NIST Election Project – Voting System Requirements

Applying VVSG 2.0 requirements to remote ballot marking systems

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Visit our website for more information: **http://civicdesign.org/projects/remote-ballot-marking/** and **https://civicdesign.org/projects/roadmap/**

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Introduction

The federal Voluntary Voting System Guidelines 2.0[1] (VVSG) requirements for usability and accessibility focus on voting activities that take place in a voting location. In the vocabulary of the VVSG, this is a context in which a voter arrives in-person at a voting station and uses a vote-capture device to mark a ballot to be cast.

This report explores how these requirements might apply to a *remote* ballot marking device in which the voter uses an electronic interface to mark their ballot. We relied research from 2015, which looked at the benefits and complexities of remote voting to develop principles and guidelines for these systems.

We use the definition from that report for a remote ballot marking system because it is not yet defined in the VVSG.

> Working Definition: Remote ballot marking system
>
> Remote ballot marking systems are systems for voters to mark their ballots outside of a voting center or polling place. These systems allow a voter to receive a blank ballot to mark electronically, print, and then cast by returning the printed ballot to the elections office.
>
> *Principles and guidelines for remote ballot marking systems, final draft March 31, 2017*

A large number of the requirements in VVSG 2.0, especially the core accessibility requirements can be used directly. Most of these requirements are derived from the federal regulation "Section 508" and the international standard, the Web Content Accessibility Guidelines 2.0 (WCAG) that is incorporated into Section 508. The VVSG includes detailed requirements to

[1] EAC Voluntary Voting System Guidelines Version 2.0
https://www.eac.gov/voting-equipment/voluntary-voting-system-guidelines

ensure that systems support voters in marking their ballot accurately and efficiently. The VVSG requirements for the display, instructions, and interaction with the ballot are already testable requirements that apply to other voting systems.

There are however, several important considerations for remote ballot marking systems, based on the nature of remote (or vote-by-mail) voting.

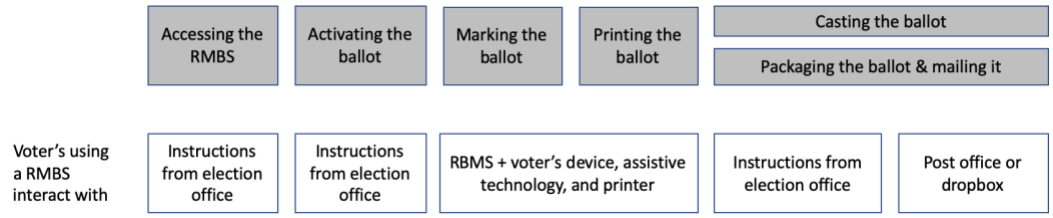
Security. Remote voting requires both security and accessibility**.** Although we have focused on the VVSG requirements in the principles for usability and accessibility for voters, security is also a critical issue in any sort of remote voting. Our goal is to identify requirements that support a voter experience within the needs of a secure and robust election administration.

Voting activities. The scope of voter activities is expanded during remote voting. Voting with a remote ballot marking system, rather at polling location, requires additional steps for voters that must be considered as part of the remote ballot marking system and meet the same accessibility requirements. Those steps may include:

- activities to request and receive the ballot
- printing the ballot on personal devices
- packing the ballot to return (perhaps with assistance)

Voters interact with additional materials during the voting process, including instructions from the elections office, tools to mark and print the ballot, and (sometimes) the US Postal Service.

Interactions during remote voting



As with any mailed-in ballot, for ballots marked using a remote ballot marking system, casting means returning the ballot to the election office, within the elections laws of a jurisdiction. Common options include putting a packaged ballot into a mailbox, using a drop box, or returning it at an election office or voting location. Each of these have implications for voter privacy and ballot secrecy.

Ballot marking location. The voter determines the voting location - and that location might be a public space such as a library, a semi-private space such as a work computer, or a private space such as a home setup. In all the locations, the assumption is that voters know how to use the equipment they are using (or have their own support).

Computer equipment used. At a polling place, the voting location device provides the assistive features (such as audio output) and hardware (for example, headsets). By contrast, with remote ballot marking, the voter chooses the context (location) and the voter's system (device plus attached peripherals) supplies the functions and hardware for accessibility. This includes:

- The device and operating system
- Input method (touch, physical keyboard, on-screen keyboard, specialized keyboard, 2-switch, 3-switch)
- Output method (visual screen, braille display, screen reader)
- Printer

A remote ballot marking system must operate similarly to a general web or software application and allow assistive technology to work correctly through correct coding and common accessibility support.

How VVSG 2.0 applies to remote ballot marking systems

In our analysis of how VVSG 2.0 requirements might apply to remote, accessible, ballot marking systems, we started by looking at the broad intent of Principles 5 - 8 and how the requirements in each principle apply to the remote ballot marking context.

We also identified new requirements from the report *Principles for remote ballot marking systems,*[2] which proposed principles for both security and accessibility of these new systems.

Principle 5 - Equivalent and consistent voter access

Both 5.1 and 5.2 apply to all voting methods.

- Some specific requirements have to be reinterpreted for the remote context, but apply in principle.

[2] Center for Civic Design, *Principles for remote ballot marking-systems* (updated March 31, 2017) https://civicdesign.org/projects/remote-ballot-marking/

- Some requirements are desirable, but may not be technically possible on all voter systems, especially the detailed audio interactions.

Principle 6 - Voter privacy

In addition to the ballot marking and return process, privacy requirements apply to the information voters must supply to receive/download ballot after being approved to vote remotely.

- The requirements in 6.1 rely in part on the hardware and design elements that help voters preserve privacy in a public voting location. Some specific requirements have to be reinterpreted for the remote context, but apply in principle.
- 6.2, voter independence without assistance, applies but it is also important to consider that voters may choose remote ballot marking because they can use their trusted assistants in a way they find appropriate. For example, the order in which ballot pages are printed can help preserve privacy.

Principle 7 - Marked, verified, and cast as intended

- Interface requirements and those derived from 508/WCAG
- Requirements having to do with the location and equipment (audio, physical controls, space/reach) may not apply in the remote context.

Principle 8 - Robust, safe, usable, and accessible

- The hardware requirements in 8.1 do not (mostly) apply to the voter computer equipment used for ballot marking.
- The general requirements in 8.1 to meet other federal accessibility laws and regulations is the key to ensuring that remote ballot marking systems are accessible and filling any gaps in the VVSG 2.0
- The need for usability testing with voters and testing documentation in 8.3 expands to cover all activities, not just marking the ballot.

Principle 2.2 – User-centered design process

- This process requirement is good practice for all election design.

Ensuring voter privacy & ballot secrecy

Compared to a poll remote ballot marking system has an extra responsibility for ensuring voter privacy and ballot secrecy even in the remote location.

Two recommendations from *Principles and guidelines for remote ballot marking systems* ensure a secret ballot by prohibiting any communication of either ballot choices or personally identifiable information (PII) over the public network. In combination, they ensure that the system does not make it possible to link voters with their ballot choices, either through the legitimate functions of the system or by hacking the communications channel.

A remote ballot marking system has an extra responsibility for ensuring voter privacy and ballot secrecy, even when communicating with a voter over a network, because it is not a closed system.

Like a polling place ballot marking system, a remote ballot marking system should allow voters to mark their ballots without any connectivity or communication with a server—in technical terms, without any packet transmission. This helps ensure ballot secrecy in a way that a fully connected system cannot.

Recommendations for several new requirements for voter privacy and ballot secrecy are adapted from the 2015 report. They include having no communication with a server once the ballot is downloaded. This helps ensure that the voter is in control of the voter while marking and returning the ballot.

New requirements for remote ballot marking systems (RBMS)

Title	Recommended requirement
RBMS-1 No linking voter and ballot choices	The remote ballot marking system must not include features or communication that can link the voter's identity to ballot selections, directly or indirectly. This includes communication with a server that includes choices and server logs that record information that can identify a voter

Title	Recommended requirement
RBMS-2 Stand-alone operation	The remote ballot marking system must not communicate any ballot choices or other voter actions to a server, or any other device outside of the control of the voter
RBMS-3 Printing	Printing instructions must include a list of the order in which pages are printed. The print order must ensure ballot secrecy. This may be achieved by one of the following methods: • Printing a title page before the ballot - this page must not include any identifying information or • Printing packaging instructions before the ballot
RBMS-4 Platforms tested	The report from 8.3-A Testing with voters, must demonstrate robustness and broad applicability by listing the equipment combinations the remote ballot marking system has been tested with including: • Hardware / device • Operating system and version • Attached peripherals
RBMS-5 Compatibility	Before the voter accesses the ballot, the remote ballot marking system must offer the opportunity to test the voter's computer system and software for compatibility. When incompatibility is discovered, • the system should identify the incompatible components to the voter. • the electronic ballot delivery system should prevent access to the ballot by voters with incompatible hardware and software. • instructions on how the voter can upgrade incompatible hardware and software should be provided. • instructions on how voter can contact the board of elections for other voting options should be provided.

Hardware display screen size requirements

Several requirements in the VVSG give physical size specifications and define ways in which the interface must adapt when text is enlarged on the screen. Those requirements are:

- **8.1-A Electronic display screens** – sets a minimum of a 12" diagonal screen for the primary voting interface
- **7.1-G Text size (electronic display**) - sets a default text size of 4.8 mm and a required range of 3.5 mm to 9.0mm
- **7.1-H Scaling and zooming (electronic display)** – matches WCAG 2.0 in prohibiting horizontal scrolling or panning when the screen is zoomed up to 200%
- **7.2-I Touch area size** – sets a minimum of 12.7 mm (0.5 inches) in both dimensions and 2.54 mm (0.1 inches) between touch areas.

Voters in a polling place have no choice of the voting systems available for use, so the VVSG requirements are aimed at providing a system that will work for all voters, allowing large enough text sizes both by default and for those using large text.

In contrast, with a remote ballot marking system, voters use their own devices and assistive technology – a setup with which they are presumably familiar and which meets their access needs. Those devices are likely to include tablets and other mobile devices in addition to laptop or desktop systems with at least a 13" monitor.

We do not have a recommendation for how remote marking systems might ensure that the display works well on personal computing equipment and provides large enough text, marking targets, and navigation. Additional research is needed to understand how voters might use a remote ballot marking system and how the accessibility and assistive technologies of their own systems might interact with such a system.

Options include:

- Restricting remote ballot marking systems to screen sizes recommended by the vendors and preventing voters from accessing the system if their device does not meet the criteria.[3]

[3] The National Federation of the Blind - Draft Electronic Ballot Delivery System Accessibility/Usability Guidelines, December 2015 includes this option in *3.2- Testing for compatibility with the voter's computer system and software.*

- Allowing remote ballot marking systems to be designed to gracefully and responsively adapt to smaller screens and show through usability testing that they meet voter accessibility needs.
- Creating specific requirements for small screens so that remote ballot marking systems used on mobile devices are comparable to well-designed election and non-election systems.

There are many current systems that can be used as research examples for the option to create specific requirements, including state online voter registration systems, existing remote accessible vote by mail systems in current use (including three products certified in California[4]) and other mobile apps for communicating with the elections office.

[4] The three system currently certified as remote accessible ballot marking systems are from Democracy Live, Five Cedars Group, and Los Angeles County's VSAP. Reports are available at: https://www.sos.ca.gov/elections/ovsta/voting-technology-vendors

Applying VVSG requirements

We analyzed each of the requirements in the VVSG to determine whether it would apply to a remote ballot marking systems. We present this analysis with the requirements grouped topically, rather than in the order they appear in the VVSG.

We found that some of the requirements can be used as written, some require either editorial adjustments or have nuances that mean they apply in some contexts, and some do not apply at all.

Requirements that do not apply

This may seem like an unusual starting point, but starting with the group of requirements that are specific to either the location and physical context or the equipment used to mark the ballot removes 20 requirements from consideration.

The requirements don't apply because the voter provides the **location and physical arrangement** are:

- 6.1-D Audio privacy
- 7.2-P Floor space
- 7.2-Q Physical dimensions
- 8.1-K Eliminating hazards

The requirements don't apply because the voter provides the **device, attached peripherals, and assistive technology** are:

- 7.1-N Tactile keys
- 7.1-O Toggle keys
- 7.2-K Key operability
- 7.2-L Bodily contact
- 7.2-R Control labels visible
- 8.1-A Electronic display screens
- 8.1-C Personal assistive technology (PAT)
- 8.1-E Standard audio connectors
- 8.1-F Discernable audio jacks
- 8.1-G Telephone style handset

- 8.1-H Sanitized headphones
- 8.1-I Standard PAT jacks
- 8.1-J Hearing aids

The requirements don't apply because **the setting is remote rather than at a voting location** and the voter casts the ballot indirectly by mailing or dropping it off are:

- 7.3-J Notification of casting[5]
- 7.3-O Instructions for election workers
- 8.4-A Usability testing with election workers

General accessibility

A number of requirements address accessibility for a wide range of voters.

The following guidelines apply as written:

- 5.1-A Interaction modes
- 5.1-F Accessibility documentation
- 6.2-A Voter independence
- 7.2-A Display and interaction options
- 7.2-D Scrolling
- 8.1-B Flashing
- 8.1-D Secondary ID and biometrics
- 8.2-A Federal standards for accessibility

Requirements for user interface design

These requirements apply user interface principles to a digital ballot interface. This is the largest group and has the biggest effect on the usability and accessibility of the remote ballot marking system

[5] It would be possible to require a ballot tracking system so that voters were informed of whether their vote had been successfully cast, but this is a policy issue and beyond the scope of this analysis, as are policies that allow voters to correct some errors on their ballot envelope that would prevent it from being counted.

The following guidelines **apply as written**:

- 7.1-E Color conventions
- 7.1-F Using color
- 7.1-I Text size (paper)
- 7.1-J Sans-serif font
- 7.2-E Touch gestures
- 7.2-I Touch area size
- 7.2-M No repetitive activation
- 7.2-N System response time
- 7.3-A System-related errors
- 7.3-P Plain language

The following guidelines have adjustments because the voter provides the device, attached peripherals, assistive technology, and printer.

VVSG requirement	Adjustment needed for it to apply to RBMS
7.1-P Identifying controls	Applies as written with these adjustments: • Remove first paragraph
7.2-F Voter speech	Applies as written with these adjustments: • Remove #1
7.2-H Accidental activation	Re-write for RBM context "The user interface implementation of the RMBS must be designed to prevent accidental activation"
7.3-L Icons labels	Applies as written with these adjustments: • Remove 2nd paragraph

The following guidelines have adjustments because the **setting is remote** (no election staff present) and there are **additional steps in the process**.

VVSG requirement	Adjustment needed for it to apply to RBMS
7.2-O Inactivity alerts	Applies as written with these adjustments: • Remove #4 Add this clause (or updated the current text) • "The voting system clears selections made and returns to the start screen"
7.3-N Instructions for voters	Applies as written with these adjustments: • Replace #2 with: "The voting system must include clear, complete, and detailed instructions and messages for: • Accessing the ballot • Activation (pulling up the appropriate ballot) • Marking • Reviewing and making changes, • Printing the ballot • Casting the ballot (packaging the printed ballot for delivery to the election office) • How to use accessibility features"

Election requirements

These requirements ensure that systems support voters in marking their ballot accurately and efficiently.

The following guidelines apply as written:

- 5.2-A No bias
- 5.2-C All information in all modes
- 6.1-A Preserving privacy for voters
- 6.1-B Warnings
- 7.2-B Navigation between contests
- 7.2-C Voter control
- 7.2-J Paper ballot target areas
- 7.3-B No split contests
- 7.3-D Consistent relationship

- 7.3-E Feedback
- 7.3-F Correcting the ballot

The guidelines below have minor changes because the **ballot scanning will happen at the election office**, not the voter's location

VVSG requirement	Adjustment needed for it to apply to RBMS
7.3-G Full ballot selections review	Applies with these adjustments: • Remove the last paragraph
7.3-H Overvotes	Applies with these adjustments: • Remove #2
7.3-I Undervotes	Applies with these adjustments: • Remove "and scanners" from #1 • Remove #2

Election administration

These requirements ensure that election officials have what they need to conduct audits. The remote location does not mean that the remote ballot marking system does not have to meet these requirements.

The guideline below applies as written:

- 5.1-C Vote records

The guideline below applies with a modification due to the **remote location** and **the voter's use of their own hardware and assistive technology**

VVSG requirement	Adjustment needed for it to apply to RBMS
5.1-E Reading paper ballots	Re-write for RBMS context "If the voting system generates a paper record (or some other durable, human-readable

VVSG requirement	Adjustment needed for it to apply to RBMS
	record) that can be the official ballot or determinative vote record, then the voting system must allow the voter to verify the paper record by visual inspection or using personal assistive technology such as magnifiers, or OCR."

Voter options and preferences

These requirements are for settings that provide the voter with the means to adjust how information is displayed

The guidelines below apply as written:

- 7.1-A Reset to default settings
- 7.1-B Reset by voter
- 7.1-H Scaling and zooming (electronic display)

The guidelines below apply with modifications because the voter is supplying **the hardware, assistive technology, and the printer:**

VVSG requirement	Adjustment needed for it to apply to RBMS
5.1-D Accessibility features	Re-write for RBMS context "Accessibility features must be supported by all of the functions provided by the RBMS throughout the voting session including any steps to access and activate the ballot, ballot marking, verification, and casting"
5.2-F Preserving votes	Applies as written with these adjustments: • Remove paragraph #1
7.1-C Default contrast	Applies as written with these adjustments:

VVSG requirement	Adjustment needed for it to apply to RBMS
	• Remove #2
7.1-D Contrast options	Applies as written with this added paragraph: • "The voting system must not override user-specified style sheets"
7.1-G Text size (electronic display)	Applies as written with these adjustments: Replace the first paragraph with this text: • "A RBMS must offer a range of text sizes that voters can select from, allowing voters to both increase and decrease the text size."

Audio

Audio can be provided in two ways, by playing a sound file or using text-to-speech technology. Screen readers and text-to-speech browser extensions all use text-to-speech.

Security and privacy requirements for voting mean that once ballot marking has commenced, no packets of information should be transmitted to or from devices not under the voter's control. As a result, the marking functions of a remote ballot marking system needs to be self-contained; not rely on or use an internet connection.

The VVSG includes several requirements to provide audio equivalents to all visually presented information. How those requirements apply, as written, or with modifications, depends on whether the remote marking system is supplying audio through sound files or the voter's text-to-speech assistive technology.

If the remote marking system provides audio

When the remote ballot marking system is supplying the audio files then the system needs to meet the requirements around speech frequencies, rate of speech, coordinated sounds cues, and so on.

When the remote ballot marking system provides audio, these requirements apply as written:

- 5.2-D Audio synchronized
- 5.2-E Sound cues
- 6.1-C Enabling or disabling output
- 7.1-K Audio settings
- 7.1-L Speech frequencies
- 7.1-M Audio comprehension
- 7.2-G Voter control of audio
- 7.3-C Contest information
- 7.3-K Warnings, alerts, and instructions

If the remote system also supports other languages, these requirements also apply:

- 5.1-B Languages
- 5.2-B Presenting content in all languages

If the voter equipment or assistive technology provides audio

When audio is provided by the voter's equipment (the computing device, attached peripherals, assistive technology) some requirements don't apply and some requirements apply with minor modifications:

The requirements below don't apply because the audio is produced by the voter's assistive technology, which manages settings, speed, and timing.

- 5.2-D Audio synchronized
- 5.2-E Sound cues
- 6.1-C Enabling or disabling output
- 7.1-K Audio settings
- 7.1-L Speech frequencies
- 7.1-M Audio comprehension
- 7.2-G Voter control of audio
- 7.3-K Warnings, alerts, and instructions

Given the reliance on the voter's assistive technology, it is important to add a requirement to ensure that the remote ballot marking system is compatible with assistive technology.

New RBMS requirement

Title	Recommended requirement
RBMS-7 Support assistive technology	The system must be designed to support the normal functioning of assistive technology with correct coding and common accessibility support.

When the voter's hardware and assistive technology is supplying the means of producing audio, not the remote ballot marking system, these requirements apply with minor modifications to address the audio-specific clauses:

VVSG requirement	Adjustment needed for it to apply to RBMS
7.3-C Contest information	Applies as written with this addition: "7. Information audio must be presented to personal devices or assistive technologies, coded so it appears in the required order and format."
7.3-K Warnings, alerts, and instructions	Applies as written with these adjustments: "Warning, alerts, and instructions issued by the voting system must be distinguishable from other information. 1. Warnings and alerts must clearly state in plain language: • the nature of the problem, • whether the voter has performed or attempted an invalid operation or whether the voting system itself has malfunctioned in some way, and • the responses available to the voter. 2. Each distinct instruction must be separated from others: • spatially in a visual presentation, • with pauses based on standard punctuation for audio formats.

Languages other than English

Providing other languages in a voting system is not required. What is required is that when other languages are provided, they are fully supported - with the entire user interface changing language.

These requirements apply as written:

- 5.1-B Languages
- 5.2-B Presenting content in all languages
- 7.3-M Identifying languages

There is an additional consideration for remote ballot marking systems which is the RBMS-specific requirements around security (see section Remote ballot marking requires both security and accessibility). It limits the remote ballot marking system to operating without sending and receiving packets of information over the internet.

So although a voting system is required to allow a voter to change languages at any time while using the voting system, that is not necessarily required for a remote ballot marking system.

A remote ballot marking system that supports other languages, might have the voter choose the language upfront, when initially accessing the system, and restart, if the voter wants to change languages..

User centered design and testing

All voting systems must ensure that voting systems have good usability and accessibility.

These requirements apply as written:

- 2.2-A User-centered design process
- 8.3-A Usability testing with voters

This requirement (8.3-A) has adjustments due to increased complexity of what is being tested. Fully documenting the test setting will necessarily include a listing of what hardware, attached peripherals, and assistive technology was used.

VVSG requirement	Adjustment needed for it to apply to RBMS
8.3-A – Usability tests with voters	Re-write for RMBS context: "The manufacturer must conduct usability tests on the voting system, including all voter activities in a voter session from ballot activation to verification and casting. 1. The test participants must include voters who represent the following: ● General population ● Voters who speak all supported languages as their primary language ● Blind voters ● Voters with low vision ● Voters with limited dexterity 2. The manufacturer must submit a report of the results of their usability tests, including effectiveness, efficiency, and satisfaction measures, as part of the Technical Data Package (TDP) using the version of the Common Industry Format modified for voting systems (CIF-for-Voting Systems). 3. Testing conditions must simulate using a remote marking ballot system, particularly allowing test participants to use their own device, attached peripherals, assistive technology, and printer. 4. Testing conditions must include technology commonly used by individuals with disabilities at the time of the testing, and shall include, but not be limited to, screen reading software, screen magnification software, refreshable Braille displays, keyboard only, and voice recognition 5. Testing protocols must include the steps to access and activate the ballot and the steps to print and package the ballot for return to the elections office.

VVSG cross-reference

This section lists the VVSG organized in the usual manner (by principle) and collects new requirements into a summary list.

VVSG requirement	RBMS applicability	Section in this document
Principle 2		
2.2-A User-centered design process	Applies as written	User centered design
Principle 5.1		
5.1-A Interaction modes	Applies as written	General accessibility
5.1-B Languages	Applies when RBMS is supplying other languages	Languages
5.1-C Vote records	Applies as written	Election administration
5.1-D Accessibility features	Applies with adjustments	Voter options & preferences
5.1-E Reading paper ballots	Applies with adjustments	Election requirements
5.1-F Accessibility documentation	Applies as written	General accessibility
Principle 5.2		
5.2-A No bias	Applies as written	Election requirements
5.2-B Presenting content in all languages	Applies when RBMS is supplying other languages	Languages
5.2-C All information in all modes	Applies as written	Election requirements
5.2-D Audio synchronized	Applies as written if the RMBS supplies audio Doesn't apply if voter's equipment supplies audio	Audio

VVSG requirement	RBMS applicability	Section in this document
5.2-E Sound cues	Applies as written if the RMBS supplies audio Doesn't apply if voter's equipment supplies audio	Audio
5.2-F Preserving votes	Applies with adjustments	Voter options & preferences
Principle 6.1		
6.1-A Preserving privacy for voters	Applies as written	Election requirements
6.1-B Warnings	Applies as written	Election requirements
6.1-C Enabling or disabling output	Applies as written if the RMBS supplies audio Doesn't apply if voter's equipment supplies audio	Audio
6.1-D Audio privacy	Doesn't apply	NA
Principle 6.2		
6.2-A Voter independence	Applies as written	General accessibility
Principle 7.1		
7.1-A Reset to default settings	Applies as written	Voter options & preferences
7.1-B Reset by voter	Applies as written	Voter options & preferences
7.1-C Default contrast	Applies with adjustments	Voter options & preferences
7.1-D Contrast options	Applies with adjustments	Voter options & preferences
7.1-E Color conventions	Applies as written	User interface
7.1-F Using color	Applies as written	User interface
7.1-G Text size (electronic display)	Applies with adjustments	Voter options & preferences See hardware note

VVSG requirement	RBMS applicability	Section in this document
7.1-H Scaling and zooming (electronic display)	Applies as written	Voter options & preferences See hardware note
7.1-I Text size (paper)	Applies as written	User interface
7.1-J Sans-serif font	Applies as written	User interface
7.1-K Audio settings	Applies as written if the RMBS supplies audio Doesn't apply if voter's equipment supplies audio	Audio
7.1-L Speech frequencies	Applies as written if the RMBS supplies audio Doesn't apply if voter's equipment supplies audio	Audio
7.1-M Audio comprehension	Applies as written if the RMBS supplies audio Doesn't apply if voter's equipment supplies audio	Audio
7.1-N Tactile keys	Doesn't apply	NA
7.1-O Toggle keys	Doesn't apply	NA
7.1-P Identifying controls	Applies with adjustments (see User interface design for good usability)	User interface
Principle 7.2		
7.2-A Display and interaction options	Applies as written	General accessibility
7.2-B Navigation between contests	Applies as written	Election requirements
7.2-C Voter control	Applies as written	Election requirements
7.2-D Scrolling	Applies as written	General accessibility

VVSG requirement	RBMS applicability	Section in this document
7.2-E Touch gestures	Applies as written	User interface
7.2-F Voter speech	Applies with adjustments	User interface
7.2-G Voter control of audio	Applies as written if the RMBS supplies audio Doesn't apply if voter's equipment supplies audio	Audio
7.2-H Accidental activation	Applies with adjustments	User interface
7.2-I Touch area size	Applies as written	User interface See hardware note
7.2-J Paper ballot target areas	Applies as written	Election requirements
7.2-K Key operability	Doesn't apply	NA
7.2-L Bodily contact	Doesn't apply	NA
7.2-M No repetitive activation	Applies as written	User interface
7.2-N System response time	Applies as written	User interface
7.2-O Inactivity alerts	Applies with adjustments (see User interface design for good usability)	User interface
7.2-P Floor space	Doesn't apply	NA
7.2-Q Physical dimensions	Doesn't apply	NA
7.2-R Control labels visible	Doesn't apply	NA
Principle 7.3		
7.3-A System-related errors	Applies as written	User interface
7.3-B No split contests	Applies as written	Election requirements

VVSG requirement	RBMS applicability	Section in this document
7.3-C Contest information	Applies as written if the RMBS supplies audio	Audio
7.3-D Consistent relationship	Applies as written	Election requirements
7.3-E Feedback	Applies as written	Election requirements
7-3-F Correcting the ballot	Applies as written	Election requirements
7.3-G Full ballot selections review	Applies with adjustments (see Election requirements)	Election requirements
7.3-H Overvotes	Applies with adjustments (see Election requirements)	Election requirements
7.3-I Undervotes	Applies with adjustments (see Election requirements)	Election requirements
7.3-J Notification of casting	Doesn't apply	NA
7.3-K Warnings, alerts, and instructions	Applies as written if the RMBS supplies audio Doesn't apply if voter's equipment supplies audio	Audio
7.3-L Icons labels	Applies with adjustments (see User interface design for good usability)	User interface
7.3-M Identifying languages	Applies as written	Languages
7.3-N Instructions for voters	Applies with adjustments	User interface
7.3-O Instructions for election workers	Doesn't apply	NA
7.3-P Plain language	Applies as written	User interface
Principle 8.1		

VVSG requirement	RBMS applicability	Section in this document
8.1-A Electronic display screens	Doesn't apply	NA See hardware note
8.1-B Flashing	Applies as written	General accessibility
8.1-C Personal assistive technology (PAT)	Doesn't apply	NA
8.1-D Secondary ID and biometrics	Applies as written	General accessibility
8.1-E Standard audio connectors	Doesn't apply	NA
8.1-F Discernable audio jacks	Doesn't apply	NA
8.1-G Telephone style handset	Doesn't apply	NA
8.1-H Sanitized headphones	Doesn't apply	NA
8.1-I Standard PAT jacks	Doesn't apply	NA
8.1-J Hearing aids	Doesn't apply	NA
8.1-K Eliminating hazards	Doesn't apply	NA
Principle 8.2, 8.3, 8.4		
8.2-A Federal standards for accessibility	Applies as written	General accessibility
8.3-A Usability testing with voters	Applies with adjustments	User centered design
8.4-A Usability testing with election workers	Doesn't apply	NA

References

California Secretary of State (nd) Voting Technology Vendors https://www.sos.ca.gov/elections/ovsta/voting-technology-vendors

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U.S. Election Administration Commission (2021). Voluntary Voting System Guidelines 2.0. https://www.eac.gov/voting-equipment/voluntary-voting-system-guidelines