

Commonwealth of Massachusetts
Information Technology Division

Enterprise Web Accessibility Standards
Version 2.0
Published 1/20/05

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About Web Accessibility Standards Version 2.0

Version 2.0 of the Web Accessibility Standards updates version 1.0, addressing Federal accessibility standards for the Internet and intranet, and for web-based applications. Version 2.0 is in effect as of the published date of these standards. Executive Department agencies must comply with these standards. Non-Executive Department agencies that have their sites integrated with the Mass.Gov portal must also comply. Other agencies are strongly encouraged to adhere to these standards.

Major revisions to the document are listed in the following table.

Topic	Standard or Section	Change
Standards benchmark	Introduction and Scope	Added the Federal accessibility standards as a benchmark
HTML markup	Standard 1.1	Added HTML markup requirements that are directly related to accessibility
Forms	Standard 1.5	Added a new standard requiring accessible forms
Timed responses	Standard 1.6	Added a new standard requiring that, for timed responses, users be given the option to request additional time
Navigation	Standard 2.1	Added information about skipping navigation
Text equivalents for non-text elements	Standard 3.1	Provided examples of alternative text that is screen-reader friendly
Image optimization	Standard 3.5 (in version 1.0)	Combined this standard with Standard 5.1
Image maps	Standard 3.6	Added a new standard requiring the use of client-side image maps, when possible.
Content requiring additional software	Standard 4.1	Provided more guidance on options and on the creation and use of PDFs
Compressed files	Standard 4.2	Moved Standard 5.2 to Section 4
File optimization	Standard 5.1	Revised the standard to provide more guidance
Web accessibility statement	Section 6	Added a new section and standard requiring an agency web accessibility statement
Web Site validation	Section 7	Added a new section and standard requiring validation of agency web sites for accessibility compliance
Web-based application accessibility standards	Section 8	Added a new section and standards for web-based applications based on Section 508 requirements
Glossary	—	Deleted the glossary, moving some definitions with the related text and referring to the glossary tools on ITD's web site

Topic	Standard or Section	Change
Sample web accessibility statement	Appendix A	Added a sample web accessibility statement
Checklist	Appendix B	Revised the checklist to reflect the changes to the Standards
Related standards (Massachusetts, Federal, and W3C WCAG)	Appendix C	Added a table showing the relationship between Massachusetts standards and other standards and guidelines

Introduction and Scope

The purpose of the Web Accessibility Standards is to ensure access to state web pages for everyone. The scope of these standards encompasses more than compliance with the Americans with Disabilities Act (ADA) and other statutes that call for accessible technology for people with disabilities.¹ The standards also address access issues for people using different technologies, including older technologies (slower Internet connections, for example) and newer technologies (mobile devices, for example), as well as issues of computer literacy.

These standards apply to external and internal agency web sites, and web-based applications. The audiences for this document are agency heads, webmasters, web content providers, application developers, and vendors or contractors doing web and application development for agency sites. These groups are jointly responsible for ensuring that agency web sites are accessible.

These standards were developed by the Information Technology Division (ITD) with the participation of state web page developers, including developers with disabilities. They are intended for use by all state agencies and their contractors to address accessibility issues in web page design and application development. These standards are based on the following laws and regulations. It should be noted that these standards apply to all web sites maintained by Executive Department agencies, whether or not those sites and those agencies are subject to these laws:

- Federal Government:
 - o Section 504 of the Rehabilitation Act, 42 U.S.C. §2000d (<http://www.section508.gov/index.cfm?FuseAction=Content&ID=15>), which applies to all state agencies, and its implementing regulations (for example, 42 C.F.R. §84).
 - o Section 508 of the Rehabilitation Act, 29 U.S.C. §794d (<http://www.section508.gov/index.cfm?FuseAction=Content&ID=12>) and its implementing regulations, 36 C.F.R. §1194.22 (Web-based intranet and internet information and applications) and 36 C.F.R. §1194.21 (Software applications and operating systems). Although Section 508 of the Rehabilitation Act does not apply to Executive Department agencies, the Commonwealth has chosen to base its web accessibility standards on the standards included in Section 508.
- State Government:

¹ Accessibility of web sites raises issues under the Americans with Disabilities Act, the Telecommunications Act, the Rehabilitation Act, and other federal and state laws.

- o Mass. Gen. L. ch. 151B, which prohibits discrimination against the handicapped in connection with housing and employment, and Ch. 272 sections 98 and 98A, which prohibit discrimination in public accommodations against persons with disabilities. All of these statutes apply to all state agencies.

These standards are also based on the World Wide Web Consortium's (W3C) Web Content Accessibility Guidelines (WCAG) 1.0 (<http://www.w3.org/TR/WAI-WEBCONTENT>)

Each Section 508 standard and W3C accessibility guideline was evaluated for applicability to the Commonwealth's environment and modified where necessary to address the Commonwealth's particular requirements. The standards and guidelines were also reviewed to ensure that they can be implemented using currently available technologies and for compatibility with other Commonwealth policies and standards.

These standards encompass the minimum requirements needed for a state agency to ensure accessibility of its web site under all foregoing laws and the W3C guidelines. All Executive Department web pages developed subsequent to the published date of these standards must incorporate these minimum requirements into their design. As existing web pages are updated, agencies must ensure that the updated pages also meet these requirements. These standards represent a floor, not a ceiling for accessibility: agencies can supplement these standards with their own web publishing guidelines that set higher standards for their own agency.

It is important to note that, for a web site to be accessible under the statutes and regulations referenced above, it cannot simply have a second text-based page with redundant information. This is the least desirable alternative. State agencies must ensure that the functionality provided in the inaccessible site has a fully equivalent alternative in the accessible site. A delay in response or receipt of information due to this alternative page may place the agency in violation of Federal or state disability statutes, such as the Americans with Disabilities Act, which can pose serious legal risks to the agency.

Please note that these standards address most accessibility issues. They do not address accessibility of Graphic Information System (GIS) maps and other complicated images.

The standards are grouped in functional categories. Accompanying each standard is:

- A brief summary of why the standard is necessary
- An explanation of what the standard means and options for implementation

Standards that apply to web-based applications are in a separate section, grouped in functional categories.

Included in appendices at the end of the document are:

- Sample text for an agency web accessibility statement
- Checklist that summarize the standards
- Table that relates these standards to other Massachusetts standards, Federal Section 508 Standards, and the World Wide Web Consortium Content Accessibility Guidelines (WCAG) (version 1.0)

- Many of the terms used in this document are defined in the document itself. Refer to ITD's Policies and Standards page to obtain definitions of unfamiliar technical terms, as well as definitions of terms particular to the Commonwealth:
 - o ITD's Policies and Standards page: <http://www.mass.gov/itd/spg/publications/standards/>

Refer to the Mass.Gov Portal Services (<http://www.mass.gov/portalservices>) for a list of key resources on accessibility techniques developed by the workgroup.

Section 1. Layout and Design

Standard 1.1: A state agency web page must use HTML markup tags according to industry standards.

Why the standard is needed: The use of HTML tags (headings, lists, blockquotes, tables, for example) is currently the *de facto* method to achieve desired formatting effects on a web page. However, using HTML tags for presentation effect relies on how a particular version of a particular browser interprets the tags being used.² If tags are misused, the browser may interpret the tags in a manner unforeseen by the web developer, making it difficult for the user to understand the organization of a page or hindering navigation.

What the standard means: When an appropriate markup language exists, web developers should use the officially sanctioned tags as established by the World Wide Web Consortium (W3C) (<http://www.w3.org>) to promote consistency and accessibility across all web sites. This means that state agencies must:

- Avoid the misuse of tags to convey formatting.
- Avoid using images to represent text — use text and style sheets instead. (Refer to Section 3, Graphics and Sound, for more information.)
- Only use tables for layout as long as the screen readers can correctly translate the information for users who cannot see a screen. It is important to note that screen readers read the information contained in a table across the rows as opposed to down the columns. Please note that if a table cannot be read with a screen reader, the web page is not accessible under the statutes referenced in Footnote 1 above.
- For data tables:
 - o Identify column and row headers appropriately (using the `th` tag).
 - o Associate table cells with the appropriate headers (for example, with the `scope` attribute).
- For validation purposes, all web pages must identify the markup language and version type in a document type declaration (DOCTYPE) statement.

Example:

```
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.01 Transitional//EN">
```

² The current version of the Enterprise Technical Reference Model: Service Oriented Architecture identifies the browsers and minimum versions supported in the Commonwealth.

The document type declaration statement informs the validator which version of HTML, XHTML, or XML the web developer is using. DOCTYPEs are a key component of compliant web pages: the markup and style sheet will not validate without them.

- Identify changes in the natural language of a document's text and any text equivalents (captions, for example) to assist screen readers and search engines.

Standard 1.2: A state agency web page should control presentation with style sheets, but the web pages must be organized so they are readable without requiring an associated style sheet.

A *style sheet* or *cascading style sheet (CSS)* is a set of statements that specify presentation of a document.

Why the standard is needed: It is recommended that web developers use style sheets whenever possible because they enhance accessibility by more precisely controlling layout and appearance of a web page and allow quicker download of pages. When used in conjunction with the other accessibility standards, style sheets make web pages easier to follow for users with disabilities, as well as the general public.

What the standard means:

- State agencies should work towards integrating Cascading Style Sheets (CSS) to achieve desired formatting effects on all state web pages.
- If style sheets are used, state agencies must organize content logically so the page's content will be rendered in a meaningful order when style sheets are overridden, turned off, or not supported.

Standard 1.3: A state agency web page should avoid using frames.

Why the standard is needed: It is strongly recommended that agencies *avoid* using frames for several reasons:

- It is difficult for people with cognitive or visual disabilities to interpret web pages built with frames.
- The use of frames requires greater technical expertise to maintain.
- Frames are difficult for the user to print.
- The major search engines do not index sites using frames.
- In many cases, the layout features of frames can be easily replicated by using tables or style sheets.
- The possibility of frame spoofing exists. (This means that unauthorized parties can post information in a frame bearing the name and logo of a state agency without the user realizing that they are not looking at official state agency information.)

What the standard means:

1. A state agency should avoid using frames whenever possible.

2. If an agency has a legitimate business need that requires the use of frames, the agency must ensure that the following points are addressed:
 - o Users should not be required to install a frame-enabled browser to view the information in a frame. Navigation options must be available when frames are turned off.
 - o Each frame must have a title to facilitate frame identification and navigation.
 - o The purpose of frames and how frames relate to each other must be provided, if it is not obvious using frame titles alone.

Standard 1.4: State agencies must ensure that their web pages are usable when scripts, applets, or other programmed objects are turned off or are not supported.

Why the standard is needed:

- Web pages need to be accessible by different types of assistive technologies. Text readers do not always support scripts and other programmed objects, which means that pages that use scripts are inaccessible.
- Although web developers are encouraged to use new technologies to solve problems that are not addressed very well by existing technologies, they should make their pages work with older browsers and for users who have turned off scripting.
- Navigation links that are written in a scripting language without an HTML alternative will not be indexed by search engines.

What the standard means:

- Information within the scripts is text-based, or a text alternative is provided within the script itself.
- All scripts are either directly accessible to assistive technology (usually keyboard access), or an alternate method of accessing equivalent functionality is provided (an HTML link, for example).
- If a legitimate business need exists to use programmed objects, a state agency web page must provide a text equivalent (by using the `NOSCRIPT` element in the HTML coding).

Standard 1.5: Forms designed to be completed online, and other interactive interface elements, must be accessible by people using assistive technology.

Why the standard is needed: Correctly designed forms allow people using assistive technology to access the information, field elements, and functionality required for completion and submission of the form.

What the standard means:

- All form controls have text labels adjacent to them.
- Form elements have labels associated with them in the markup.

- Dynamic HTML scripting of the form does not interfere with assistive technologies.

Standard 1.6: When a timed response is required, the user must be provided the opportunity to request additional time to continue working before the time-out occurs.

Why the standard is needed: A user's disability can have a direct impact on the speed with which he or she can read, move around, or enter information. A page may "time out" before the user is able to finish reading it. Many forms, when they "time out" automatically, also delete whatever data has been entered. The result is that someone with a disability who enters data slowly cannot complete the form.

What the standard means: When a timed response is required, the user must be alerted via a prompt and given sufficient time to indicate whether additional time is needed.

Section 2. Navigation

Standard 2.1: A state agency web page must use clear and consistent navigation mechanisms.

A *navigation mechanism* is any means by which a user can navigate a web page or web site (for example, navigation bar, site map, or table of contents).

Why the standard is needed: A consistent style of presentation on each page allows users to locate important content and to skip navigation mechanisms, if desired. This not only helps users with learning disabilities, but also makes navigation easier for all users. Predictability will increase the likelihood that users will find information at a site or avoid it when they so desire.

What the standard means:

- Users of the web site must be able to identify at all times where they are on the site, even if they reached the current page directly by using a search engine.
- A link to the home page, and preferably some kind of consistent site navigation, should be included on every page of the web site.
- Navigation mechanisms should appear in the same location and work the same way on every page of an agency web site.
- Agency web pages must provide links that allow people using assistive technology to skip repetitive navigational menus or other lengthy lists of links.

Example:

```
<a href="#skipnav" title="Skip to main content.">Skip to main
content</a>

... [Navigational links] ...

<a name="skipnav" id="skipnav">
```

... [Main page content] ...

Standard 2.2: A state agency must ensure that users are able to interact with web page elements in a device independent manner.

Why the standard is needed: When an interactive element can only be activated with a mouse or other pointing device, the element is inaccessible to a person who is using voice input, a keyboard, or other non-pointing input device. This is problematic for users with various types of disabilities such as blindness, quadriplegia, and arthritis, and also for users of some new technologies (mobile technologies, for example).

What the standard means:

- All actions that can be identified or labeled with text must be executable from a keyboard.
- Web pages do not have to support every input or output device, but they must, at a minimum, support mouse and keyboard input. A page designed for keyboard access in addition to mouse access will generally be accessible to users with other input devices (such as pointing devices, Braille devices, head wands, and microphones) and output devices (such as speech synthesizers and Braille devices).
- Web developers must not use event handlers or action handlers that rely solely on using the mouse or that prevent the use of keyboard-only navigation.

Section 3. Graphics and Sound

Standard 3.1: A state agency web page must provide a text equivalent for every non-text element.

Why the standard is needed: Graphics can be useful and attractive enhancements to a web page. However, when graphics are used, text equivalents must be provided so that information is also accessible to people from various disability groups using a variety of technologies. Text display is essential to make web pages available to people using assistive technology and also to enhance usability.

What the standard means:

- For every image on a state agency web page, an `alt` attribute in the image tag must be used. The `alt` text must sufficiently describe the image so that a person unable to see the image can understand the content and meaning for its use. The term *image* in this standard includes elements such as pictures, graphical representations of text (including symbols), image map regions, animations (animated GIFs, for example), graphic list bullets, spacers, and graphical buttons.

A good test to determine if a text equivalent is useful is to imagine reading the document aloud over the telephone. What would you say upon encountering this image to make the page comprehensible to the listener?

Examples:

- o Mass.Gov logo and State House image:
 - If used as a link to the home page, the `alt` text could be “Link to Mass.Gov home page” or simply “Mass.Gov home page” (since screen readers generally indicate that the image has a link, or the user is tabbing through the links on the web page and will know that it is a link).
 - If not used as a link, the `alt` text could be “Mass.Gov Logo and State House Image.”
- o If images are used for the bullets in a list, the `alt` text for each bullet could be “bullet.”
- o If an image should be ignored by the screen reader (for example, a spacer image that controls page layout only), the `alt` text must be "" (quote-quote with no space).
- For complex content, where the `alt` text does not provide a complete text equivalent, provide additional description using, for example, the `longdesc` element or a link to a page explaining the content.

Standard 3.2: A state agency web page must provide synchronized auditory and readable text descriptions of the important information of the visual track of a multimedia presentation.

Why the standard is needed: Providing non-text equivalents (pictures, videos, and pre-recorded audio, for example) of text are beneficial to some users, especially nonreaders or users who have difficulty reading. In movies or visual presentations, visual action such as body language or other visual cues may not be accompanied by enough audio information to convey the same information. Unless verbal descriptions of this visual information are provided, people who cannot see or interpret the visual content will miss that part of the presentation.

What the standard means: Where streaming video has been approved for use, a state agency must adhere to the following:

- Provide an auditory and a readable text (captioned) description of the important visual information of the visual track of a multimedia presentation. This means that a state agency must provide descriptive audio and captioning for any streaming video on a state agency web page. The descriptive audio must be user-controlled: the user must be able to initiate and terminate the audio. However, if there is no important visual information (for example, an animated “talking head” that describes through prerecorded speech how to use the site), then only a brief notation that the video is present is required along with a transcript.
- For streaming video, effectively communicate the content, typically by providing auditory descriptions that are synchronized with the original audio.

Example: Below is how an excerpt from a clip from *The Lion King* would appear as readable text. Note that the Describer is providing the auditory description of the video track and that the description has been integrated into the transcript.

Simba: Yeah!

Describer: Simba races outside, followed by his parents. Sarabi smiles and nudges Simba gently toward his father. The two sit side-by-side, watching the golden sunrise.

Mufasa: Look Simba, everything the light touches is our kingdom.

Simba: Wow.

Standard 3.3: A state agency web page must provide a text equivalent for information provided in audio format.

Why the standard is needed: Users who are hearing impaired need a text transcript of any information provided in audio format.

What the standard means:

Where streaming audio has been approved for use, a state agency can use streaming audio on web pages, but must also:

- Provide a text equivalent, such as a transcript, for the information provided in audio format.
- Ensure the audio message is user-controlled: the user must be able to initiate and terminate the audio.

Example: If a state agency web page provides a link to an audio broadcast of a speech, the content of the speech must also be provided in text format.

Standard 3.4: A state agency web page that uses motion must ensure that the motion is integral to the content of the site, user-controlled, and limited to three cycles and then stopped automatically.

Why the standard is needed: State agencies are strongly discouraged from using motion (animated graphics, blinking text, scrolling banners, and auto-updating objects and pages) on a state agency web page for several reasons:

- People with photosensitive epilepsy can have seizures triggered by flickering or flashing in the 2 to 55 flashes per second (Hertz) range with a peak sensitivity at 20 flashes per second as well as quick changes from dark to light (like strobe lights).
- Some people with cognitive or visual disabilities are unable to read moving text quickly enough or at all.
- Movement can also cause such a distraction that the rest of the page becomes unreadable for people with cognitive disabilities.
- Screen readers are unable to read moving text.
- Some people with physical disabilities cannot move quickly or accurately enough to interact with moving objects.

What the standard means:

1. A state agency should avoid using motion on its web pages whenever possible.
2. If a legitimate business need exists, a state agency can use motion, but must also ensure that:
 - o The motion is integral to the content of the site. This means the site would not convey the same information if the image were not moving.

- o The motion is user-controlled. This means that the user must have a mechanism for initiating and freezing this motion.
- o The motion is limited to three cycles and then stopped automatically.
- o A text description must be provided to ensure that visually impaired users have access to the same information.

Example: A web page explaining how to make rope knots might have a legitimate need to display how the knot is tied using an animated graphic. However, the animation should begin when the user chooses to activate the motion by selecting it. The user must be able to end the motion. A text description explaining how to make rope knots must also be provided.

Standard 3.5: A state agency must ensure that the use and selection of color do not affect the information conveyed on a page.

Why the standard is needed: If color alone is used to convey information, users who cannot differentiate between certain colors and users with devices that have non-color or non-visual displays will not receive the information. When foreground and background colors are too close to the same hue or luminosity, the colors may not provide sufficient contrast when viewed using monochrome displays or by people with color blindness.

What the standard means:

- A state agency must ensure that all information conveyed with color alone is also available without color.
- A state agency must ensure that foreground and background color combinations provide strong contrast.

Example: An air quality report that uses a red bar to indicate an alert level must also include that information in text.

Standard 3.6: Client-side image maps are recommended. If server-side image maps must be used, provide redundant text links for each active region.

An *image map* is an image that has been divided into regions with associated actions.

Why the standard is needed: When a server-side image map presents the user with a selection of options, browsers cannot indicate to the user the URL that will be followed when a region of the map is activated. Therefore, a redundant text link is necessary to provide access to the page for anyone not able to see or accurately click on the image map.

What the standard means:

1. Use client-side image maps whenever possible. Use the `alt` attribute to identify each active region.
2. If a server-side image map must be used, provide a redundant text link for each active region that can be identified or labeled with text.

Section 4. Content Requiring Additional Software

Standard 4.1: All information published on a state agency web page must be published in HTML, whenever possible, to eliminate the need for additional software.

Why the standard is needed: File formats that require browser plug-ins or special software limit accessibility to information on the web in a number of ways:

- Installation of the necessary software may not be easy or even possible because users:
 - o May not be authorized or allowed to download software (for instance, if they work for some state agencies or they use library or school computers)
 - o May not be comfortable downloading and installing new software or may be concerned about computer viruses
 - o May encounter installation problems and software conflicts
- The alternative file format itself may be inaccessible to many users. For example, audio and video files without text equivalents are useless to some disabled users (see Section 3, Graphics and Sound).
- Most major search engines only index HTML pages.³ These search engines are an important way for users to find information on the web.

What the standard means:

1. State agencies are strongly encouraged to publish all web pages in HTML whenever possible.
2. There are times when a business need exists to provide information in an alternative format. In these situations:
 - a. Choose a format that is consistent with the open standards specified in the Commonwealth's Enterprise Architecture. (Please consult the latest version of the Enterprise Technical Reference Model: Service Oriented Architecture posted on ITD's web site.)
 - b. Provide links to free, non-proprietary, readers or viewers, when appropriate.
 - c. Provide an HTML version of the information in addition to the original format whenever possible.

The Portable Document Format (PDF) file format is often used for the following business reasons:

- Documents need to match a printed version (signed documents, for example).
- Lengthy documents cannot be broken down easily into web pages because of readability and printing limitations (manuals or instructions, for example).

³ As of the release of this document, the Mass.Gov Search function only indexes HTML pages.

- The integrity of the document format must be preserved for historical or regulatory reasons.

When documents are published in PDF, the following are implementation options in order of preference:

1. Create a PDF that is optimized (resulting in less download time) and accessible. Provide navigation aids within the PDF (for example, a Table of Contents, bookmarks, "Back to" buttons) as well as navigation back to the appropriate web site page. In addition to the PDF, provide the information in HTML or another accessible format.
 - o Indicate that the link is to a PDF file format.
 - o Identify the alternative format provided, and explain its use (for example, "Please view the HTML version of this document.")

Note: Content authors who produce PDF documents for publishing on the web must familiarize themselves with best practices for optimizing PDFs for disabled users. Refer to the Mass.Gov Portal Services (<http://www.mass.gov/portalservices>) resources for a list of key resources developed by the workgroup.

2. When option 1 is not possible, use an optimized and accessible PDF, and provide a link to the agency web accessibility statement (see Section 6) that provides contact information for obtaining an accessible version of the document for those experiencing difficulties with the PDF file.

Note: Choosing option 2, rather than option 1, means that disabled users *do not* in fact have equal access to the information that the state agency is providing on the web. This is an option of last resort, and should *never* be used as a standard practice. Every effort should be made (and documented) to publish all web content in a format that will be accessible to all.

Standard 4.2: A state agency that offers files to download in compressed format (Zip files, for example) must also provide the same information in its uncompressed format or as a self extracting file.

Why the standard is needed: File compression can both assist and hinder accessibility. Smaller files (75% compression is not uncommon) are faster to download — a major concern for users with slower Internet connections. On the other hand, compressed files may require special software to extract the information.

What the standard means: If providing information in a compressed format, the state agency must also adhere to the following:

- For compressed files, do at least one of the following:
 - o Provide an alternative, uncompressed file to download, *or*
 - o Provide a self-extracting file (requiring no third-party software). Keep in mind that some users may not wish to download executable (.exe) files due to security concerns.
- Provide links to decompression utilities. Ensure that the agency has a license that allows distribution or that the utility is "freeware." **Note:** The requirement for a decompression utility reduces accessibility.

- Provide and prominently display a link to the web accessibility statement, which provides contact information for obtaining assistance in working with a compressed file. For more information refer to Section 6.

Note: Single, small files (less than 35 KB) should never be compressed since the time saved downloading may not be worth the need for special software.

Section 5. File Size

Standard 5.1: A state agency must optimize files to improve download time.

Why the standard is needed: The size of a file on the web impacts the time it takes to download that file and is an issue that affects everyone using the web. Users with slower Internet connections and users of the latest mobile technologies are particularly impacted by the issues of file size and download time.

Keep in mind when making decisions about file size that not all users are going to be able to afford high-speed connections. For more information, refer to the report, “Accessibility and the Digital Divide”:

http://www.mass.gov/itd/massgov/publications/workgroupprpt/accessibility_report.htm

What the standard means:

To optimize performance on the web, files need to transmit fewer packets of information and minimize server requests. Web developers should use the following practices, whenever possible, to improve download time:

- Create files of the smallest size possible while taking into consideration their intended purpose. Top level files, such as home pages, which target all users of a web site, should always download quickly. A general guideline for reasonable download time of a top level page is 5 to 10 seconds on a 56 K modem, which translates to a file size range of 30 to 60 KB including HTML, images, and other embedded objects.
- Break large files into smaller sections for quicker download whenever reasonable and supported by the structure of the document. For example, a report in chapters might easily be broken up by chapter while a policy document may be better posted as a single file.
- Indicate file size for files larger than 1 MB so users will have some indication of how long the download will take.
- Optimize the color depth (the number of colors stored in the file) and resolution of images. Most monitors only display a resolution of 72 pixels per inch, with some high-end exceptions that display at 96 pixels per inch. The color depth for GIF files should be reduced, and the compression of JPEG files should be increased to the extent feasible while maintaining required image quality. Reducing the color depth and resolution can greatly reduce the size of the file without affecting the display quality of the image.
- Create image files with the dimensions that will be used when displayed. Do *not* define the size of the image using the `height` and `width` attributes of `img` or `table` tags. Instead, use `height` and `width` attributes to describe the actual size of the images on a web page.

This will allow the user's web browser to display the layout and text of the web page while images continue to download from the server

- Know your audience and refer to web charts with the download times for different Internet connections. When appropriate, particularly when targeting an audience with slower connections and newer mobile technologies, provide multiple download options for larger files.

Section 6. Web Accessibility Statement

Standard 6.1: A state agency web site must provide a link to a web accessibility statement.

Why the standard is needed: An agency web accessibility statement communicates the agency's commitment to making information accessible and gives a mechanism to request assistance and to provide feedback.

What the standard means: Agency web sites must include a web accessibility statement, linked from the agency home page. The web accessibility statement can be accessed from a site policies link on the home page and included with other site policies, such as the site's privacy and security policies. The web accessibility statement must, at a minimum, provide the following information regarding accessibility issues:

- A statement of adherence to the latest version of the Enterprise Web Accessibility Standards (with a link to the standards).
- Specific information regarding the use of PDF files (if applicable to the agency's web site).
- Contact information (mailing address, email address, phone number) if a user is unable to access files on the web site, needs assistance, or wants to provide feedback related to accessibility issues. State that this contact is for accessibility issues only.

Refer to Appendix A, Sample Agency Web Accessibility Statement, for suggested text.

Section 7. Web Site Validation

Standard 7.1: A state agency must validate web content against these Standards prior to posting and at regular intervals after posting.

Why the standard is needed: Validation of new and existing web content allows agencies to ensure conformance to the Standards, ensuring that web content is accessible.

What the standard means: Agencies must:

- Validate new web content prior to posting.
- Develop an audit program for randomly validating, at least every other year, all posted web content.

- Maintain a record with the dates and results of these audits.

Validation tools in conjunction with human judgment are the only ways to be sure web content meets these standards. Several free accessibility validation tools are available that will test for compliance against WCAG or Section 508 standards; they are limited, however, in what they can do. Do not assume that the agency web site is accessible based solely on automated validation tools. View web pages in alternative browsers to gain a better understanding of how the web site may appear in less-popular browsers.

Compliance with this standard begins with testing using recommended validation tools. Developers should also include persons with disabilities during the development process where feasible. At a minimum, web developers can evaluate the accessibility of the web site themselves using the following methods:

1. Perform simple tasks using keyboard navigation.
2. Use validation tools.
3. Test using alternate browsers and assistive technology.

For more information, refer to the list of resources developed by the workgroup on the Mass.Gov Portal Services web site: <http://www.mass.gov/portalservices>.

Section 8. Web-based Applications

The following standards apply to web-based applications. These Federal standards are detailed in Section 508 and are incorporated here as Commonwealth standards for web-based applications. For the exact wording and an explanation of each standard, refer to Section 508 standards for software applications and operating systems: <http://www.access-board.gov/sec508/guide/1194.21.htm>.

Layout and Design

Standard 8.1: A well-defined on-screen indication of the current focus shall be provided that moves among interactive interface elements as the input focus changes. The focus shall be programmatically exposed so that assistive technology can track focus and focus changes.

Standard 8.2: When electronic forms are used, the form shall allow people using assistive technology to access the information, field elements, and functionality required for completion and submission of the form, including all directions and cues.

Standard 8.3: Web-based applications shall not disrupt or disable activated features of other products that are identified as accessibility features, where those features were developed and documented as accessibility standards.

Standard 8.4: Sufficient information about a user interface element including the identity, operation, and state of the element shall be available to assistive technology. When an image represents a program element, the information conveyed by the image must also be available in text.

Navigation

Standard 8.5: Web-based application functions shall be executable from a keyboard where the function itself or the result of performing a function can be discerned textually.

Graphics

Standard 8.6: When bitmap images are used to identify controls, status indicators, or other programmatic elements, the meaning assigned to those images shall be consistent throughout the application's performance.

Standard 8.7: When animation is displayed, the information shall be displayable in at least one non-animated presentation mode at the option of the user.

Standard 8.8: Software shall not use flashing or blinking text, objects, or other elements having a flash or blink frequency greater than 2 Hz and lower than 55 Hz.

Standard 8.9: Web-based applications shall not override user selected contrast and color selections and other individual display attributes.

Standard 8.10: Color coding shall not be used as the only means of conveying information, indicating an action, prompting a response, or distinguishing a visual element.

Standard 8.11: When a web-based application permits a user to adjust color or contrast settings, a variety of color selections capable of producing a range of contrast levels shall be provided.

Appendix A. Sample Agency Web Accessibility Statement

The *[Agency Name]* is committed to achieving meaningful accessibility to this online environment for all users, including users with disabilities. We follow specific Commonwealth enterprise standards *[link to latest version of the Enterprise Web Accessibility Standards]* designed to meet the needs of our citizens with disabilities. The Commonwealth enterprise standards are generally based on standards used by the Federal government for technology accessibility for people with disabilities, and web content accessibility guidelines developed by the World Wide Web Consortium (W3C). For more information about the Federal standards, please visit the Section 508 web site (<http://www.section508.gov>) or the Federal Access Board web site (<http://www.access-board.gov>). For more information about the W3C guidelines, please visit their web site (<http://www.w3.org/TR/WAI-WEBCONTENT>). The *[Agency Name]* web site is regularly tested using leading web accessibility technologies and reviewed by users to verify that this web site is compliant with applicable standards.

About Portable Document Format (PDF)

Some documents on this web site are produced in Portable Document Format (PDF). Efforts are currently underway to ensure that all files are produced using the latest version of Acrobat (file conversion software for PDFs), which is the most accessible technology currently available for these types of files. In order to improve viewing of these files, please download the latest version of Adobe Reader™, which is available for free at the Adobe web site (<http://www.adobe.com>).

However, recognizing that even this version does not always work for all users, alternative accessible formats are provided wherever possible, most commonly through a text or an HTML file.

Contact Information

If any file format prevents you from accessing the information, please contact us for assistance. In order to respond in a manner most helpful to you, please note the nature of your accessibility concern, the format in which you prefer to receive the material, the web page address of the requested material, and the best way to contact you.

We also welcome your questions about this accessibility statement and comments on how to improve the site's accessibility.

Please contact us at *[mailing address]*, 617-XXX-XXXX, or by email at XXXX@state.ma.us.

IMPORTANT: Only messages regarding technical accessibility will be answered at the above phone or email addresses. All other questions should be sent to *[Appropriate Agency Web Site Contact Email Address]*.

Appendix B. Web Accessibility Standards Checklist

This checklist summarizes the requirements set forth in the Web Accessibility Standards, version 2.0. The checklist complements, but is not a substitute for, the standards.

Layout and Design

- _____ [1.1](#) HTML markup tags are used according to industry standards.
 - _____ Markup is used in data tables to identify row and column headers, and to associate table cells with headers.
 - _____ The markup language and version type is identified on each web page.
 - _____ Changes in natural language are identified.
- _____ [1.2](#) Style sheets, which are consistent with the remainder of the standards, should be used to control presentation. The web page is readable when style sheets are overridden, turned off, or not supported.
- _____ [1.3](#) The use of frames has been avoided. If frames are used, each frame has been titled.
- _____ [1.4](#) Web pages containing scripts, applets, and other programmed objects are useable with the programmed objects turned off or not supported.
- _____ [1.5](#) Forms are designed to be accessible using assistive technology.
- _____ [1.6](#) If a timed response is required, the user is given the opportunity to request additional time to continue working before the time-out occurs.

Navigation

- _____ [2.1](#) Navigation is consistent from page to page and includes links that enable users to skip repetitive navigation menus and long lists of links.
- _____ [2.2](#) Users are able to interact with web page elements in a device-independent manner.

Graphics and Sound

- _____ [3.1](#) Every picture, graphic or non-text element, including purely decorative elements, has a text alternative (`alt` attribute) describing the object.
- _____ [3.2](#) Multimedia presentations include synchronized auditory and readable text descriptions of the visual track.
- _____ [3.3](#) Text-equivalent versions of audio files are provided.
- _____ [3.4](#) Any use of motion is absolutely integral to the site, is user-controlled, is limited to three cycles, and stops automatically.
- _____ [3.5](#) Information is conveyed by means other than just color, and color combinations provide sufficient contrast.
- _____ [3.6](#) Client-side image maps are used whenever possible. If server-side image maps must be used, redundant text links have been provided for each active region.

Content Requiring Additional Software

- _____ [4.1](#) Content is provided in HTML whenever possible.
 - _____ Alternative formats are only used when necessary and provide links to free readers or viewers.
 - _____ Contact information is provided for obtaining accessible versions of documents.
- _____ [4.2](#) Compressed files are provided along with the uncompressed format or as self-extracting files.

File Size

- _____ [5.1](#) The total document weight of the web page (including HTML, images, and embedded objects) is as small as possible, and file size is indicated when a file for download exceeds 1 MB.

Web Accessibility Statement

- _____ [6.1](#) An agency web accessibility statement, which outlines the agency's commitment to accessibility and provides contact information for accessibility issues, is provided on the web site.

Web Site Validation

- _____ [7.1](#) The web content is validated prior to posting and randomly validated at least every two years after posting.

Web-based Applications

- _____ [8](#) Web-based applications are accessible as specified in the Section 508 standards (36 C.F.R. §1194.21).

Appendix C. Related Standards (Massachusetts, Federal, and W3C WCAG)

Standard (this document)	Other Massachusetts Standards	Section 508 §1194.22 (Internet) ⁴	W3C WCAG (P1=Priority 1, P2=Priority 2, P3=Priority 3) ⁵
Introduction		(k)	P1: 11.4
1.1	ETRM: SOA ⁶	(g) and (h)	P1: 4.1, 5.1, 5.2 P2: 3.1, 3.2, 3.5, 3.6, 3.7, 5.3, 5.4, 11.1, 11.2 P3: 4.3
1.2		(d)	P1: 6.1 P2: 3.3, 3.4
1.3		(i)	P1: 12.1 P2: 12.2
1.4		(l)	P1: 6.2, 6.3 P2: 6.5, 8.1
1.5		(n)	P2: 10.2, 12.4 P3: 9.4
1.6		(p)	
2.1		(o)	P2: 13.3, 13.4 P3: 14.3
2.2			P2: 6.4, 9.2, 9.3
3.1		(a)	P1: 1.1
3.2		(b)	P1: 1.1, 1.3, 1.4
3.3		(a)	P1: 1.1, 1.3
3.4		(j)	P1: 7.1 P2: 7.2, 7.3
3.5		(c)	P1: 2.1 P2: 2.2
3.6		(e) and (f)	P1: 1.1, 1.2, 9.1 P3: 1.5
4.1	ETRM: SOA ⁴		P3: 11.3
4.2		(m)	
5.1			P2: 12.3

⁴ Refer to <http://www.access-board.gov/sec508/guide/1194.22.htm> for more information.

⁵ Refer to <http://www.w3.org/TR/WCAG10/full-checklist.html> for more information.

⁶ The latest version of the Enterprise Technical Reference Model: Service Oriented Architecture, available on ITD's web site.

Standard (this document)	Section 508 §1194.21 (Applications)⁷
8.1	(c)
8.2	(l)
8.3	(b)
8.4	(d)
8.5	(a)
8.6	(e)
8.7	(h)
8.8	(k)
8.9	(g)
8.10	(i)
8.11	(j)
—	(f)

⁷ Refer to <http://www.access-board.gov/sec508/guide/1194.21.htm> for more information.

Software Applications and Operating Systems (1194.21)

Updated:

June 21, 2001

These provisions are applicable for both software applications and operating systems. They address program features that must be contained in software for the product to meet the standards. Because there are many programming languages from which a software producer may select, it is impossible to give specific coding techniques. In some cases it is possible that a particular programming language may not possess the features necessary to fulfill these requirements. In those instances, another language for creating the program would most likely have to be considered for the product to meet the standards.

All electronic and information technology contains software of some type. Do these provision apply to all software with no exceptions?

To meet the standards, a product can either build all accessibility features in, or be compatible with assistive technology. Many of the provisions in this section are required to make software compatible with assistive technology. For example, how text is to be written to the display is required so assistive technology can read the text output of a program. Therefore, if the software is running on a product, such as a desktop computer, where it is possible to add assistive technology, that software must comply with this section.

Are these provisions the only feasible approach for making software work with assistive technology?

No. By studying these provisions, a software producer can gain an understanding of what is to be achieved. However, as stated in 1194.5, equivalent facilitation, the provisions are not intended in anyway to discourage producers from developing their own approach to achieving the end result. Alternative approaches through equivalent facilitation are allowed as long as the alternative provides equivalent or greater access than the approach specified in these provisions.

- | | |
|---|--|
| <u>(a) Executing Function from Keyboard</u> | <u>(b) Accessibility Features</u> |
| <u>(c) Input Focus</u> | <u>(d) User Interface Element</u> |
| <u>(e) Bitmap Images</u> | <u>(f) Textual Information</u> |
| <u>(g) User Selected Attributes</u> | <u>(h) Animation</u> |
| <u>(i) Color Coding</u> | <u>(j) Color and Contrast Settings</u> |
| <u>(k) Flashing or Blinking Text</u> | <u>(l) Electronic Forms</u> |

(a) When software is designed to run on a system that has a keyboard, product functions shall be executable from a keyboard where the function itself or the result of performing a function can be discerned textually.

Why is keyboard access to software required?

When keyboard access to a programs' controls and features is provided, a person who cannot use a mouse or other pointing device will still be able to run the product. For example, a person with a disability that affects dexterity may find it impossible to move or hold a pointing device with enough accuracy to activate desired features. A person who cannot see the screen, therefore relying on assistive technology, may have no problems moving the pointer but will be unable to determine what is being pointed to.

Software drop-down menu that includes alternate keyboard commands

Does this provision prohibit the use of "mouse-only" functions in any software?

All actions that can be identified or labeled with text are required to be executable from a keyboard. For example, most of the menu functions even in common drawing programs that allow a user to open, save, size, rotate, and perform other actions on a graphic image can all be performed from the keyboard. However, providing keyboard alternatives for creating an image by selecting a "drawing tool", picking a color, and actually drawing a design would be extremely difficult. Such procedures require the precise level of control afforded by a pointing device (e.g., a mouse) and cannot be given text labels because there is no way to predict what action the user plans to perform. Therefore, when a programmer is determining which functions need keyboard access, the best rule of thumb is to add keyboard shortcuts to any feature where the function can be identified with a text label.

Many applications utilize toolbars with buttons. Do these buttons all need keyboard access?

Not necessarily. Most toolbars give a visual shortcut to functions that also exist in the menu structure of a program. If the feature activated by a control on a toolbar is a duplicate of a menu function that already has a keyboard shortcut then the toolbar control does not need its own keyboard access. However, if the control on the toolbar is unique and cannot be accessed in any other way, the control will be required to have a keyboard shortcut. Although not in the toolbar, a scroll feature which is not available in a menu bar must have keyboard alternatives. Typically, the use of the page up, and page down keys will provide keyboard access to scroll bars.

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(b) Applications shall not disrupt or disable activated features of other products that are

identified as accessibility features, where those features are developed and documented according to industry standards. Applications also shall not disrupt or disable activated features of any operating system that are identified as accessibility features where the application programming interface for those accessibility features has been documented by the manufacturer of the operating system and is available to the product developer.

What is the application programming interface?

The application programming interface, (API) refers to a standard way for programs to communicate with each other, including the operating system, and with input and output devices. For instance, the application programming interface affects how programs display information on a monitor or receive keyboard input via the operating system.

What are accessibility features?

Many commercially available software applications and operating systems have features built into the program that are labeled as accessibility features. These features can typically be turned on or off by a user. Examples of these features include: reversing the color scheme (to assist people with low vision), showing a visual prompt when an error tone is sounded (to assist persons who are deaf or hard of hearing), or providing "sticky keys" that allow a user to press key combinations (such as control-C) sequentially rather than simultaneously (to assist persons with dexterity disabilities). This requirement prohibits software programs from disabling these features when they have been activated prior to running the application.

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(c) A well-defined on-screen indication of the current focus shall be provided that moves among interactive interface elements as the input focus changes. The focus shall be programmatically exposed so that assistive technology can track focus and focus changes.

What is the importance of the focus for assistive technology?

The position on a screen where an action will take place is referred to as the "focus". For example, when a menu item in a program is highlighted - meaning that if the user clicks the mouse or presses the enter key - the feature will activate and that item has the focus. Providing a visual indication of the focus allows someone who is viewing the screen to accurately access the programs' features. When a computer is being operated by a person who is also running a screen enlargement program or a speech or Braille output system, the assistive technology must discern the focus point. This provision requires that the position of the programs' focus be made available through its code to assistive technology. When, for example, a screen enlargement program magnifies a section of the screen, it must be able to follow the focus as the focus changes. If the magnified area does not move with the focus, the user may easily

move down through a list of choices with the arrow keys but the magnified area remains stationary and very shortly the user has no idea what items will be activated if an action is taken.

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(d) Sufficient information about a user interface element including the identity, operation and state of the element shall be available to assistive technology. When an image represents a program element, the information conveyed by the image must also be available in text.

What is considered a "user interface element"?

Examples of user interface elements include button checkboxes, menus, toolbars, scroll bars, and any other feature of a program that is intended to allow the user to perform some action.

What does this provision require to be done with these elements?

This provision requires that text must be associated with each element. The text must identify the element and its current state or condition. For example, a button that shows a hand for getting more help must have the word "help" associated with the button. If a checkbox is present, a text label must indicate what is being checked, and whether the checkbox is checked or unchecked. There are many ways to accomplish this depending on the program language being used.

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(e) When bitmap images are used to identify controls, status indicators, or other programmatic elements, the meaning assigned to those images shall be consistent throughout an application's performance.

What forms of bitmap images are affected by this provision?

This provision applies to those images which are used to indicate an action. An image used strictly for decoration is not covered by this provision.

Why is the provision important for accessibility?

Most screen reading programs allow users to assign text names to bitmap images. If the bitmap image changes meaning during a program's execution, the assigned identifier is no longer valid and is confusing to the user.



(f) Textual information shall be provided through operating system functions for displaying text. The minimum information that shall be made available is text content, text input caret location, and text attributes.

Can an application programmer develop unique display techniques for writing text on the screen or using graphics?

The operating system is the "core" computer software that controls basic functions, such as receiving information from the keyboard, displaying information on the computer screen, and storing data on the hard disk. Other software programs use the standard protocols dictated by the operating system for displaying their own information or processing the output of other computer programs. When programs are written using unique schemes for writing text on the screen or use graphics, other programs such as software for assistive technology may not be able to interpret the information. This provision does not prohibit or limit an application programmer from developing unique display techniques. It requires that when a unique method is used, the text should also be written to the screen through the operating system.



(g) Applications shall not override user selected contrast and color selections and other individual display attributes.

How does this requirement improve accessibility for people with disabilities?

Often, persons with disabilities can increase their efficiency with a system by selecting colors, contrast, keyboard repeat rate, and keyboard sensitivity settings provided by an operating system. When an application disables these system-wide settings, accessibility is reduced. This provision is aimed at allowing users to select personalized settings which cannot be disabled by software programs.

Does this provision mean that programs may not use any custom settings?

This provision allows programs to have unlimited options for customizing the display of the programs' content. However, there must be a section in the software that tells the program not to use its own setting, but to use whatever settings are already in place before the program starts. A simple menu selection, for example under a view, or options menu, might be a checkbox that lets the user check "use system display setting."



(h) When animation is displayed, the information shall be displayable in at least one non-animated presentation mode at the option of the user.

How can screen animation affect accessibility for people with disabilities?

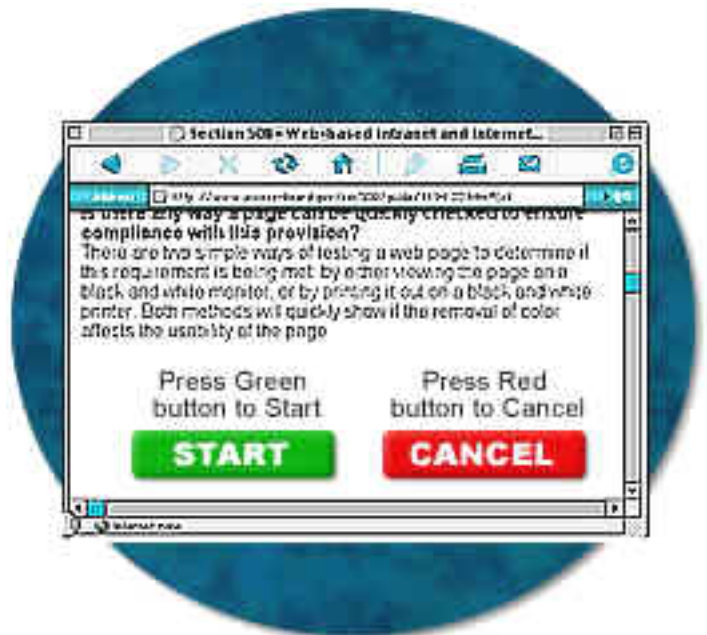
The use of animation on a screen can pose serious access problems for users of screen readers or other assistive technology applications. When important elements such as push-buttons or relevant text are animated, the user of assistive technology cannot access the application reliably. This provision requires that in addition to the animation, an application shall provide an option to turn off animation.

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(i) Color coding shall not be used as the only means of conveying information, indicating an action, prompting a response, or distinguishing a visual element.

How can color coding create accessibility difficulties?

A software program that requires a user to distinguish between otherwise identical red and blue squares for different functions (e.g., printing a document versus saving a file) would pose problems for anyone who was color blind and would generally be very difficult to run with assistive technology. Screen reading software can announce color changes. However, this is an "on/off" feature. This means that if a user had to identify a specific color, they would have to have all colors announce which would greatly reduce the usability of the software for that person.



Does the provision prohibit the use of colors?

No. This provision does not prohibit the use of color to enhance identification of important features. It does, however, require that some other method of identification, such as text labels, be combined with the use of color.

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(j) When a product permits a user to adjust color and contrast settings, a variety of color selections capable of producing a range of contrast levels shall be provided.

Do all products have to provide color selections?

No. This provision is applied to those products that already allow a user to adjust screen colors.

What is the desired outcome of this requirement?

This provision requires more than just providing color choices. The available choices must also allow for different levels of contrast. Many people experience a high degree of sensitivity to bright displays. People with this condition cannot focus on a bright screen for long because they will soon be unable to distinguish individual letters. An overly bright background causes a visual "white-out". To alleviate this problem, the user must be able to select a softer background and appropriate foreground colors. On the other hand, many people with low vision can work most efficiently when the screen is set with very sharp contrast settings. Because there is such a variance in individual needs it is necessary for a program to have a variety of color and contrast settings.

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(k) Software shall not use flashing or blinking text, objects, or other elements having a flash or blink frequency greater than 2 Hz and lower than 55 Hz.

Why are flashing or blinking displays limited by this provision?

This requirement is necessary because some individuals with photosensitive epilepsy can have a seizure triggered by displays that flicker or flash, particularly if the flash has a high intensity and is within certain frequency ranges. The 2 Hz limit was chosen to be consistent with proposed revisions to the ADA Accessibility Guidelines which, in turn, are being harmonized with the International Code Council (ICC)/ANSI A117 standard, "Accessible and Usable Buildings and Facilities", ICC/ANSI A117.1-1998 which references a 2 Hz limit. An upper limit was identified at 55 Hz.

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(l) When electronic forms are used, the form shall allow people using assistive technology to access the information, field elements, and functionality required for completion and submission of the form, including all directions and cues.

Why are electronic forms so difficult for some people with disabilities to access?

At present, the interaction between form controls and screen readers can be unpredictable, depending upon the design of the page containing these controls.

How can forms in a software application meet this provision?

If keyboard alternatives are provided for navigating through a form, and all elements of the form are labeled with text located in close proximity to the field that is to be completed, the form will most likely meet this provision. Attention must be paid to the placement of field labels. On a webpage, a label can have a direct association with a particular field that is indicated in the HTML code. Assistive technology can interpret the HTML and correctly announce the appropriate label. There is no similar method for forms in software programs. Therefore, the label must be in a logical position relative to the input areas. For example, placing labels to the immediate left of where the user is to enter information is by far the most logical position for the label.

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