A GENERAL INTERPRETATION OF SUBPARTS B, C, & D OF THE TECHNICAL STANDARDS OF THE ELECTRONIC AND INFORMATION TECHNOLOGY ACCESSIBILITY STANDARDS.

The following interpretations are provided for reference purposes only. The comments presented herein are provided by the Department of Energy's (DOE) Office of the Chief Information Officer (OCIO) as a general interpretation of standards. It is a mixture of guidance provided by the Architectural and Transportation Barriers Access Board, the DOE OCIO, and other sources. These interpretations are intended for reference only and are not binding on any element of the Department of Energy.

Subpart B Technical Standards

1194.21 - SOFTWARE APPLICATIONS AND OPERATING SYSTEMS

This section addresses rules and functionality that must be available in software applications, whether custom or commercials, and operating systems.

(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.

Paragraph (a) refers to having software application commands that can be invoked by means of sequenced keystrokes such as *Control + S* to save a document or *Control + P* to print a document. The application must provide a means of invoking these commands from the keyboard for people who cannot accurately control a mouse, having access to the software's controls through keyboard alternatives is essential. Only those actions that are presented textually are required to be executable from a keyboard. For example, most of the menu functions 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, keyboard alternatives for creating an image by selecting a paintbrush, picking a color, and actually drawing a design requires a fine level of control afforded by a pointing device (e.g., a mouse) and thus cannot be discerned textually without a lengthy description.

Accordingly keyboard alternatives are only required when the function (e.g., rotate figure) or the result of performing a function (e.g., save file confirmation) can be represented with words.

(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.

Paragraph (b) addresses concerns over possible application conflicts. It prohibits applications from disrupting or disabling activated features of other products, particularly if they are accessibility

features developed and documented according to industry standards. This applies to operating systems that contain accessibility features as well.

Many commercially available software applications and operating systems have built-in features labeled as access features. These features can typically be turned on or off by a user. Examples of these features may 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 provision prohibits software programs from disabling these features when selected.

(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.

Paragraph (c) requires that software applications place on the screen a visual indication of where some action may occur if a mouse click or keystroke takes place. This point on a screen indicating where an action will take place is commonly referred to as the "focus". This provision also requires that the focus be readable by other software programs such as screen readers used by computer users who are blind.

(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.

Paragraph (d) requires that software programs, through the use of program code, make information about the program's controls readable by assistive technology. Simply stated, this paragraph requires that information that can be delivered to or received from the user must be made available to assistive technology, such as screen reading software. Examples of controls would include button checkboxes, menus, and toolbars. For assistive technology to operate efficiently, it must have access to the information about a program's controls to be able to inform the user of the existence, location, and status of all controls. If an image is used to represent a program function, the information conveyed by the image must also be available in text.

(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.

Paragraph (e) requires that when bitmap images are used by a program to identify programmatic features, the meaning of that image doesn’t change during the operation of a program. "Bitmap images" refer to a type of computer image commonly used in "icons" (e.g., a small picture of a printer to activate the print command). 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 becomes 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.

Paragraph (f) makes the control functions of an operating system the mandatory default when displaying text. Most 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, particularly software for assistive technology, may not be able to interpret the information – hence, the default requirement. 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 be consistently written throughout the operating system.

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

Paragraph (g) prohibits applications from overriding user selected contrast and color selections and other individual display attributes. Like paragraph (f), the standard invokes the system-wide nature of operating system control features to ensure consistency. This permits, for instance, users to display all text in very large characters or adjust contrast levels as offsets to their needs. When an application disables these system-wide settings, accessibility is reduced.

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

Paragraph (h) addresses animated text or objects. The use of animation on a screen poses serious problems for users of screen readers or other assistive technology applications and may impede or deny user access to an application. This provision requires that in addition to the animation, an application provide the elements in a non-animated form.

(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.***

Paragraph (i) prohibits the use of color as the only method for indicating important information or functionality. For instance, a computer 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 not comply with this provision. Relying on color as the only method for identifying screen elements or controls poses problems, not only for people with limited or no vision, but color blindness as well. This does not prohibit the use of color to enhance identification of important features. It does, however, require that another method of identification, like text labels, be combined with the color.

(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.

Paragraph (j) requires software applications to provide users with a variety of color settings that can be used to set a range of contrast levels.

(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.

Paragraph (k) limits the flashing or blinking rate of screen items. This provision 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.

(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.

Paragraph (l) requires that people with disabilities have access to electronic forms**.**

1194.22 - WEB-BASED INTRANET AND INTERNET INFORMATION AND APPLICATIONS

The reference material used in this section was obtained from the World Wide Web Consortium (W3C) Accessibility Initiative. The W3C, founded by Tim Berners-Lee, works to set common standards for the web. The accessibility initiative is an example of this effort. These standards are based on elements of the initiative. "Checkpoints", the equivalent of checklist items, are provided by the W3C on their website and used here to expand on access board requirements in technical terms. The URL's to quoted checkpoints are provided for convenience as changes to an HTML version may affect a checkpoint.

Each checkpoint has an assing priority level based on the checkpoint's impact on accessibility. Priority levels are defined as follows:

> **[Priority 1] -** A Web content developer **must** satisfy this checkpoint. Otherwise, one or more groups will find it impossible to access information in the document. Satisfying this checkpoint is a basic requirement for some groups to be able to use Web documents.
>
> **[Priority 2] -** A Web content developer **should** satisfy this checkpoint. Otherwise, one or more groups will find it difficult to access information in the document. Satisfying this checkpoint removes significant barriers to accessing Web documents.
>
> **[Priority 3] -** A Web content developer **may** address this checkpoint. Otherwise, one or more groups will find it somewhat difficult to access information in the document. Satisfying this checkpoint will improve access to Web documents.

Some checkpoints specify a priority level that may change under certain (indicated) conditions. While lower priority checkpoints are worth reviewing, the checkpoints incorporated in the Access Board standards are all Priority 1.

(a) A text equivalent for every non-text element shall be provided (e.g., via "alt", "longdesc", or in element content).

Checkpoint 1.1 - Provide a text equivalent for every non-text element (e.g., via "alt", "longdesc", or in element content). This includes images, graphical representations of text (including symbols), image map regions, animations (e.g., animated GIFs), applets and programmatic objects, ascii art, frames, scripts, images used as list bullets, spacers, graphical buttons, sounds (played with or without user interaction), stand-alone audio files, audio tracks of video, and video. [Priority 1]

http://www.w3.org/TR/WAI-WEBCONTENT-TECHS/#tech-text-equivalent

(b) Equivalent alternatives for any multimedia presentation shall be synchronized with the presentation.

Checkpoint 1.4 - For any time-based multimedia presentation (e.g., a movie or animation), synchronize equivalent alternatives (e.g., captions or auditory descriptions of the visual track) with the presentation. [Priority 1]

http://www.w3.org/TR/WAI-WEBCONTENT-TECHS/#tech-synchronize-equivalents

(c) Web pages shall be designed so that all information conveyed with color is also available without color, for example from context or markup.

Checkpoint 2.1 - Ensure that all information conveyed with color is also available without color, for example from context or markup. [Priority 1]

http://www.w3.org/TR/WAI-WEBCONTENT-TECHS/#tech-color-convey

(d) ***Documents shall be organized so they are readable without requiring an associated style sheet.***

Checkpoint 6.1 - Organize documents so they may be read without style sheets. For example, when an HTML document is rendered without associated style sheets, it must still be possible to read the document. [Priority 1]

When content is organized logically, it will be rendered in a meaningful order when style sheets are turned off or not supported.

http://www.w3.org/TR/WAI-WEBCONTENT-TECHS/#tech-order-style-sheets

(e) Redundant text links shall be provided for each active region of a server-side image map.

Checkpoint 1.2 - Provide redundant text links for each active region of a server-side image map. [Priority 1]

http://www.w3.org/TR/WAI-WEBCONTENT-TECHS/#tech-redundant-server-links

(f) Client-side maps shall be provided instead of server-side maps except where the regions cannot be defined with an available geometric shape.

Checkpoint 9.1 - Provide client-side image maps instead of server-side image maps except where the regions cannot be defined with an available geometric shape. [Priority 1]

http://www.w3.org/TR/WAI-WEBCONTENT-TECHS/#tech-client-side-maps

(g) ***Row and column headers shall be identified for data table.***

Checkpoint 5.1 - For data tables, identify row and column headers. [Priority 1]

For example, in HTML, use TD to identify data cells and TH to identify headers.

http://www.w3.org/TR/WAI-WEBCONTENT-TECHS/#tech-table-headers

(h) Markup shall be used to associate data cells and header cells for data tables that have two or more logical levels of row or column headers.

Checkpoint 5.2 - For data tables that have two or more logical levels of row or column headers, use markup to associate data cells and header cells. [Priority 1]

For example, in HTML, use THEAD, TFOOT, and TBODY to group rows, COL and COLGROUP to group columns, and the "axis", "scope", and "headers" attributes, to describe more complex relationships among data.

http://www.w3.org/TR/WAI-WEBCONTENT-TECHS/#tech-table-structure

(i) Frames shall be titled with text that facilitates frame identification and navigation.

Checkpoint 12.1 - Title each frame to facilitate frame identification and navigation. [Priority 1]

For example, in HTML use the "title" attribute on FRAME elements.

http://www.w3.org/TR/WAI-WEBCONTENT-TECHS/#tech-frame-titles

(j) Pages shall be designed to avoid causing the screen to flicker with a frequency greater than 2 Hz and lower than 55 Hz.

Checkpoint 7.1 - Until user agents allow users to control flickering, avoid causing the screen to flicker. [Priority 1]

Note: People with photosensitive epilepsy can have seizures triggered by flickering or flashing in the 4 to 59 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).

http://www.w3.org/TR/WAI-WEBCONTENT-TECHS/#tech-avoid-flicker

(k) A text-only page, with equivalent information or functionality, shall be provided to make a web site comply with the provisions of this part, when compliance cannot be accomplished in any other way. The content of the text-only page shall be updated whenever the primary page changes.

Checkpoint 11.4 - If, after best efforts, you cannot create an accessible page, provide a link to an alternative page that uses W3C technologies, is accessible, has equivalent information (or functionality), and is updated as often as the inaccessible (original) page. [Priority 1]
http://www.w3.org/TR/WAI-WEBCONTENT-TECHS/#tech-alt-pages

* Paragraphs L – P are not part of the W3C Accessibility Initiative. These were created by the Access Board and extends beyond Priority 1 checkpoints issued by the W3C. The balance of W3C Priority 1 checkpoints follows paragraph (p) and is provided for reference.

(l) When pages utilize scripting languages to display content, or to create interface elements, the information provided by the script shall be identified with functional text that can be read by assistive technology.

Paragraph (l) requires that when a special programming instructions, or "script", is used to affect information displayed or to process user input, a functional text shall be included and readable by assistive technology such as screen reading software. When authors do not provide functional text with a script, a screen reader will often read the content of the script itself in a meaningless jumble of numbers and letters. Although this jumble is text, it cannot be interpreted or used. Scripts are widely used by web sites as an efficient method to create faster or more secure web communications. Currently, JavaScript, a standardized object-oriented programming language, is the most popular scripting language, although certain plug-ins support slightly different scripting languages (see next paragraph).

(m) When a web page requires that an applet, plug-in or other application be present on the client system to interpret page content, the page must provide a link to a plug-in or applet that complies with 1194.21(a) through (l).

Paragraph (m) requires web pages providing content proprietary software, such as Real Audio® or Acrobat® PDF, files also provide a link to a plug-in that will meet the software provisions previously noted in Section 1194.21. It is very common for a web page to provide links to needed plug-ins. For example, web pages containing Real Audio almost always have. This provision places a responsibility on the web page author to know that a compliant application exists, before requiring a plug-in, and provide a link to a source where the user can obtain the necessary player.

(n) When electronic forms are designed to be completed on-line, 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.

Paragraph (n) requires that people with disabilities have access to interactive electronic forms. This is supported by the 1998 Government Paperwork Elimination Act which requires Federal agencies to make electronic versions of their forms available on-line when practicable and allow individuals and businesses to use electronic signatures to file these forms electronically. At present, the interaction between form controls and screen readers can be unpredictable, depending upon the design of the page containing these controls. Some developers place control labels and controls in different table cells; others place control labels in various locations in various distances from the controls themselves, making the response from a screen reader less than accurate many times. Scripts or plug-ins or other existing products may be used to support these features as long as they meet the provisions of paragraphs (l) and (m).

(o) ***A method shall be provided that permits users to skip repetitive navigation links.***

Paragraph (o) requires simplified paths to content that give users of assistive technology the option to skip repetitive navigation links.

(p) When a timed response is required, the user shall be alerted and given sufficient time to indicate more time is required.

Paragraph (p) addresses an accessibility problem that can occur if a web page times-out while a user is completing a form. Web pages can be designed with scripts so that the web page disappears or "expires" if a response is not received within a specified amount of time. Sometimes, this technique is used for security reasons or to reduce the demands on the computer serving the web pages. A disability can have a direct impact on the speed with which a person can read, move around, or fill in a web form. For this reason, when a timed response is required, the user needs to be alerted and given sufficient time to indicate that additional time is necessary.

Additional WCAG 1.0 Priority 1 Checkpoints:

* These W3C Priority 1 checkpoints are provided for reference and are **NOT** Section 508 standards. Use of the following checkpoint by any element of the Department of Energy is elective.

Checkpoint 1.3 - Until user agents can automatically read aloud the text equivalent of a visual track, provide an auditory description of the important information of the visual track of a multimedia presentation. [Priority 1]

Synchronize the auditory description with the audio track as per checkpoint 1.4. Refer to checkpoint 1.1 for information about textual equivalents for visual information.

http://www.w3.org/TR/WAI-WEBCONTENT-TECHS/#tech-auditory-descriptions

Checkpoint 1.4 - For any time-based multimedia presentation (e.g., a movie or animation), synchronize equivalent alternatives (e.g., captions or auditory descriptions of the visual track) with the presentation. [Priority 1]

http://www.w3.org/TR/WAI-WEBCONTENT-TECHS/#tech-synchronize-equivalents

Checkpoint 4.1 - Clearly identify changes in the natural language of a document's text and any text equivalents (e.g., captions). [Priority 1]

For example, in HTML use the "lang" attribute. In XML, use "xml:lang".

http://www.w3.org/TR/WAI-WEBCONTENT-TECHS/#tech-identify-changes

Checkpoint 6.1 - Organize documents so they may be read without style sheets. For example, when an HTML document is rendered without associated style sheets, it must still be possible to read the document. [Priority 1]

When content is organized logically, it will be rendered in a meaningful order when style sheets are turned off or not supported.

http://www.w3.org/TR/WAI-WEBCONTENT-TECHS/#tech-order-style-sheets

Checkpoint 6.2 - Ensure that equivalents for dynamic content are updated when the dynamic content changes. [Priority 1]

http://www.w3.org/TR/WAI-WEBCONTENT-TECHS/#tech-dynamic-source

Checkpoint 6.3 - Ensure that pages are usable when scripts, applets, or other programmatic objects are turned off or not supported. If this is not possible, provide equivalent information on an alternative accessible page. [Priority 1]

For example, ensure that links that trigger scripts work when scripts are turned off or not supported (e.g., do not use "javascript:" as the link target). If it is not possible to make the page usable without scripts, provide a text equivalent with the NOSCRIPT element, or use a server-side script instead of a client-side script, or provide an alternative accessible page as per checkpoint 11.4. Refer also to guideline 1.

http://www.w3.org/TR/WAI-WEBCONTENT-TECHS/#tech-scripts

Checkpoint 14.1 - Use the clearest and simplest language appropriate for a site's content. [Priority 1]

http://www.w3.org/TR/WAI-WEBCONTENT-TECHS/#tech-simple-and-straightforward

1194.23 - TELECOMMUNICATIONS PRODUCTS

(a) Telecommunications products or systems which provide a function allowing voice communication and which do not themselves provide a TTY functionality shall provide a standard non-acoustic connection point for TTYs. Microphones shall be capable of being turned on and off to allow the user to intermix speech with TTY use.

Paragraph (a) requires that telephone equipment shall provide a standard non-acoustic connection point for TTYs. A TTY is a device that includes a keyboard and display that is used to transmit and receive text over a telephone line using sound. Originally, TTY's used acoustic connections and the user placed the telephone handset on the TTY to transfer the sound signals between the TTY and the telephone. Handsets on many modern telephones do not fit well with many TTY acoustic couplers, allowing interference from outside noise. Individuals who use TTY's to communicate must have a non-acoustic way to connect TTY's to telephones in order to obtain clear TTY connections, such as through a direct RJ-11 connector, a 2.5 mm audio jack, or other direct connection.

(b) ***Telecommunications products which includes voice communication functionality shall support all commonly used cross-manufacturer non-proprietary standard TTY signal protocols.***

Paragraph (b) requires that products providing voice communication functionality be able to support the use of non-proprietary, e.g. standard, signals used by TTY's. Some products compress or alter the audio signal in such a manner that standard signals used by TTY's are not transmitted properly,

preventing successful TTY communication. This provision is consistent with the Telecommunications Act Accessibility Guidelines.

(c) Voice mail, auto-attendant, and interactive voice response telecommunications systems shall be usable by TTY users with their TTYs.

Paragraph (c) provides that TTY users be able to utilize voice mail, auto-attendant, and interactive voice response telecommunications systems. Voice mail systems are available which allow TTY users to retrieve and leave TTY messages. This provision does not require that phone systems have voice to text conversion capabilities. It requires that TTY users can retrieve and leave TTY messages and utilize interactive systems. The ability to "opt out" of a menu and connect with an operator or transfer to a TTY system are also ways to make these services available and usable without highly sophisticated decoding technology.

(d) Voice mail, messaging, auto-attendant, and interactive voice response telecommunications systems that require a response from a user within a time interval, shall give an alert when the time interval is about to run out, and shall provide sufficient time for the user to indicate more time is required.

Paragraph (d) addresses access problems that can arise when telecommunications systems require a response from a user within a certain time. Due to the nature of the equipment, users of TTY's may need additional time to read and respond to menus and messages. This provision is identical to section 1194.22(p).

(e) ***Where provided, caller identification and similar telecommunications functions shall also be available for users of TTY's, and for users who cannot see displays.***

Paragraph (e) requires that functions such as caller identification must be accessible for users of TTY's, and for users who cannot see displays.

(f) For transmitted voice signals, telecommunications products shall provide a gain adjustable up to a minimum of 20 dB. For incremental volume control, at least one intermediate step of 12 dB of gain shall be provided.

Paragraph (f) requires products to be equipped with volume control that provides an adjustable amplification up to a minimum of 20 dB of gain. If a volume adjustment is provided that allows a user to set the level anywhere from 0 to the upper requirement of 20 dB, there is no need to specify a lower limit. If a stepped volume control is provided, one of the intermediate levels must provide 12 dB of gain. The gain applies to the voice output.

(g) If the telecommunications product allows a user to adjust the receive volume, a function shall be provided to automatically reset the volume to the default level after every use.

Paragraph (g) requires that an automatic reset be installed on any telephone that allows the user to adjust the volume higher than the normal level. This is a safety feature to protect people from suffering damage to their hearing if they accidentally answer a telephone with the amplification turned too high.

(h) Where a telecommunications product delivers output by an audio transducer which is normally held up to the ear, a means for effective magnetic wireless coupling to hearing technologies shall be provided.

Paragraph (h) requires telephones, or other products that provide auditory output by an audio transducer normally held up to the ear, to provide a means for effective wireless coupling to hearing aids. Many hearing aids incorporate "T-coils" that generate sounds based on magnetic signals received from earpieces that can generate the appropriate magnetic field. Generally, this provision means the earpiece generates sufficient magnetic field strength to induce an appropriate field in a hearing aid T-coil. The output in this case is the direct voice output of the transmission source, not the "machine language" such as tonal codes transmitted by TTY's. For example, a telephone must generate a magnetic output so that the hearing aid equipped with a T-coil can accurately receive the message. This provision is consistent with the Telecommunications Act Accessibility Guidelines.

(i) Interference to hearing technologies (including hearing aids, cochlear implants, and assistive listening devices) shall be reduced to the lowest possible level that allows a user of hearing technologies to utilize the telecommunications product.

Paragraph (i) requires that interference to hearing technologies be reduced to the lowest possible level that allows a user of hearing technologies to utilize a telecommunications product. Individuals who are hard of hearing use hearing aids and other assistive listening devices, but they cannot be used if products introduce noise into the listening aids because of electromagnetic interference.

(j) Products that transmit or conduct information or communication, shall pass through cross-manufacturer, non-proprietary, industry-standard codes, translation protocols, formats or other information necessary to provide the information or communication in a usable format. Technologies which use encoding, signal compression, format transformation, or similar techniques shall not remove information needed for access or shall restore it upon delivery.

Paragraph (j) provides that all products that act as a transport or conduit for information or communication are to pass all codes, translation protocols, formats, or any other information necessary to provide information or communication in a usable format. In particular, signal compression technologies cannot remove information needed for access or it must be restored upon decompression. Some transmissions include codes or tags embedded in "unused" portions of the signal to provide accessibility.

For example, closed captioning information is usually included in portions of a video signal not seen by users without decoders. This section prohibits products from stripping out such information or requires the information to be restored at the end point.

(k) Products which have mechanically operated controls or keys, shall comply with the following:

(1) Controls and keys shall be tactilely discernible without activating the controls or keys.

(2) Controls and keys shall be operable with one hand and shall not require tight grasping, pinching, or twisting of the wrist. The force required to activate controls and keys shall be 5-lbs. (22.2 N) maximum.

(3) If key repeat is supported, the delay before repeat shall be adjustable to at least 2 seconds. Key repeat rate shall be adjustable to 2 seconds per character.

(4) ***The status of all locking or toggle controls or keys shall be visually discernible, and discernible either through touch or sound.***

Paragraph (k) addresses controls that require some physical force to activate. It is the application of force to these controls that distinguishes them from touch sensitive controls where the mere presence of a hand or finger is detected and reacted to by the product.

Paragraph (k)(1) provides that mechanically operated controls and keys are tactilely discernible without activating the controls or keys. Tactilely discernible means that individual keys can be located and distinguished from adjacent keys by touch. An example being the raised bumps on the "F", "J", and "5" keys on most computer keyboards. To comply with this provision, controls that must be touched to activate, must be distinguishable from each other. This can be accomplished by using various shapes, spacing, or tactile markings.

Paragraph (k)(2) provides that mechanically operated controls are accessible to persons with limited dexterity. Individuals with tremor, cerebral palsy, paralysis, arthritis, or artificial hands may have difficulty operating systems which require fine motor control, assume a steady hand, or require two hands or fingers to be used simultaneously for operation. Individuals with high spinal cord injuries, arthritis, and other conditions may have difficulty operating controls which require significant strength. The provision limits the force required to five pounds and is based on §4.27.4 of the ADA Accessibility Guidelines and is consistent with the Telecommunications Act Accessibility Guidelines.

Paragraph (k)(3) establishes provisions for key repeat rate where an adjustable keyboard repeat rate is supported. It requires that the keyboard delay before repeat shall be adjustable to at least two seconds per character.

Paragraph (k)(4) provides that the status of toggle controls such as the "caps lock" or "scroll lock" keys be determined by both visual means and by touch or sound. For example, adding audio patterns such as ascending and descending pitch tones that indicate when a control is turned on or off would alleviate the problem of a person who is blind inadvertently pressing the locking or toggle controls. Also, buttons which remain depressed when activated or switches with distinct positions would meet this provision.

1194.24 - VIDEO AND MULTIMEDIA PRODUCTS

(a) ***All analog television displays 13 inches and larger, and computer equipment that includes analog television receiver or display circuitry, shall be equipped with caption decoder circuitry which appropriately receives, decodes, and displays closed captions from broadcast, cable, videotape, and DVD signals. As soon as practicable, but not later than July 1, 2002, widescreen digital television (DTV) displays measuring at least 7.8 inches vertically, DTV sets with conventional displays measuring at least 13 inches vertically, and stand-alone DTV tuners, whether or not they are marketed with display screens, and computer equipment that includes DTV receiver or display circuitry, shall be equipped with caption decoder circuitry***

which appropriately receives, decodes, and displays closed captions from broadcast, cable, videotape, and DVD signals.

Paragraph (a) requires that television displays 13 inches and larger, and computer equipment that includes television receiver or display circuitry be equipped with the capacity to decode and display captioning for audio material.

(b) Television tuners, including tuner cards for use in computers, shall be equipped with secondary audio program playback circuitry.

Paragraph (b) requires that television tuners, including tuner cards for use in computers, have the ability to handle a secondary audio track used for audio description of visual material. The secondary audio channel is commonly used for audio description. An "audio description" is a verbal description of the visual content of a presentation. Audio descriptions are important for persons who are blind or who have low vision because they provide a description of the visual content of a presentation synchronized with verbal information.

(c) ***All training and informational video and multimedia productions which support the agency's mission, regardless of format, that contain speech or other audio information necessary for the comprehension of the content, shall be open or closed captioned.***

Paragraph (c) requires the captioning of audio material in certain multimedia presentations. The final rule has been modified to require that all training and informational video and multimedia presentations that contain speech or other audio information necessary for the comprehension of the content and which supports an agency's mission, shall be open or closed captioned regardless of the anticipated audience. This provision would not require that a videotape recorded by a field investigator to document a safety violation be captioned or audio described, for example. On the other hand, if such a videotape were subsequently used as part of a training or informational presentation, it would have to be captioned and audio described. A video of a retirement celebration would not be in support of an agency's mission and would thus not be required to be captioned. Also, this provision applies only to video and multimedia presentations which contain speech or other audio information necessary for the comprehension of the content. A video that is not narrated would not be required to be captioned since it does not contain speech.

(d) All training and informational video and multimedia productions which support the agency's mission, regardless of format, that contain visual information necessary for the comprehension of the content, shall be audio described.

Paragraph (d) requires that certain multimedia presentations provide an audio description of visual material. A video or multimedia presentation that does not support an agency's mission would not be required to be audio described. This provision applies only to videos or multimedia presentations that contain visual information necessary for the comprehension of the content. A "talking heads" video does not generally contain visual information necessary for the comprehension of the content and would therefore not be required to be audio described.

(e) Display or presentation of alternate text presentation or audio descriptions shall be user-selectable unless permanent.

Paragraph (e) provides that the captioning and audio description required in (c) and (d) above must be user selectable unless permanent.

1194.25 - SELF CONTAINED, CLOSED PRODUCTS

(a) Self-contained products shall be usable by people with disabilities without requiring an end-user to attach assistive technology to the product. Personal headsets for private listening are not assistive technology.

Paragraph (a) provides that access features must be built-into a self contained, closed product rather than requiring users to attach an assistive device to the product. Personal headsets are not considered assistive technology and may be required to use the product.

(b) When a timed response is required, the user shall be alerted and given sufficient time to indicate more time is required.

Paragraph (b) addresses access problems that can arise when self contained, closed products require a response from a user within a certain time and is identical to §1194.22 (p) and §1194.23 (d). The final rule requires only that a user be notified if a process is about to time-out and be given an opportunity to answer a prompt asking whether additional time is needed.

(c) ***Where a product utilizes touchscreens or contact-sensitive controls, an input method shall be provided that complies with 1194.23 (k) (1) through (4).***

Paragraph (c) requires that when a product utilizes touchscreens or contact-sensitive controls, a method of operating the product be provided that complies with the provisions for controls in §1194.23 (k) (1) through (4).

(d) When biometric forms of user identification or control are used, an alternative form of identification or activation, which does not require the user to possess particular biological characteristics, shall also be provided.

Paragraph (d) addresses the use of biometric controls. Biometric controls refer to controls that are activated only if particular biological features (e.g., fingerprint, retina pattern, etc.) of the user matches specific criteria. Using retinal scans or fingerprint identification may become a common practice as a method of allowing an individual to gain access to personal data from an information transaction type of machine.

(e) When products provide auditory output, the audio signal shall be provided at a standard signal level through an industry standard connector that will allow for private listening. The product must provide the ability to interrupt, pause, and restart the audio at anytime.

Paragraph (e) requires that when products use audio as a way to communicate information, the auditory signal will be available through an industry standard connector at a standard signal level. Individuals using personal headphones, amplifiers, audio couplers, and other audio processing devices need a place to plug these devices into the product in a standard fashion. This gives the user

the ability to listen privately to the information. The product must also provide a method to pause, restart, and interrupt the flow of information.

(f) ***When products deliver voice output in a public area, incremental volume control shall be provided with output amplification up to a level of at least 65 dB. Where the ambient noise level of the environment is above 45 dB, a volume gain of at least 20 dB above the ambient level shall be user selectable. A function shall be provided to automatically reset the volume to the default level after every use.***

Paragraph (f) provides that when products deliver voice output, they shall provide incremental volume control with output amplification up to a level of at least 65 dB. Where the ambient noise level of the environment is above 45 dB, a volume gain of at least 20 dB above the ambient level shall be user selectable. According to the Occupational Safety and Health Administration, and the American Speech, Language, and Hearing Association, 65 dB is the volume level for normal speech. This provision requires that audio output from a kiosk type product shall have a minimum level of 65 dB. For people with reduced hearing, voice levels must be 20 dB above the surround sound level to be understandable.

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

Paragraph (g) addresses the use of color prompting and is identical to section 1194.21(i).

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

Paragraph (h) addresses color selection and contrast settings and is identical to section 1194.21(j).

(i) Products shall be designed to avoid causing the screen to flicker with a frequency greater than 2 Hz and lower than 55 Hz.

Paragraph (i) addresses the use of flashing objects and is identical to section 1194.21(k).

(j) Products which are freestanding, non-portable, and intended to be used in one location and which have operable controls shall comply with the following:

- ***(1) The position of any operable control shall be determined with respect to a vertical plane, which is 48 inches in length, centered on the operable control, and at the maximum protrusion of the product within the 48-inch length.***
- ***(2) Where any operable control is 10 inches or less behind the reference plane, the height shall be 54 inches maximum and 15 inches minimum above the floor.***
- ***(3) Where any operable control is more than 10 inches and not more than 24 inches behind the reference plane, the height shall be 46 inches maximum and 15 inches minimum above the floor.***
- **(4)** ***Operable controls shall not be more than 24 inches behind the reference plane.***

Paragraphs (j) (1) through (4) provide provisions for the physical characteristics of large office equipment including reach ranges and the general physical accessibility of controls and features. Examples of these products, include but are not limited to, copiers, information kiosks and floor standing printers. These provisions are based on the Americans with Disabilities Act Accessibility Guidelines

1194.26 - DESKTOP AND PORTABLE COMPUTERS

(a) All mechanically operated controls and keys shall comply with 1194.23 (k) (1) through (4).

Paragraph (a) addresses keyboards and other mechanically operated controls. These provisions are addressed further in sections 1194.23 (k) (1) through (4).

(b) If a product utilizes touchscreens or touch-operated controls, an input method shall be provided that complies with 1194.23 (k) (1) through (4).

Paragraph (b) provides that systems using touchscreen technology must also provide controls that comply with sections 1194.23 (k) (1) through (4).

(c) When biometric forms of user identification or control are used, an alternative form of identification or activation, which does not require the user to possess particular biological characteristics, shall also be provided.

Paragraph (c) requires that when biometric forms of identification are used, an alternative must also be available. This provision is identical to §1194.25 (d).

(d) ***Where provided, at least one of each type of expansion slots, ports and connectors shall comply with publicly available industry standards.***

Paragraph (d) requires that products have standard ports and connectors. This means that the connection points on a system must comply with a standard specification that is available to other manufacturers. This provision assures that the designers of assistive technology will have access to information concerning the design of system connections and thus be able to produce products that can utilize those connections.

Subpart C - Functional Performance Criteria

1194.31 - Functional performance criteria.

(a) ***At least one mode of operation and information retrieval that does not require user vision shall be provided, or support for assistive technology used by people who are blind or visually impaired shall be provided.***

Paragraph (a) provides that at least one mode of operation and information retrieval that does not require user vision shall be provided, or support for assistive technology used by people who are blind or visually impaired shall be provided. It is not expected that every software program will be

self-voicing or have its own built-in screen reader. Software that complies with §1194.21 would also satisfy this provision.

(b) ***At least one mode of operation and information retrieval that does not require visual acuity greater than 20/70 shall be provided in audio and enlarged print output working together or independently, or support for assistive technology used by people who are visually impaired shall be provided.***

Paragraph (b) provides that at least one mode of operation and information retrieval that does not require visual acuity greater than 20/70 (when corrected with glasses) must be provided in audio and enlarged print output that works together or independently. In the alternative, support for assistive technology used by people who are blind or who have low vision must be provided. Although visual acuity of 20/200 is considered "legally blind," there are actually millions of Americans with vision below the 20/200 threshold who can still see enough to operate and get output from technology, often with just a little additional boost in contrast or font size. This paragraph requires either the provision of screen enlargement and voice output or, that the product support assistive technology.

(c) ***At least one mode of operation and information retrieval that does not require user hearing shall be provided, or support for assistive technology used by people who are deaf or hard of hearing shall be provided.***

Paragraph (c) provides that at least one mode of operation and information retrieval that does not require user hearing must be provided, or support for assistive technology used by people who are deaf or hard of hearing shall be provided. This provision is met when a product provides visual redundancy for any audible cues or audio output. If this redundancy cannot be built-into a product then the product shall support the use of assistive technology.

(d) ***Where audio information is important for the use of a product, at least one mode of operation and information retrieval shall be provided in an enhanced auditory fashion, or support for assistive hearing devices shall be provided.***

Paragraph (d) requires that audio information important for the use of a product, must be provided in an enhanced auditory fashion by allowing for an increase in volume and/or altering the tonal quality or increasing the signal-to-noise ratio. For example, increasing the output would assist persons with limited hearing to receive information. Audio information that is important for the use of a product includes, but is not limited to, error tones, confirmation beeps and tones, and verbal instructions.

(e) At least one mode of operation and information retrieval that does not require user speech shall be provided, or support for assistive technology used by people with disabilities shall be provided.

Paragraph (e) provides that at least one mode of operation and information retrieval which does not require user speech must be provided, or support for assistive technology shall be provided. Most products do not require speech input. However, if speech input is required to operate a product, this paragraph requires that at least one alternative input mode also be provided. For example, an interactive telephone menu that requires the user to say or press "one" would meet this provision.

(f) At least one mode of operation and information retrieval that does not require fine motor control or simultaneous actions and that is operable with limited reach and strength shall be provided.

Paragraph (f) provides that at least one mode of operation and information retrieval that does not require fine motor control or simultaneous actions and which is operable with limited reach and strength must be provided.

Subpart D - Information, Documentation, and Support

1194.41 - Information, documentation, and support.

(a) Product support documentation provided to end-users shall be made available in alternate formats upon request, at no additional charge.

Paragraph (a) states that when an agency provides end-user documentation to users of technology, the agency must ensure that the documentation is available upon request in alternate formats. Alternate formats are defined in §1194.4, Definitions. Except as provided in paragraph (b) below, this provision does not require alternate formats of documentation that is not provided by the agency to other users of technology.

(b) End-users shall have access to a description of the accessibility and compatibility features of products in alternate formats or alternate methods upon request, at no additional charge.

Paragraph (b) requires that agencies supply end-users with information about accessibility or compatibility features that are built-into a product, upon request.

(c) ***Support services for products shall accommodate the communication needs of end-users with disabilities.***

Paragraph (c) provides that help desks and other support services serving an agency must be capable of accommodating the communications needs of persons with disabilities. For example, an agency help desk may need to communicate through a TTY. The help desk or support service must also be familiar with such features as keyboard access and other options important to people with disabilities.