

# REPORT DOCUMENTATION PAGE

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<b>15. SUBJECT TERMS</b> software, functionality, conformance, system of systems, accessibility, 508, compliance, enterprise, medical						
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U.S. ARMY TEST AND EVALUATION COMMAND  
TEST OPERATIONS PROCEDURE

\*Test Operations Procedure 01-2-701  
DTIC AD No.

17 December 2020

USER ACCESSIBILITY OF ENTERPRISE BUSINESS AND MEDICAL SOFTWARE

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## 1. OVERVIEW.

The Section 508 Amendment to the Rehabilitation Act of 1973 requires all federal agencies to make their Information Technology accessible to people with disabilities. This Test Operations Procedure (TOP) will focus on web accessibility requirements, which are assessed through Web Content Accessibility Guidelines (WCAG). The topics in this document identifies standard industry instrumentation, verification processes, and WCAG 2.0 compliance reporting. WCAG 2.0 guidelines contain subsections categorized as Level A, Level AA, and Level AAA requirements. Level A requirements represent the minimum a website must achieve to meet a guideline. Level AA requirements are additional standards applied to enhance the usability of websites for disabled users. Level AAA standards are the strictest; websites that meet these standards are the most accessible, however these requirements are usually optional. To meet Section 508 requirements, all web pages associated with a domain must meet all Level A and Level AA standards described in Appendix A and Appendix B respectively.

### 1.1 Purpose.

The purpose of this TOP is to explain processes and techniques that leverage the use of Commercial Off-The-Shelf (COTS) software to assess the compliance of web applications as they pertain to Section 508 accessibility standards.

### 1.2 Application.

This TOP is appropriate for all applicable web applications software, either acquired or developed.

### 1.3 Limitations.

This TOP is not applicable to systems with user interfaces not subject to Section 508 standards including those used for intelligence activities, cryptologic activities related to national security, command and control of military forces, equipment that is an integral part of a weapon or weapons system, or systems which are critical to the direct fulfillment of military or intelligence missions.

### 1.4 Web Accessibility Instrumentation.

The following tools are commonly used for accessibility testing and are identified with their latest version numbers. As new and improved tools are created, they will be added to the inventory. The list of tools include both automated utilities for scanning web sites and manual verification tools for web pages. A short description of each tool identifies their basic function. Section 2 will highlight sample use cases for each tool.

a. Odellus Comply First 2012. This tool is compliance verification software. Comply First is capable of scanning through the Hypertext Markup Language (HTML) code of an entire web domain. The details, Section 508 provision information, locations, number of reoccurrences

and recommended fixes for all violations are returned automatically. Comply First also includes manual verification tools.

b. Deque Axe v4.5.3. This tool is a web extension for Firefox or Chrome that tests compliance. Axe can flag violations within the browser but can only scan one page at a time. The details, number of reoccurrences, locations, and recommended fixes for all violations are returned automatically.

c. Wave v3.1. This is a browser extension for Firefox and Chrome that tests compliance. Wave flags violations within the browser, but scans only one page at a time. Wave graphically depicts where violations occur within a webpage. The details and number of reoccurrences for all violations are also returned.

d. Freedom Scientific Fusion v2019.1810.19. This is Assistive Technology (AT), which enables disabled users to utilize information technology. It includes tools such as the Job Access With Speech (JAWS) screen reader, Zoomtext screen magnifier, and screen enhancers. These Fusion products are used to test the software for accessibility elements that affect those with visual and hearing impairments.

## 2. TEST PROCEDURES.

Accessibility testing of web pages is most efficient when automation is maximized, and user input is limited. Odellus Comply First includes all WCAG reference documentation required to verify website Section 508 compliance. This tool enables testers to crawl through a Uniform Resource Locator (URL) to identify all associated links that must be scanned for compliance. Setting the crawl level to 99 will identify every link associated with the domain. To save time, the tester can select the “crawl + verify” option within Odellus Comply First to scan and verify web pages in accordance to WCAG 2.0 requirements. This can be done concurrently and is shown in an example below. It is important to note that pages that require user input will be reported as unreachable resulting in an incomplete assessment. In these cases, testers should be provided with scripts outlining how to fill out forms or input blocks to proceed to the next page to ensure a complete assessment and save run time. Browser based verification tools, and manual testing processes are used to retest pages that are unreachable or must be reassessed because of inconclusive or contradictory results.

### 2.1 Automated Section 508 Verification.

a. Odellus Comply First gives testers multiple options for scanning customer websites as indicated in Figure 1.

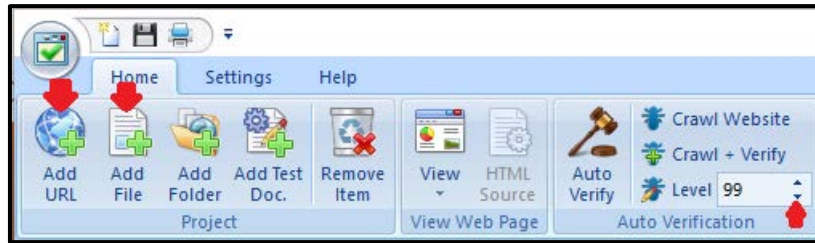


Figure 1. Comply First interface.

(1) Testers can upload HTML files from web pages and verify them with no internet connection or access to the website. Testers can also add a URL and scan a domain assuming they have access to customer networks or unrestricted access to the website. For domain scans, testers will set the crawl level to ensure complete site coverage or focus on part of the domain. For example, if the crawl level is set to three, it will scan links up to three extensions as indicated in the following web address [www.domain.gov/level1/level2/level3](http://www.domain.gov/level1/level2/level3). As discussed previously, setting the crawl level to 99 will scan the entire domain. No errors will appear as a result of a domain containing less than the specified number of extensions. After setting the crawl level, the tester will select the “crawl + verify” option to scan a domain for WCAG 2.0 compliance. Test results are shown in Figure 2.

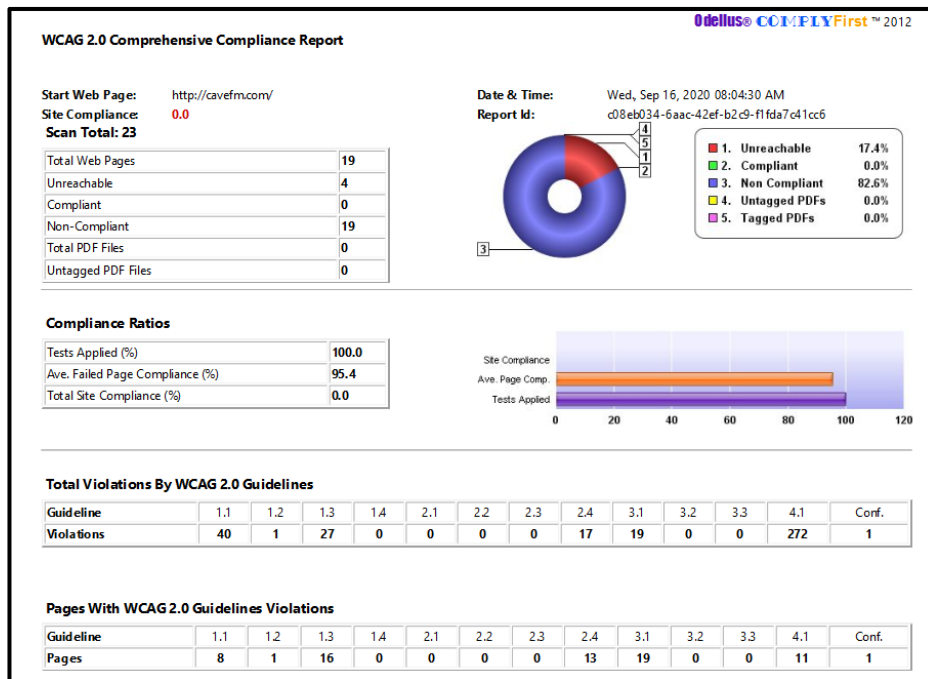


Figure 2. Comprehensive report.

(2) Comply First measures site compliance by calculating the percentage of webpages that failed verification. The categories of unreachable pages, and tagged and untagged Portable Document Format (PDF) files are not accounted for in this calculation. However, they are still important for the visually impaired, as tagging PDF files enables their screen reading software to identify a specific file. Total violations by guideline and number of pages with violations are displayed at the bottom of the screen. This is a Comprehensive Compliance Report, individual violation reports such as the Failed Pages Report and Compliance Detailed Report are provided to the customer for webpage corrections. These reports are discussed in Section 3. At the conclusion of leveraging the Comply First utility across the domain, web pages that could not be reached, or must be reassessed due to inconclusive or contradictory results, will be retested with browser based verification tools.

b. Browser Based Verification.

(1) When Comply First’s crawl function is used, it may generate a few reports stating a page was unreachable. These pages will be tested individually utilizing Deque’s Axe software. Axe verifies results within a browser as shown in Figure 3. The summary report allows the user to identify violations on the webpage and drill down to identify their respective fixes.

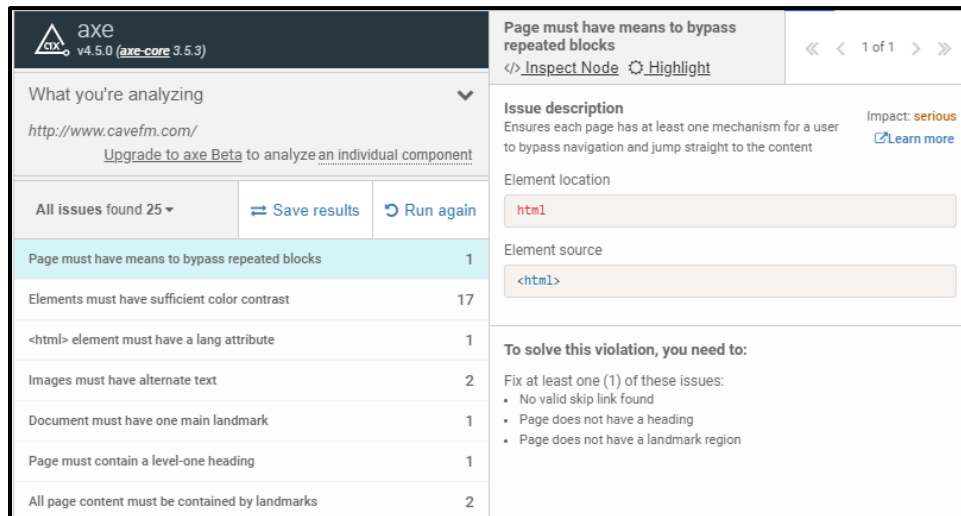


Figure 3. Deque Axe results.

(2) For systems that utilize Firefox or Chrome, Deque’s Wave browser extension further enriches browser-based results. The Wave web extension identifies violations, but also reveals their locations graphically within the web page. Figure 4 reveals how these graphics are applied. Wave also provides explanations for why something was flagged as a violation, an overview of which rules were broken, and how many times they were broken.



Figure 4. Wave results.

## 2.2 Manual Section 508 Verification.

a. Some Section 508 Standards cannot be verified automatically thus manual testing must take place. For example, automated software can determine whether a title is in plain text or not, but cannot determine if that title is descriptive given the context of the page content. To perform a manual test, testers must inspect the website with AT. Testers will utilize the Scientific American Fusion software, which includes the JAWS screen reader and Zoomtext screen enhancement utilities. The interface for JAWS is shown in Figure 5.

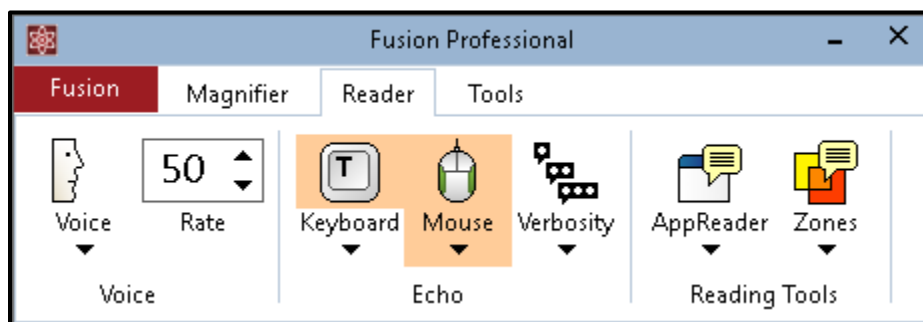


Figure 5. Fusion JAWS interface.

b. The JAWS screen reader is used to read aloud both focused and alternative text. This enables testers to evaluate requirements such as reasonable tab order, and descriptive alternative text for images. JAWS provides other utilities such as an automated app reader that enables testers to navigate a page without the use of a keyboard. The Zoomtext interface is shown in Figure 6.

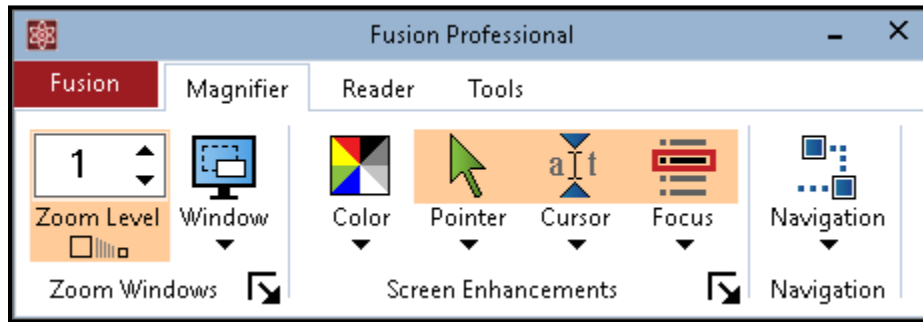


Figure 6. Fusion Zoomtext interface.

c. Zoomtext screen enhancement tools include a text magnifier, color enhancer, and focus border, which further aid testers in determining WCAG 2.0 site compliance. For example, testers can use the zoom utility to test for compliance to requirements guiding text sizing and zoom compatibility. To record violations discovered manually with Zoomtext or JAWS, Odellus Comply First tools will be used to categorize the HTML code violation. When the HTML code violation is identified as in Figure 7, the accessibility violation form appears (Figure 8).

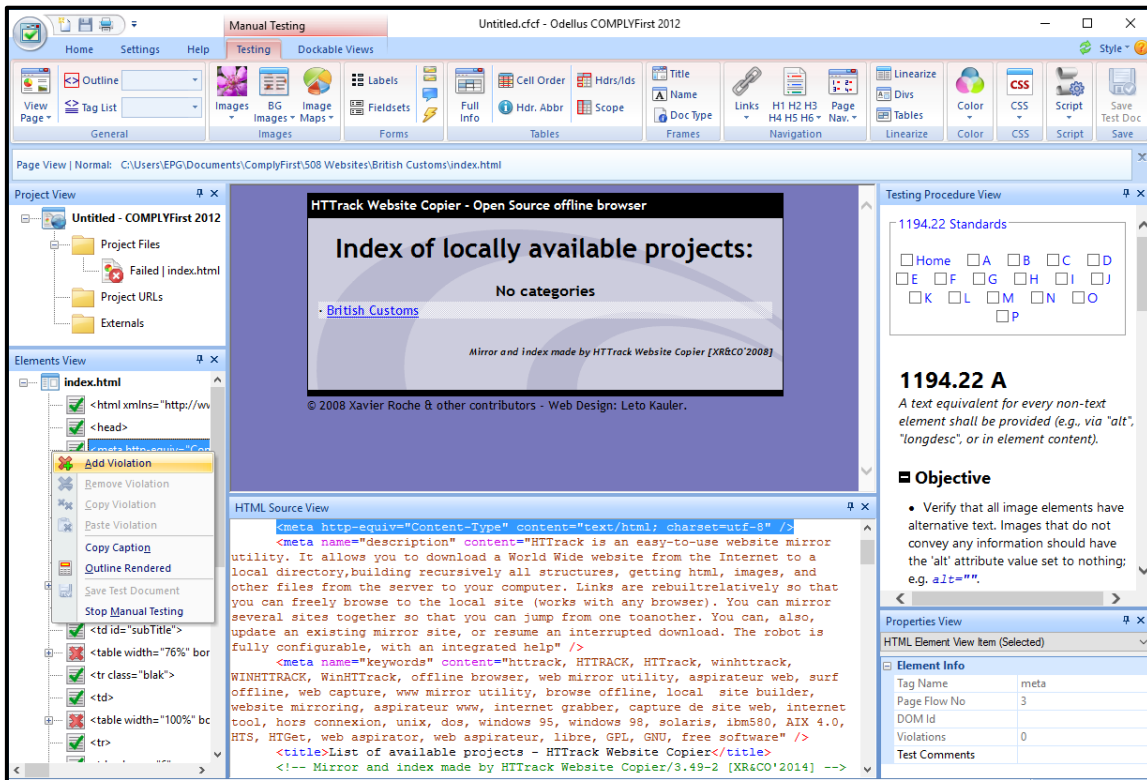


Figure 7. Comply First manual interface.

The screenshot shows the "Add Accessibility Violation" dialog box. It features a golden scales icon on the left. The "Source" field contains the HTML code: `<meta http-equiv="Content-Type" content="text/html; charset=windows-1252">`. Below this are several input fields for "Violation Details (\* Required)", including "Description", "Suggested Repair", "Other Details", and "Image Location". There are also dropdown menus for "WCAG 2.0 (\* Required)" with "Guideline" and "Success Criterion" options, and a "Section 508 1194.22 (Optional)" section with a "Provision" dropdown. The dialog box has "OK" and "Cancel" buttons at the bottom.

Figure 8. Accessibility violation form.

d. Testers will utilize the violation details section to describe the violation and recommend a fix. Testers will also identify the WCAG criteria the violation falls under.

### 3. PRESENTATION OF DATA.

a. Data presentation will be dependent upon the results of WCAG 2.0 using both manual and automated tools. All relevant conformance data will be delivered via the Failed Pages Report, the Unreachable Pages Report (not shown, as it is a list of web links), and the Detailed Compliance Report. The format of these reports are not customizable and are provided as PDF files. The Failed Pages Report shown in Figure 9 allows for a quick review of results.

**WCAG 2.0 Failed Pages Report** Odellus COMPLYFirst™ 2012

Start Web Page: <http://cavefm.com/> Date & Time: Wed, Sep 16, 2020 08:08:11 AM  
 Total Failed Pages: 19 Report Id: c860f26f-d3d8-43fe-8318-0edc0ec50e09  
<http://cavefm.com/>

Auto Tested: Yes													Manually Tested: No	
WCAG 2.0 Guideline	1.1	1.2	1.3	1.4	2.1	2.2	2.3	2.4	3.1	3.2	3.3	4.1	Conf.	Total
Flagged	2	0	1	0	0	0	0	1	1	0	0	15	0	20

[http://cavefm.com/cave\\_coverage.html](http://cavefm.com/cave_coverage.html)

Auto Tested: Yes													Manually Tested: No	
WCAG 2.0 Guideline	1.1	1.2	1.3	1.4	2.1	2.2	2.3	2.4	3.1	3.2	3.3	4.1	Conf.	Total
Flagged	2	1	1	0	0	0	0	1	1	0	0	0	1	7

<http://cavefm.com/cavemen.html>

Auto Tested: Yes													Manually Tested: No	
WCAG 2.0 Guideline	1.1	1.2	1.3	1.4	2.1	2.2	2.3	2.4	3.1	3.2	3.3	4.1	Conf.	Total
Flagged	7	0	1	0	0	0	0	2	1	0	0	1	0	12

<http://cavefm.com/contact.html>

Auto Tested: Yes													Manually Tested: No	
WCAG 2.0 Guideline	1.1	1.2	1.3	1.4	2.1	2.2	2.3	2.4	3.1	3.2	3.3	4.1	Conf.	Total
Flagged	0	0	10	0	0	0	0	1	1	0	0	59	0	71

Figure 9. Failed pages report.

b. The number of flags under each criteria for every page is displayed in this document. It will let the customer know which pages are most problematic and for what reasons. The Detailed Compliance Report is shown in Figure 10.

WCAG 2.0 Compliance Detailed Report			
<a href="#">Show Full Header</a>		WCAG 2.0 Violations: 20	Compliance Status: <b>Not Compliant</b>
Page URL: <a href="http://cavefm.com/">http://cavefm.com/</a>			
WCAG 2.0 Compliance Test Results			
Guideline	Description	Flagged	Compliance
1.1	<p><b>Text Alternatives:</b> Provide text alternatives for any non-text content so that it can be changed into other forms people need, such as large print, braille, speech, symbols or simpler language.</p> <p>Success Criterion: 1.1.1 - (A) Missing Alt Text</p> <p><b>Check:</b> Image is missing alternative text.</p> <p><b>Repair:</b> Dedare an <code>alt</code> attribute for this image and set its value to the equivalent text. For example, <code>alt="Equivalent text"</code>. If this is an "Invisible / Decorative / Formatting" image, set its value to null. For example, <code>alt=""</code>.</p> <p>Tag Number: 9  <code>&lt;img border="0" src="caveLogo4.gif" width="1057" height="147"&gt;</code></p> <p>Tester(s): COMPLY First-AV            Date Tested: Wed, Sep 16, 2020 08:04:25 AM            Image Path: None</p>	2	Failed
1.2	<p>Success Criterion: 1.1.1 - (A) Missing Alt Text</p> <p><b>Check:</b> Image is missing alternative text.</p> <p><b>Repair:</b> Dedare an <code>alt</code> attribute for this image and set its value to the equivalent text. For example, <code>alt="Equivalent text"</code>. If this is an "Invisible / Decorative / Formatting" image, set its value to null. For example, <code>alt=""</code>.</p> <p>Tag Number: 70  <code>&lt;img border="0" src="cave.jpg" width="823" height="496"&gt;</code></p> <p>Tester(s): COMPLY First-AV            Date Tested: Wed, Sep 16, 2020 08:04:25 AM            Image Path: None</p>	0	Passed
1.2	<b>Time-based Media:</b> Provide alternatives for time-based media.	0	Passed

Figure 10. Comply First detailed report.

c. The details, locations, and suggested fixes for all violations are displayed in this report. It provides customers the means to address WCAG violations. Both reports present the data in a clear concise manner for a broad audience. Do note, results from browser extensions cannot be saved; therefore testers will adjudicate results not otherwise captured by Comply First and add violations to results manually. This will allow additional information from browser extensions to be reflected in the detailed and failed pages reports.

d. Data harvesting should occur at the conclusion of manual testing. This will allow the most comprehensive reports to be generated. To validate data, testers will manually verify automated results and/or re-test pages with all browser based verification tools as discussed in Section 2.

APPENDIX A. WEB CONTENT ACCESSIBILITY GUIDELINES (WCAG) TESTING  
CRITERIA LEVEL A.

CRITERIA	CONFORMANCE LEVEL
<a href="#">1.1.1 Non-text Content (Level A)</a>	A
<a href="#">1.2.1 Audio-only and Video-only (Prerecorded) (Level A)</a>	A
<a href="#">1.2.2 Captions (Prerecorded) (Level A)</a>	A
<a href="#">1.2.3 Audio Description or Media Alternative (Prerecorded) (Level A)</a>	A
<a href="#">1.3.1 Info and Relationships (Level A)</a>	A
<a href="#">1.3.2 Meaningful Sequence (Level A)</a>	A
<a href="#">1.3.3 Sensory Characteristics (Level A)</a>	A
<a href="#">1.4.1 Use of Color (Level A)</a>	A
<a href="#">1.4.2 Audio Control (Level A)</a>	A
<a href="#">2.1.1 Keyboard (Level A)</a>	A
<a href="#">2.1.2 No Keyboard Trap (Level A)</a>	A
<a href="#">2.1.4 Character Key Shortcuts (Level A 2.1 only)</a>	A
<a href="#">2.2.1 Timing Adjustable (Level A)</a>	A
<a href="#">2.2.2 Pause, Stop, Hide (Level A)</a>	A
<a href="#">2.3.1 Three Flashes or Below Threshold (Level A)</a>	A
<a href="#">2.4.1 Bypass Blocks (Level A)</a>	A
<a href="#">2.4.2 Page Titled (Level A)</a>	A
<a href="#">2.4.3 Focus Order (Level A)</a>	A
<a href="#">2.4.4 Link Purpose (In Context) (Level A)</a>	A
<a href="#">2.5.1 Pointer Gestures (Level A 2.1 only)</a>	A
<a href="#">2.5.2 Pointer Cancellation (Level A 2.1 only)</a>	A
<a href="#">2.5.3 Label in Name (Level A 2.1 only)</a>	A
<a href="#">2.5.4 Motion Actuation (Level A 2.1 only)</a>	A
<a href="#">3.1.1 Language of Page (Level A)</a>	A
<a href="#">3.2.1 On Focus (Level A)</a>	A
<a href="#">3.2.2 On Input (Level A)</a>	A
<a href="#">3.3.1 Error Identification (Level A)</a>	A
<a href="#">3.3.2 Labels or Instructions (Level A)</a>	A
<a href="#">4.1.1 Parsing (Level A)</a>	A
<a href="#">4.1.2 Name, Role, Value (Level A)</a>	A

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APPENDIX B. WEB CONTENT ACCESSIBILITY GUIDELINES (WCAG) TESTING  
CRITERIA LEVEL AA.

CRITERIA	CONFORMANCE LEVEL
<a href="#">1.2.4 Captions (Live) (Level AA)</a>	AA
<a href="#">1.2.5 Audio Description (Prerecorded) (Level AA)</a>	AA
<a href="#">1.3.4 Orientation (Level AA 2.1 only)</a>	AA
<a href="#">1.3.5 Identify Input Purpose (Level AA 2.1 only)</a>	AA
<a href="#">1.4.3 Contrast (Minimum) (Level AA)</a>	AA
<a href="#">1.4.4 Resize text (Level AA)</a>	AA
<a href="#">1.4.5 Images of Text (Level AA)</a>	AA
<a href="#">1.4.10 Reflow (Level AA 2.1 only)</a>	AA
<a href="#">1.4.11 Non-text Contrast (Level AA 2.1 only)</a>	AA
<a href="#">1.4.12 Text Spacing (Level AA 2.1 only)</a>	AA
<a href="#">1.4.13 Content on Hover or Focus (Level AA 2.1 only)</a>	AA
<a href="#">2.4.5 Multiple Ways (Level AA)</a>	AA
<a href="#">2.4.6 Headings and Labels (Level AA)</a>	AA
<a href="#">2.4.7 Focus Visible (Level AA)</a>	AA
<a href="#">3.1.2 Language of Parts (Level AA)</a>	AA
<a href="#">3.2.3 Consistent Navigation (Level AA)</a>	AA
<a href="#">3.2.4 Consistent Identification (Level AA)</a>	AA
<a href="#">3.3.3 Error Suggestion (Level AA)</a>	AA
<a href="#">3.3.4 Error Prevention (Legal, Financial, Data) (Level AA)</a>	AA
<a href="#">4.1.3 Status Messages (Level AA 2.1 only)</a>	AA

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APPENDIX C. ABBREVIATIONS.

AD No.	accession number
APG	U.S. Army Aberdeen Proving Ground
AT	Assistive Technology
ATEC	U.S. Army Test and Evaluation Command
COTS	commercial off-the-shelf
DOD	Department of Defense
DTIC	Defense Technical Information Center
HTML	Hypertext Markup Language
ISO	International Organization for Standardization
JAWS	Job Access With Speech
PDF	portable document format
TOP	Test Operations Procedure
URL	Uniform Resource Locator
WCAG	Web Content Accessibility Guidelines

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APPENDIX D. REFERENCES.

For information only (related publications).

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APPENDIX D. REFERENCES.

1. U.S. Army Test and Evaluation Command (ATEC) Regulation 73-1, Test and Evaluation, System Test and Evaluation Policy, 13 May 2019.

APPENDIX E. APPROVAL AUTHORITY.

CSTE-CI

17 December 2020

MEMORANDUM FOR

Commander, U.S. Army Operational Test Command  
Director, U.S. Army Evaluation Center  
Commanders, ATEC Test Centers  
Technical Directors, ATEC Test Centers

SUBJECT: Test Operations Procedure 01-2-701, User Accessibility of Enterprise  
Business and Medical Software, Approved for Publication

1. Test Operations Procedure (TOP) 01-2-701, User Accessibility of Enterprise Business and Medical Software, has been reviewed by the U.S. Army Test and Evaluation Command (ATEC) Test Centers, the U.S. Army Operational Test Command, and the U.S. Army Evaluation Center. All comments received during the formal coordination period have been adjudicated by the preparing agency.
2. Scope of the document. This TOP explains processes and techniques that leverage the use of commercial off-the-shelf software to assess the compliance of web applications as they pertain to Section 508 accessibility standards.
3. This document is approved for publication and has been posted to the Reference Library of the ATEC Vision Digital Library System (VDLS). The VDLS website can be accessed at <https://vdls.atc.army.mil/>.
4. Comments, suggestions, or questions on this document should be addressed to U.S. Army Test and Evaluation Command (CSTE-CI), 6617 Aberdeen Boulevard-Third Floor, Aberdeen Proving Ground, MD 21005-5001; or e-mailed to [usarmy.apg.atec.mbx.atec-standards@mail.mil](mailto:usarmy.apg.atec.mbx.atec-standards@mail.mil).

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Integration (DCI)

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