Human-System Interface Design Review Guideline

Reviewer's Checklist

Final Report

Manuscript Completed: March 1996
Date Published: June 1996

Division of Systems Technology
Office of Nuclear Regulatory Research
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

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ABSTRACT

NUREG-0700, Revision 1, provides human factors engineering (HFE) guidance to the U.S. Nuclear Regulatory Commission staff for its: (1) review of the human system interface (HSI) design submittals prepared by licensees or applicants for a license or design certification of commercial nuclear power plants, and (2) performance of HSI reviews that could be undertaken as part of an inspection or other type of regulatory review involving HSI design or incidents involving human performance. The guidance consists of a review process and HFE guidelines. The document describes those aspects of the HSI design review process that are important to the identification and resolution of human engineering discrepancies that could adversely affect plant safety. Guidance is provided that could be used by the staff to review an applicant's HSI design review process or to guide the development of an HSI design review plan, e.g., as part of an inspection activity. The document also provides detailed HFE guidelines for the assessment of HSI design implementations. NUREG-0700, Revision 1, consists of three stand-alone volumes. Volume 1, Human System Interface Design Review Guideline: Process and Guidelines, is the principal technical document and provides a detailed discussion of both the review procedures and HFE guidelines. Volume 2, Human System Interface Design Review Guideline: Reviewer's Checklist, provides the HFE guidelines in a checklist format. Volume 3, Human System Interface Design Review Guideline: Review Software and User's Guide, contains an interactive software application to support design reviews.

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PREFACE

NUREG-0700, Revision 1, consists of three volumes. The contents of each are briefly described below.

Volume 1 - Human System Interface Design Review Guideline: Process and Guidelines

Volume 1 consists of two major parts. Part 1 describes those aspects of the review process of the human system interface (HSI) design that are important to identifying and resolving human engineering discrepancies (HEDs). Guidance is provided that could be used by the staff to review an applicant's or licensee's HSI design review process. Part 1 could also be used by the staff to assist with developing an HSI design review plan that might be used, for example, as part of an inspection activity. Part 2 of Volume 1 contains detailed guidelines for a human factors engineering (HFE) review which identify criteria for assessing the implementation of an applicant's or licensee's HSI design.

Volume 2 - Human System Interface Design Review Guideline: Reviewer's Checklist

Volume 2 is a complete set of the guidelines contained in Volume 1, Part 2, but in a checklist format that can be used by reviewers to assemble sets of individual guidelines for use in specific design reviews. The checklist provides space for reviewers to enter guidelines evaluations and comments.

Volume 3 - Human System Interface Design Review Guideline: Review Software and User's Guide

Volume 3 contains an interactive software application of the NUREG-0700, Revision 1 guidance and a user's guide for this software. The software supports reviewers during review preparation, evaluation design using the HFE guidelines, and in report preparation. The user's guide provides system requirements and installation instructions, detailed explanations of the software's functions and features, and a tutorial on using the software.

ACRONYMS

ACR	advanced control room
AEOD	Office for Analysis and Evaluation of Operational Data
ARP	alarm response procedure
CFR	U.S. Code of Federal Regulations
CIE	Commission Internationale de l'Eclairage
COL	combined operating license
CR	control room
DCRDR	detailed control room design review
DBA	design basis accident
DRG	Design Review Guideline
EOF	emergency operations facility
FCC	Federal Communications Commission
HED	human engineering discrepancy
HFE	human factors engineering
HRA	human reliability analysis
HSI	human system interface
I&C	instrumentation and control
INSAG	International Nuclear Safety Advisory Group
KBS	knowledge-based system
LCS	local control station
LED	light-emitting diode
LER	licensee event report
LOS	line of sight
MFTA	modulation transfer function area
MPCD	minimum perceptible color difference
MUX	multiplexer
NPP	nuclear power plant
NRC	U.S. Nuclear Regulatory Commission
P&ID	pipng and instrumentation diagram
PRA	probabilistic risk assessment
PWR	pressurized water reactor
RF	radio frequency
SAR	safety analysis report
SDCV	spatially-dedicated, continuously visible display
SGTR	steam generator tube rupture
SPDS	safety parameter display system
SRP	Standard Review Plan
SSAR	standard safety analysis report
T&E	test and evaluation
TSC	technical support center

ACRONYMS (Cont'd.)

UCS	uniform color space
UHF	ultra high frequency
V&V	verification and validation
VDU	video display unit

INTRODUCTION

The Human-System Interface Design Review Guideline (NUREG-0700, Rev. 1) contains guidance to support the U.S. Nuclear Regulatory Commission (NRC) staff's review of nuclear power plant (NPP) human-system interfaces (HSIs). The guidance consists of design review procedures (contained in Volume 1, Part 1) and human factors engineering (HFE) guidelines (contained in Volume 1, Part 2). This document, Volume 2, provides the HFE guidelines in a checklist format. Before using this checklist, the reviewer should be familiar with the HSI design review objectives, scope, and procedures described in Volume 1. As stated in the Preface, the guidelines are also available in electronic form in Volume 3.

HFE GUIDELINE DESCRIPTION

The HFE guidelines in Volume 1, Part 2, consist of the following components:

- *Guideline Number* - Each guideline has a unique number which reflects its section/subsection location, followed by a dash and then its unique number. For example, in Guideline 1.1-1, Display Screen Partitioning for HSI Functions, the "1.1" indicates that it is located in Section 1.1, General Display Principles, and the "-1" indicates that it is the first guideline in the section. Within sections or subsections, individual guidelines are numbered consecutively.
- *Guideline Title* - Each guideline has a unique, descriptive title.
- *Review Criterion* - Each guideline contains a statement of an HSI characteristic with which the reviewer may judge the HSI's acceptability. The criterion is not a requirement, and discrepant characteristics may be judged acceptable as per the procedures in the review process (see Volume 1, Part 1).
- *Additional Information* - For many guidelines, additional information is given which may address clarifications, examples, exceptions, details regarding measurement, figures, or tables. This information is intended to assist the reviewer in interpreting or applying the guideline.
- *Source* - The source document(s) from which the guideline was developed is shown in superscript, according to the suffix number of the NUREG or NUREG/CR (e.g., a guideline from NUREG-0700, Rev. 0, is referenced as 0700 in superscript following the *Additional Information*).

In the interest of space, this checklist does not contain the *Additional Information* and *Source* components of the guidelines, nor the tables or figures that are referenced in the *Additional Information*. The tables and figures referred to in the review criterion are included in this checklist. However, for consistency across the volumes, these tables and figures have the same numbers as they have in Volume 1, Part 2; that is, they have not been renumbered for this checklist. Tables and figures occasionally contain reference notes. The full citations for these notes are contained on page 427 of Volume 1.

When a guideline in Volume 1 includes the *Additional Information* component, this checklist will show [AI] after the guideline. The reviewer should consult Volume 1, if necessary, to obtain the additional information and source documents.

Figure 1 illustrates the appearance of a guideline in Volume 1, and Figure 2 illustrates the appearance of the same guideline as it is presented in this checklist.

As shown in Figure 2, each guideline in the checklist contains space for the reviewer to evaluate the guideline (see the Design Evaluation section below) and to comment on the evaluation. The way in which the checklist is to be used is described in the next section.

1.1-1 Display Screen Partitioning for HSI Functions

A standard display screen organization should be evident for the location of various HSI functions (such as a data display zone, control zone, or message zone) from one display to another.

ADDITIONAL INFORMATION: Consistent display screen organization will help establish and preserve user orientation. Reserved screen areas, for example, might be used for a display title, alarms, display control options, instructions, error messages, and menus. Display formats should be consistent with accepted usage and existing user habits.^{5908,0700}

Figure 1 Appearance of a guideline in Volume 1

1.1-1 Display Screen Partitioning for HSI Functions

A standard display screen organization should be evident for the location of various HSI functions (such as a data display zone, control zone, or message zone) from one display to another.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

Figure 2 Appearance of a guideline in Volume 2 (checklist)

USE OF THE CHECKLIST

Preparation

The guidelines in this checklist are mainly used in carrying out a HFE Design Verification, i.e., an assessment that the characteristics of the HSI, including devices and the work environment, conform to HFE guidelines. The reviewer should follow the procedures described in Section 4.2, HFE Design Verification, of Volume 1, Part 1, in preparation for using the guidelines.

As described in the design review methodology, it may not be necessary to review each HSI component or characteristic. A sampling strategy may be employed to identify a subset of HSI components and characteristics to be reviewed. Once the appropriate aspects of the HSI are identified, the reviewer can select the appropriate guidelines to support the review.

Guideline Selection

The HFE guidelines address a broad range of technologies and HSI characteristics. Not all of the guidelines will be applicable to each design review. The guidelines selected should be based on the characteristics of the HSI components that are to be addressed by the evaluation. Different HSI components have different characteristics and, therefore, require different guidelines for their review.

Selection of Guidelines should be accomplished by matching the HSI characteristics (as defined in Section 3.4, HSI Inventory and Characterization, of Volume 1, Part 1) to the topics contained in the guidelines. For example, if the design implementation used bar charts, graphs, and mimic display formats, then the guidelines selected should include the specific sections of guidelines pertaining to these formats (Sections 1.2.4, 1.2.5, and 1.2.8, of this checklist, respectively); it would not be necessary to include guidance for table or data form display formats. Thus, for a specific review, only the subset of guidelines that are applicable to the design need be used.

The guidelines in this checklist have been provided in binder format so that the necessary subset of guidelines can be separated from those that are not needed.

Design Evaluation

The general methodology is to compare the HSI component's characteristics and functions with the criteria provided in the HFE guidelines. HFE guidelines are applicable to different aspects of the HSI design implementation: task-independent aspects (e.g., font size), task-specific aspects (e.g., scale units), and task integration aspects (e.g., control-display proximity).

To enable the reviewer to enter the results of an evaluation, check boxes are provided with space for handwritten comments below and to the left of each guideline (see Figure 2). For each selected guideline, the reviewer should determine whether the aspect of the HSI being reviewed should be marked as follows:

- **OK** - This indicates that the aspect of the HSI is acceptable. This evaluation should be given only if there is total compliance, i.e., only if every instance of the item being reviewed is fully consistent with the provisions of the guideline. If there is any instance of full or partial noncompliance, then an evaluation of **Discrepancy** should be given (see below).

- **Discrepancy**- This indicates that the aspect of the HSI under review is discrepant from the guideline; i.e., there is less than total compliance with the guideline. (It should be noted that, as described in Volume 1, Part 1, Section 4.2, HFE Design Verification, discrepancies could be acceptable within the context of the fully integrated design.)
- **N/A**- This should be checked for individual guidelines that do not apply to the particular review. Since the guidelines are selected for inclusion in the review on a section-by-section basis, an individual guideline within an included section may not be relevant.
- **Return** - This should be indicated when a guideline is applicable but the information needed to make the evaluation is not available. In this case, the reviewer can check the **Return** box and indicate what is needed to complete the evaluation (e.g., a measurement, documentation, or consultation with an operator). Providing a reason to return to the guideline will make it easier to group and find all guidelines requiring the same information, e.g., access to operators, when the information source becomes available. Once the information is available, the appropriate evaluation can be entered in the check box.

The **Comment** space under each guideline (see Figure 2) can be used to record the reviewer's notes, such as to identify the HSI component (e.g., a display number), or an explanation of the type of discrepancy.

1 INFORMATION DISPLAY

1.1 General Display Guidelines

NUREG-0700, Rev.1, Vol. 2
Page 1-1

1.1-1 Display Screen Partitioning for HSI Functions

A standard display screen organization should be evident for the location of various HSI functions (such as a data display zone, control zone, or message zone) from one display to another.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.1-2 Display Conventions

Consistent interface design conventions should be evident for all display features (such as labels).[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.1-3 Numeral and Letter Styles

Numeral and letter styles should be simple and consistent.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.1-4 Distinctive HSI Functional Organization and Display Elements

The HSI functional zones and display features should be visually distinctive from one another, especially for on-screen command and control elements (which should be visibly distinct from all other screen structures).[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.1-5 Display Title

Every display should begin with a title or header at the top, briefly describing the contents or purpose of the display.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

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1.1-6 Display Identification

Every display page should have a unique identification to provide a reference for use in requesting the display of that page.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.1-7 Hierarchy of Titles

Where displays have several levels of titles (and/or labels), the system should provide visual cues to aid users in distinguishing among the levels in the hierarchy.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.1-8 Display Simplicity

Displays should present the simplest information consistent with their function; information irrelevant to the task should not be displayed, and extraneous text and graphics should not be present.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.1-9 Redundancy

Redundancy in the presentation of information items should be limited to cases where needed for backup or to avoid excessive operator movement.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.1-10 Availability of Task-Related Information

All information required by the user during a task should be available on the current display.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

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1.1-11 Uncluttered Displays

Displays should be as uncluttered as possible.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.1-12 Task-Related Partitioning of Displays

When displays are partitioned into multiple pages, function/task-related data items should be displayed together on one page.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.1-13 Numbering Pages of Multipage Displays

Users working with multipage displays should be provided with a page location reference within the display sequence.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.1-14 Display Frame Location Cues

Users viewing a portion of a larger display should be provided with an indication of the location of the visible position of a display (frame) in the overall display.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.1-15 Grouping of Information in a Display

Information on a display should be grouped according to principles obvious to the user, e.g., by task, system, function, or sequence, based upon the user's requirements in performance of the ongoing task.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.1-16 Demarcation of Groups

When information is grouped on a display, the groups should be made visually distinct by such means as color coding or separation using blanks or demarcation lines.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.1-17 Appropriate Display Format

The display presentation format, e.g., table, graph, or flowchart, should be consistent with tasks that the user will be performing with the displayed information.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.1-18 Display Information in Directly Usable Form

Information should be displayed to users in directly usable form consistent with the task requirements.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.1-19 Indication of Transformations Needed

If it is necessary to multiply or divide the displayed readings by powers of 10 to determine quantitative value, the operation required and result derived must be clearly indicated.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.1-20 Display Information Consistent with User Conventions

Information should be displayed consistently according to standards and conventions familiar to users.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.1-21 Display Information Consistent with Control Requirements

Displays should be consistent in word choice, format, and basic style with requirements for data and control entry.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.1-22 Sensitivity

Display dynamic sensitivity should be selected to minimize the display of normal random variations in equipment performance.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.1-23 Display Flexibility

Users should be able to control the amount, format, and complexity of displayed data to meet task requirements.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.1-24 Range of Conditions Displayed

The display system should correctly display information about the plant's safety status including severe accident symptoms.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.1-25 Actual System/Equipment Status

Indications of the actual status of plant systems and equipment, as opposed to demand status, should be provided when required by the task.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.1-26 Rapid Recognition of Safety Status Change

User comprehension of a change in the safety status from critical safety function displays should be achieved in a matter of seconds.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.1-27 Display of Parameters and Variables Important to Safety

Plant parameters and variables important to safety should be displayed in a way that is convenient and readily accessible to control room operators.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.1-28 Critical Safety Function Display Visibility

Critical safety function displays should be readable from the workstations of users needing access to these displays.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.1-29 Normal Value Reference Index

Displays should contain reference(s) to the values of normal operating condition(s).[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.1-30 Critical Value Reference Index

A reference index should be included in a display when the user must compare displayed information with some critical value. Limit marks should be used for each critical plant parameter displayed.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

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1.1-31 Critical Parameter Monitoring Support

The system should assist the user in monitoring critical parameters, especially parameters that change very rapidly or very slowly, by alerting the user when values are out of range.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.1-32 Choice of Setpoints

Setpoints used to indicate a change in status should be chosen to provide users with sufficient time to respond appropriately.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.1-33 Coding Display Items Requiring Rapid Discrimination

Coding should be provided when a user must distinguish rapidly among different categories of displayed data.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.1-34 Meaningful Codes

Meaningful or familiar codes should be used, rather than arbitrary codes.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.1-35 Consistent Coding Across Displays

Consistent meanings should be assigned to codes, from one display to another.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

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1.1-36 Readability of Coded Information

Coding should not interfere with the readability of displayed information.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.1-37 Coding and Transmission Time

Coding should not increase transmission time.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.1-38 Distinctive Coding of Critical Information

Distinctive means of coding/highlighting should be used when a user's attention must be directed to changes in the state of the system, critical or off-normal data, and hazardous conditions.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.1-39 Highlighting Text Displays

When critical text merits emphasis to set it apart from other text, that text should be highlighted by bolding/brightening or color coding or by some auxiliary annotation.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.1-40 Graphic Display Enhancement With Text

When a graphic display contains some outstanding or discrepant feature that merits attention by a user, supplementary text should be displayed to emphasize that feature.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

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1.1-41 Graphic Display Enhancement With Numeric Values

When precise reading of a graphic display is required, the display should be annotated with actual data values to supplement their graphic representation.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.1-42 Display Enhancement With Time Data

When task performance requires or implies the need to assess currency of information within a display, the information should be annotated with time information.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.1-43 Alert to Higher Level Displays

While viewing secondary displays, a perceptual (audible or visual) cue should be provided by the system to alert the user to return to the primary display format if significant information in that display requires user attention.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.1-44 Freezing Rapidly Changing Information

When task requirements dictate that current information changes be continuously viewed and the display is changing so rapidly that the information is difficult to read, the user should have the capability of simultaneously viewing the information in a supplemental "snapshot" display (i.e., a display frozen to enhance readability) along with the continuous display.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

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1.1-45 Freeze Feedback

If a display has a freeze capability, the display should have an obvious reminder that it is in the freeze mode.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.1-46 Indication of Display System Failure

A display feature should be provided to indicate to the user that the system is operating properly (or that a system failure has occurred).[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.1-47 On-Line Dictionary of Display Element Definitions

The user should have access to a dictionary that contains definitions for all display element conventions through the display or an on-line help system.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.1-48 Display Background Color

A single nondistracting background color should be used that has a hue/contrast which allows the data (foreground) to be easily visible and which does not distort or interfere with the coding aspects of the display.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.1-49 Readability Conditions

Important display elements and codes should be identifiable and readable from the maximum viewing distance and under minimal ambient lighting conditions.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

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1.1-50 Labeling Scrollable and Multipage Displays

General labels and row/column labels should remain along the top (or bottom) and left (or right) edges of the display.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ●	Reason:

1.1-51 Data Overlays

Displayed information which temporarily overlays and obscures other display data should not erase the overlaid data.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ►	Reason:

1.1-52 Physical Overlays

Overlays should not distract or interfere with the observation or interpretation of displayed information.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ►	Reason:

1.1-53 Hardcopy of VDU Displays

Users should be able to obtain a hardcopy of any VDU display.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ►	Reason:

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1.2 Display Formats

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1.2.1 Continuous Text Displays

1.2.1-1 Standard Text Format

A standard text display format should be used from one display to another.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.1-2 Consistency Between VDU-Based Text and Printed Text

VDU displays of textual data, messages, or instructions should generally follow design conventions for printed text.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.1-3 Sentences Begin with Main Topic

The main topic of each sentence should be located near the beginning of the sentence.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.1-4 Clarity of Wording

Text displays should employ simplicity and clarity of wording.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.1-5 Distinct Wording

Distinct words rather than contractions or combined forms should be used, especially in phrases involving negation.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

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1.2.1 Continuous Text Displays

1.2.1-6 Concise Wording

The text should be worded concisely to aid comprehension.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.1-7 Abbreviations Defined in Text

When words in text displays are abbreviated, each abbreviation (or acronym) should be defined in parentheses following its first appearance.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.1-8 Affirmative Sentences

Affirmative statements rather than negative statements should be used.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.1-9 Active Voice

Sentences should be composed in the active rather than the passive voice.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.1-10 Temporal Sequence

When a sentence describes a sequence of events, it should be phrased with a corresponding word order.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.1 Continuous Text Displays

1.2.1-11 Minimum Number of Displayed Lines

When a user must read continuous text on line, at least four lines of text should be displayed at one time.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.1-12 Line Length

Continuous text should be displayed in wide columns, containing at least 50 characters per line.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.1-13 Minimal Hyphenation

In display of textual material, words should be kept intact, with minimal breaking by hyphenation between lines.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.1-14 Conventional Punctuation

Conventional punctuation should be used in textual display.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.1-15 Inter-Word Spacing

Consistent spacing between the words of displayed text should be maintained, with left justification of lines and ragged right margins. A minimum of one character width (capital N for proportional spacing) should be used between words.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.1 Continuous Text Displays

1.2.1-16 Inter-Line Spacing

A minimum of two stroke widths or 15 percent of character height, whichever is greater, should be used for spacing between lines of text.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.1-17 Inter-Paragraph Spacing

Displayed paragraphs of text should be separated by at least one blank line.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.1-18 Combining Text with Other Data

Text should be formatted in a few wide lines rather than in narrow columns of many short lines, when it is combined with graphics or other data in a single display, thus limiting the available space.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.1-19 Placing Figures Near Their Citations

When tables and/or graphics are combined with text, each figure should be placed near its first citation in the text, preferably in the same display frame.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.1-20 Underlining for Emphasis

When a line is placed under an item to mark or emphasize it, the line should not impair the legibility of the item, e.g., by obscuring the descenders.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1 INFORMATION DISPLAY

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1.2 Display Formats

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1.2.1 Continuous Text Displays

1.2.1-21 Font Coding

Within a text file or table, the use of a different font style should be preferred over the use of a different size for highlighting information.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.1-22 Attention Symbols in Alphanumeric Displays

When a special symbol, such as an asterisk, is used to draw attention to a selected item in alphanumeric displays, the symbol should be separated from the beginning of the word by a space.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.1-23 Hardcopy for Lengthy Text Displays

When a user must read lengthy textual material, that text should be available in printed form.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.2 Tables and Lists

1.2.2-1 Logical Organization

Information should be organized in some recognizable logical order to facilitate scanning and assimilation.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.2-2 Table Layout by Row and Column

A table should be constructed so that row and column labels represent the information a user has prior to consulting the table.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.2-3 Row and Column Labels

Each row and column should be uniquely and informatively labeled and should be visually distinct from data entries.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.2-4 Labeling Units of Measurement

Labels should include the unit of measure for the data in the table; units of measurement should be part of row or column labels.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.2-5 Consistent Spacing Within Tables

Consistent column and row spacing should be maintained within a table, and from one table to another. Similarly, spacing between rows should be consistent within a table and between related tables.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.2 Tables and Lists

1.2.2-6 Minimum Column Spacing

The spacing between columns should be greater than any internal spaces that might be displayed within a tabulated data item.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.2-7 Row Separation

In dense tables with many rows, a blank line, dots, or some other distinctive feature (to aid horizontal scanning) should be inserted after a group of rows at regular intervals.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.2-8 Consistent Character Appearance

The font and size of alphanumeric characters should be consistent within a table and between related tables.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.2-9 Justification of Alphabetic Data

Columns of alphabetic data should be displayed with left justification to permit rapid scanning.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.2-10 Justification of Numeric Data

Columns of numeric data should be justified with respect to a fixed decimal point; if there is no decimal point, then numbers should be right-justified.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.2 Tables and Lists

1.2.2-11 Arabic Numerals for Numbered List Items

Arabic rather than Roman numerals should be used when listed items are numbered.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.2-12 Numbered Items Start with "1"

Item numbers should begin with one rather than zero.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ●	Reason:

1.2.2-13 Continuous Numbering in Multipage Lists

When a list of numbered items exceeds one display page, the items should be numbered continuously in relation to the first item on the first page.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.2-14 Repeated Elements in Hierarchic Numbering

Complete numbers should be displayed for hierarchic lists with compound numbers, i.e., repeated elements should not be omitted.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.2-15 Single-Column List Format

Lists should be formatted so that each item starts on a new line.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ●	Reason:

1.2.2 Tables and Lists

1.2.2-16 Marking Multiline Items in a List

When a single item in a list continues for more than one line, items should be marked in some way so that the continuation of an item is obvious.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.2-17 Vertical List Extension Beyond One Page

Where lists extend over more than one display page, the last line of one page should be the first line on the succeeding page.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.2-18 Hierarchic Structure for Long Lists

For a long list, extending more than one displayed page, a hierarchic structure should be used to permit its logical partitioning into related shorter lists.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.2-19 Vertical Ordering in Multiple Columns

If a list is displayed in multiple columns, the items should be ordered vertically within each column rather than horizontally within rows and across columns.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.2-20 Annotating Display of Continued Data

When lists or tables are of variable length and may extend beyond the limits of one display page, the user should be informed when data are continued on another page and when data are concluded on the present page.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2 Display Formats

1.2.3 Data Forms and Fields

1.2.3-1 Comparing Data Fields

Data fields to be compared on a character-by-character basis should be positioned one above the other.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.3-2 Consistent Format Across Displays

The ordering and layout of corresponding data fields across displays should be consistent from one display to another.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.3-3 Consistency of VDU and Hardcopy Formats

The format of a VDU data form should be similar to that of commonly used hardcopy source documents.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.3-4 Form Compatible for Data Entry and Display

When forms are used for data entry as well as for data display, the formats of these forms should be compatible.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.3-5 Visually Distinct Labels and Data Entry Areas

Clear visual definition of data fields should be provided so that the data are distinct from labels and other display features.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.3 Data Forms and Fields

1.2.3-6 Separation of Field Label and Data Entry Area

The label and the data entry area should be separated by at least one character space.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.3-7 Data Field Separation

At least three spaces should appear between the longest data field in one column and the rightmost label in an adjacent column.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.3-8 Justification: Data Field Labels of Equal Length

When label sizes are relatively equal, both labels and data fields should be left justified. One space should be left between the longest label and the data field column.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.3-9 Justification: Data Field Labels of Unequal Length

When label sizes vary greatly, labels should be right justified and the data fields should be left justified. One space should be left between each label and the data field.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.3-10 Protected Labels

Field labels should be protected from keyed entry by having the cursor skip over them automatically when a user is spacing or tabbing.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.3 Data Forms and Fields

1.2.3-11 Highlight Active Data Entry Field

The current field to be entered should be highlighted.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

1.2.3-12 Data Entry Cues

If appropriate, labels should be used to help cue the user as to the expected data entry.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

1.2.3-13 Label Punctuation as Entry Cue

The label for each entry field should end with a special symbol, signifying that an entry may be made.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

1.2.3-14 Data Form Entry Error

Data entered that does not match the predefined format of the data form should be highlighted and signaled to the user.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

1.2.3-15 Distinguishing Blanks from Nulls

Blanks (keyed spaces) should be distinguished from nulls (no entry at all) in the display of data forms, where it can aid task performance.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

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1.2.3 Data Forms and Fields

1.2.3-16 Labeling Groups of Data Fields

A field group heading should be centered above the labels to which it applies.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.3-17 Data Field Group Separation

At least five spaces should appear between groups of data fields.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.3-18 Headings and Label Indentation

When headings are located on the line above related screen fields, the labels should be indented a minimum of five spaces from the start of the heading.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.3-19 Heading Proximity to Subordinate Labels

When headings are placed adjacent to the related fields, they should be located to the left of the topmost row of related fields. The column of labels should be separated from the longest heading by a minimum of three blank spaces.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.4 Bar Charts and Histograms

1.2.4-1 Labeling Single Bars

Each bar on the display should have a unique identification label.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.4-2 Labeling Paired Bars

When bars are displayed in pairs, they should be labeled as a unit, with individual distinguishing labels for each bar.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.4-3 Bar Spacing

When data must be compared, bars should be adjacent to one another and spaced such that a direct visual comparison can be made without eye movement.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.4-4 Consistent Orientation of Bars

In a related series of bar charts, a consistent orientation of the bars (vertical or horizontal) should be adopted.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.4-5 Highlighting

If one bar represents data of particular significance, then that bar should be highlighted.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.4 Bar Charts and Histograms

1.2.4-6 Zero Reference on Deviation Bar Charts

The zero reference should be the center of the deviation bar chart.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.4-7 Normal Range on Deviation Bar Charts

On a deviation bar chart, the range of normal conditions for positive or negative deviations should represent no more than 10 percent of the total range.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.4-8 Indication of Magnitude on Deviation Bar Charts

The magnitude of each variable should be displayed when a deviation bar display is used as a primary display format for safety function parameters.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.4-9 Coding Segmented Bar Charts

Segmented bars, in which differently coded segments are shown cumulatively within a bar, should be used when both the total measures and the portions represented by the segments are of interest.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.4-10 Ordering Data in Segmented Bars

The data categories should be ordered within each bar in the same sequence, with the least variable categories displayed at the bottom and the most variable at the top.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.5 Graphs

1.2.5-1 Interpreting Graphs

Graphs should convey enough information to allow the user to interpret the data without referring to additional sources.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.5-2 Labeling Curves

When multiple curves are included in a single graph, each curve should be identified directly by an adjacent label, rather than by a separate legend.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.5-3 Legend Ordering

If a legend must be displayed, the codes in the legend should be ordered to match the spatial order of their corresponding curves in the graph itself.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.5-4 Coding to Distinguish Curves

Coding should be used when multiple functions are displayed in a single graph.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.5-5 Consistent Line Coding

Line coding should be used consistently across graphs.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.5 Graphs

1.2.5-6 Highlighting Significant Curves

In displays of multiple curves, if one curve represents data of particular significance, then that curve should be highlighted.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.5-7 Trending Time Intervals

Trend displays should be capable of showing data collected during time intervals of different lengths.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.5-8 Multiple Trend Lines

When the user must compare data represented by separate curves, the curves should be displayed in one combined graph.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.5-9 Stability of Trend Data

Trend rates should not fluctuate as a result of minor fluctuations in data or oscillatory behavior which may be superimposed on a well-defined trend.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.5-10 Indication of Non-Representative Trend Data

When a simple quantitative rate-of-change value is used, an indication should be provided to inform the user when, as a result of minor fluctuations or oscillations, the rate value does not accurately represent the trend.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.5 Graphs

1.2.5-11 Display of Projected Values

Curves representing planned, projected, or extrapolated data should be distinctive from curves representing actual data.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.5-12 Curve Averaging

Combining several individual curves into a single average curve should only be done when users do not need to know the pattern of individual curves or when curves differ on the basis of minor irregularities.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.5-13 Repeating Display of Cyclic Data

Where curves represent cyclic data, the graph should be extended to repeat uncompleted portions of the displayed cycle.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.5-14 Target Area Definition

The target area, preferred combination of X- and Y-axis values, should be graphically defined.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.5-15 Minimize Clutter

Old data points should be removed after some fixed period of time.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.5 Graphs

1.2.5-16 Linear Profile Pattern Recognition

The graph should form recognizable geometric patterns for specific abnormal conditions.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.5-17 Coding Linear Profile Charts

The area below the profile line should be shaded to provide a more distinguishable profile.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.5-18 Labeling Linear Profile Charts

Labels should be provided along the bottom to identify each parameter.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.5-19 Circular Profile Chart

The circular profile chart should form a recognizable geometric pattern for specific abnormal conditions.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.5-20 Labeling Circular Profile Displays

Labels should be provided to identify each radial line.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.5 Graphs

1.2.5-21 Coding Circular Profile Displays

The area within the profile should be shaded to enhance the operator's perception of plant status.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.5-22 Depicting Bands in Segmented Curve Graphs

All segments in a segmented curve graph should be related to the total value.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.5-23 Ordering Data in Segmented Curve Graphs

The data categories in a segmented curve graph should be ordered so that the least variable curves are displayed at the bottom and the most variable at the top.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.5-24 Coding Segmented Curve Graphs

The different bands of segmented curve graphs should be made visually distinctive by coding, such as by the texturing or shading of bands.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.5 Graphs

1.2.5-25 Labeling Segmented Curve Graphs

Where space permits, the different bands of segmented curve graphs should be labeled directly within the textured or shaded bands.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.5-26 Highlighting Scatterplots

If some plotted points represent data of particular significance, they should be highlighted to make them visually distinctive from others.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.5-27 Grouping Scatterplots to Show Multiple Relations

When relations among several variables must be examined, an ordered group (matrix) of scatterplots should be displayed, each showing the relation between just two variables.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.5-28 Interactive Analysis of Grouped Scatterplots

When scatterplots are grouped in a single display to show relations among several variables, an interactive aid should be provided for analysis so that if a user selects a set of data in one plot then the corresponding data points in other plots will be highlighted.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.6 Pie Charts

1.2.6-1 Partitioning

Partitioning should be limited to five segments or less.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.6-2 Labeling Pie Charts

Pie chart segments should be labeled directly rather than by a separate legend. If a segment is too small to contain the label, the label should be placed outside the segment with a line from it to the segment.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.6-3 Numeric Annotation of Labels

If the task requires precise values, numbers should be added to pie chart segment labels to indicate the percentage and/or absolute values.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.6-4 Highlighting

If a particular segment of a pie chart requires emphasis, it should be highlighted by special hatching or displaced slightly from the remainder of the pie.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.7 Flowcharts

1.2.7-1 Logical Ordering of Decision Options

The available decision options should be displayed in logical order.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.7-2 Single Decision at Each Step

Only a single decision should be required at each step.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.7-3 Consistent Ordering of Decision Options

When a flowchart is designed so that a user must make decisions at various steps, the available options should be displayed in some consistent order from step to step.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.7-4 Availability of Supplemental Information

While flowcharts should display only the data immediately required by the user, more detailed data should be available with a single action.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.7-5 Conventional Path Orientation

Flowcharts should be designed so that the path of the logical sequence is consistent with familiar orientation conventions.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

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1.2.7 Flowcharts

1.2.7-6 Flowchart Symbol Set

There should be a standard set of flowchart symbols.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return	Reason:

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1.2.8 Mimics and Diagrams

1.2.8-1 Level of Detail

Mimics and diagrams should contain the minimum amount of detail required to yield a meaningful pictorial representation.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.8-2 Component Identification

Plant components represented on mimic lines should be identified.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.8-3 Line Points of Origin

All flow path line origin points should be labeled or begin at labeled components.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.8-4 Line Termination Points

All flow path line destination or terminal points should be labeled or end at labeled components.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.8-5 Directional Arrowheads

Flow directions should be clearly indicated by distinctive arrowheads.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2 Display Formats

1.2.8 Mimics and Diagrams

1.2.8-6 Line Coding

Flow paths should be coded (e.g., by color and/or width) to indicate important information.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.8-7 Overlapping Lines

Overlapping of flow path lines should be avoided.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.8-8 Symbol-Data Integration

Where symbols are used to represent equipment components and process flow or signal paths, numerical data should be presented reflecting inputs and outputs associated with equipment.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.8-9 Aids for Evaluation

When users must evaluate information in detail, computer aids for calculation and visual analysis should be provided.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.9 Maps

1.2.9-1 Feature Identification

Significant features of a map should be labeled directly on the display unless cluttering or obscuring of other information would result.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.9-2 Consistent Orientation

When several different maps will be displayed, a consistent orientation should be used so that the top of each map will always represent the same direction.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.9-3 User Selectable Orientation

The user should be able to select different orientations and reference points.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.9-4 Panning Map Displays

When a map exceeds the capacity of a single display frame, users should be able to pan the display over the mapped data in order to examine different areas of current interest.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.9-5 Area Coding

Codes, such as texture patterns, color, or tonal variations, should be used when different areas of a map must be defined, or when geographic distribution of a particular variable must be indicated.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.9 Maps

1.2.9-6 Color Tonal Codes

Tonal codes (different shades of one color) rather than spectral codes (different colors) should be used when users must make relative judgments for different colored areas of a display.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

1.2.9-7 Ordered Coding

Where different areas of a map are coded by texture patterns or tonal variation, the darkest to lightest shades correspond to the extreme values of the coded variable.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

1.2.9-8 Mapping Nongeographic Data

In applications where the geographic distribution of nongeographic data must be displayed, other graphic elements should be added to a map for that purpose.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

1.2.9-9 Highlighting Data Change

When changes in mapped data are significant for a user's task, auxiliary graphic elements should be included to highlight those changes.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

1.2.9-10 Aids for Analyzing Maps

When the use of mapped data may be complex, computer aids should be provided for data analysis.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

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1.2.10 Graphic Instrument Panels

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1.2.10-1 Display Range Coding

Zones indicating operating ranges should be color coded by edge lines or wedges for circular scales.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.10-2 Location of Zero

When check-reading positive and negative values on rotary meters (circular displays), the zero or null position should be at 12 o'clock or 9 o'clock.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.10-3 Pointer Orientation

The pointer on fixed scales should extend from the right of vertical scales and from the bottom of horizontal scales.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.10-4 Pointer Obscurement

The pointer on fixed scales should extend to but not obscure the shortest graduation marks.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.10-5 Tick Mark Separation

Tick marks should be separated by at least 0.07 inches (1.75 millimeters) for a viewing distance of 28 inches (71 centimeters) under low illumination.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.10 Graphic Instrument Panels

1.2.10-6 Number of Tick Marks

Scales should not be cluttered with more marks than necessary for precision.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2 Display Formats

1.2.11 Speech Displays

1.2.11-1 Limits on Speech Messages

Speech should be limited to provide only a few messages.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.11-2 Message Repeat Capability

The user should be able to have speech messages repeated.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.11-3 Simple Spoken Messages

Messages should be short and simple.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.11-4 Type of Voice

A distinctive and mature voice should be used.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.11-5 Delivery Style

Spoken messages should be presented in a formal, impersonal manner.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2 Display Formats

1.2.11 Speech Displays

1.2.11-6 Word Selection

Words in a speech message should be concise, intelligible, and appropriate for the information presented.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.11-7 Speech Message Priority

A speech message priority system should be established such that more critical messages override the presentation of any message occurring below it on the priority list.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.11-8 Distinctive Spoken Warnings

If speech is used to provide warnings as well as other forms of user guidance, spoken warnings should be easily distinguishable from routine messages.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.2.11-9 Intensity of Speech Presentation

Speech signal intensity should be clearly audible for the expected ambient noise environment.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1 INFORMATION DISPLAY

1.3 Display Elements

1.3.1 Alphanumeric Characters

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1.3.1-1 Conventional Use of Mixed Case

Text to be read (except labels) should be presented using upper and lower case characters.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.1-2 Font Style

A clearly legible font should be utilized. Fonts should have true ascenders and descenders, uniform stroke width, and uniform aspect ratio.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.1-3 Distinguishability of Characters

For a given font, it should be possible to clearly distinguish between the following characters: X and K, T and Y, I and L, I and 1, O and Q, S and 5, and U and V.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.1-4 Character Size for Text Readability

The height of characters in displayed text or labels should be at least 16 minutes of arc (4.7 mrad) and the maximum character height should be 24 minutes of arc (7 mrad).[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.1-5 Character Height-to-Width Ratio

For fixed (as opposed to proportionally spaced) presentations, the height-to-width ratio should be between 1:0.7 to 1:0.9.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3 Display Elements

1.3.1 Alphanumeric Characters

1.3.1-6 VDU Character Format

A 4x5 (width-to-height) character matrix should be the minimum matrix used for superscripts and for numerators and denominators of fractions that are to be displayed in a single character position.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.1-7 Inter-Character Spacing

Horizontal separation between characters or symbols should be between 10 and 65 percent of character or symbol height.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.1-8 Brightness Ratio

The characters should be at least twice as light (or dark) as the background.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.2 Abbreviations and Acronyms

1.3.2-1 Avoiding Abbreviations

Abbreviations should be avoided (except when terms are commonly referred to by their initialisms, e.g., SPDS).[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.2-2 Abbreviation Rule

When defining abbreviations which are not common to the user population, a simple rule should be used that users understand and recognize.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.2-3 Distinctive Abbreviations

Abbreviations should be distinctive so that abbreviations for different words are distinguishable.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.2-4 Punctuation of Abbreviations

Abbreviations and acronyms should not include punctuation.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.2-5 Short Abbreviations for Arbitrary Codes

When arbitrary codes must be remembered by the user, characters should be grouped in blocks of three to five characters, separated by a minimum of one blank space or other separating character such as a hyphen or slash.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.2 Abbreviations and Acronyms

1.3.2-6 Avoid O and I in Arbitrary Codes

The use of the letters O and I in a non-meaningful code should be avoided since they are easily confused with the numbers 0 (zero) and 1 (one), respectively.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.2-7 Combining Letters and Numbers in Arbitrary Codes

When codes combine both letters and numbers, letters should be grouped together and numbers grouped together rather than interspersing letters with numbers.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.3 Labels

1.3.3-1 Group Labels

Each individual aspect of a display (e.g., data group, field, or message) should contain a distinct, unique, and descriptive label.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.3-2 Meaningfulness

Labels should be meaningful words or accepted technical terms.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.3-3 Label Formats

Label formats should be consistent across and within displays.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.3-4 Consistent Wording of Labels

Labels should be worded consistently, so that the same item is given the same label whenever it appears.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.3-5 Distinctive Labels

Labels should be uniquely and consistently highlighted, capitalized, or otherwise emphasized to differentiate them from other screen structures and data.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3 Display Elements

1.3.3 Labels

1.3.3-6 Label Separation

Labels should be separated from one another by at least two standard character spaces.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.3-7 Normal Orientation for Labels

The annotation of graphic displays, including labels for the axes of graphs, should be displayed in a normal orientation for reading text.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.3-8 Label Content for User Options

When presenting a list of user options, labels should reflect the question or decision being posed to the user.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.3-9 Graphic Objects

The label for a specific graphic object (e.g., an icon) should be placed in close proximity to the graphical object.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.4 Icons and Symbols

1.3.4-1 Appropriate Use of Icons

The primary use of icons in graphic displays should be to represent actual objects or actions.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.4-2 Iconic Representation

Icons should be designed to look like the objects, processes, or operations they represent, by use of literal, functional, or operational representations.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.4-3 Simple Design

Icons should be simple, closed figures when possible.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.4-4 Use of Abstract Symbology

Abstract symbols should conform to user conventions or to common electrical and mechanical symbol conventions when user conventions do not exist.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.4-5 Distinguishability

Each icon and symbol should represent a single object or action, and should be easily discriminable from all other icons and symbols.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.4 Icons and Symbols

1.3.4-6 Consistent Use of Special Symbols

Special symbols to signal critical conditions should be used exclusively for that purpose.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return	Reason:

1.3.4-7 Upright Orientation

Icons and symbols should always be oriented "upright."

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return	Reason:

1.3.4-8 No Alternating Words and Symbols

Words and symbols should not be used alternately.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return	Reason:

1.3.4-9 Size

Icons and symbols should be large enough for the user to perceive the representation and discriminate it from other icons and symbols.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return	Reason:

1.3.4-10 Highlighting

An icon or symbol should be highlighted when the user has selected it.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return	Reason:

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1.3 Display Elements

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1.3.4 Icons and Symbols

1.3.4-11 Labeling Icons

Icons should be accompanied by a text label.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.4-12 Labels for Control Option Icons

If icons are used to represent control action options, a label indicating the action should be associated with the icon.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.5 Numeric Data

1.3.5-1 Number System

Numeric data should be displayed in the decimal, rather than binary, octal, hexadecimal, or other number system.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.5-2 Leading Zeros

Leading zeros in numeric entries for whole numbers should be suppressed.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.5-3 Maintaining Significant Digits

A number should be displayed at the number of significant digits required by users to perform their tasks.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.5-4 Display Range

Numeric displays should accommodate the variable's full range.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.5-5 Rate of Display Change

Digital displays should change slowly enough to be readable.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.5 Numeric Data

1.3.5-6 Direction of Change in Digital Display

If users must rapidly discern directional change, digital displays should be provided with arrows to indicate the direction of change.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.5-7 Direct Display of Differences

If users must evaluate the difference between two sets of data, the difference should be presented on the display.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.5-8 Orientation of Numbers

All numbers should be oriented upright.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3 Display Elements

1.3.6 Scales, Axes, and Grids

1.3.6-1 Numbering of Scales

Numbers on a scale should increase clockwise, left to right, or bottom to top.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.6-2 Scale Intervals

Nine should be the maximum number of tick marks between numbers.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.6-3 Scaling in Standard Intervals

Scales should have tick marks at a standard interval of 1, 2, 5, or 10 (or multiples of 10) for labeled divisions; intervening tick marks to aid visual interpolation should be consistent with the labeled scale interval.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.6-4 Circular Scales

For one-revolution circular scales, zero should be at 7 o'clock and the maximum value should be at 5 o'clock, with a 10-degree break in the arc.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.6-5 Axis Labels

Axes should be clearly labeled with a description of what parameter is represented by the axis.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3 Display Elements

1.3.6 Scales, Axes, and Grids

1.3.6-6 Identification of Units of Measurement

The units of measurement represented by the scale should be included in the axis label.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.6-7 Scaling Conventions

Conventional scaling practice should be followed, in which the horizontal X-axis is used to plot time or the postulated cause of an event, and the vertical Y-axis is used to plot a caused effect.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.6-8 Consistent Scaling

If users must compare graphic data across a series of displays, the same scale should be used for each.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.6-9 Scales Consistent with Function

The scales should be consistent with the intended functional use of the data.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.6-10 Linear Scaling

A linear scale should be used for displayed data, in preference to logarithmic or other non-linear methods of scaling, unless it can be demonstrated that non-linear scaling will facilitate user interpretation of the information.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.6 Scales, Axes, and Grids

1.3.6-11 Numeric Scales Start at Zero

When users must compare aggregate quantities within a display, or within a series of displays, scaling of numeric data should begin with zero.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.6-12 Display of Origin

When graphed data represent positive numbers, the graph should be displayed with the origin at the lower left, such that values on an axis increase as they move away from the origin of the graph.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.6-13 Single Scale On Each Axis

Only a single scale should be shown on each axis, rather than including different scales for different curves in the graph.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.6-14 Scaling Against a Reference Index

If different variables on a single graph require different scales, they should be scaled against a common baseline index, rather than showing multiple scales.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.6-15 Indication of Scale

When a graphic display has been expanded from its normal coverage, some scale indicator of the expansion factor should be provided.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3 Display Elements

1.3.6 Scales, Axes, and Grids

1.3.6-16 Manual Rescaling

Users should be able to manually change the scale for the purpose of maintaining an undistorted display for different operating conditions.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.6-17 Indication of Automatic Rescaling

If the system is designed to automatically change scale, an alert should be given to the user that the change is being made.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.6-18 Aids for Scale Interpolation

If interpolation must be made or where accuracy of reading graphic data is required, computer aids should be provided for exact interpolation.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.6-19 Unobtrusive Grids

When grid lines are displayed, they should be unobtrusive and not obscure data elements (e.g., curves and plotted points).[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.6-20 Numbering Grids

Graphs should be constructed so that the numbered grids are bolder than unnumbered grids.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ●	Reason:

1.3.6 Scales, Axes, and Grids

1.3.6-21 Discontinuous Axes

When data comparisons of interest fall within a limited range, the scaled axis should emphasize that range, with a break in the displayed axis to indicate discontinuity with the scale origin.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.6-22 Duplicate Axes

When scaled data will contain extreme values, duplicate axes should be displayed, so that the X-axis appears at both the top and bottom, and the Y-axis at both the left and right sides of the graph.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ●	Reason:

1.3.6-23 Restricted Use of Three-Dimensional Scaling

Unless required, use of three-dimensional scales (i.e., where a Z-axis is added to the display) should be avoided.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

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1.3 Display Elements

1.3.7 Borders, Lines and Arrows

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1.3.7-1 Line Types

Meaningful differences between lines appearing in graphic displays, such as flow paths, should be depicted by using various line types, e.g., solid, dashed, dotted, and widths.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return	Reason:

1.3.7-2 Conventional Use of Arrows

In flow charts and other graphics displays, arrowheads should be used in a conventional fashion to indicate directional relations in the sequential links between various elements.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return	Reason:

1.3.7-3 Restricted Use of Borders

Unnecessary borders should not be used in the display.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return	Reason:

1.3.7-4 Bordering Single Blocks

A border should be used to improve the readability of a single block of numbers or letters.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return	Reason:

1.3.7-5 Distinctive Borders Around Critical Information

If several labels or messages are clustered in the same area, distinctive borders should be placed around the critical ones only.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return	Reason:

1.3.8 Color

1.3.8-1 Use of Color

Where color is used for coding, it should be employed conservatively and consistently.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.8-2 Color Coding for Discrete Data Categories

When a user must distinguish rapidly among several discrete categories of data, a unique color should be used to display the data in each category.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ●	Reason:

1.3.8-3 Color Coding for Relative Values

When the relative rather than the absolute values of a variable are important, gradual color changes as a tonal code should be used to show the relative values of a single variable.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.8-4 Color Coding to Draw Attention

Brighter and/or more saturated colors should be used when it is necessary to draw a user's attention to critical data.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.8-5 Color Selection

Colors for coding should be based on user conventions with particular colors.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ●	Reason:

1.3.8 Color

1.3.8-6 Pure Blue

Pure blue on a dark background should be avoided for text, for thin lines, or for high-resolution information.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.8-7 Easily Discriminable Colors

When selecting colors for coding discrete categories of data, those colors should be easily discriminable.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.8-8 Unique Assignment of Color Codes

When color coding is used, each color should represent only one category of displayed data.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.8-9 Minimum Color Differences

When color coding is used for discriminability or conspicuity of displayed information, all colors in the set should differ from one another by a minimum of $40\Delta E$ (CIE $L^*u^*v^*$) distances.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.8-10 Color Contrast

For adequate legibility, colored symbols should differ from their color background by a minimum of $100\Delta E$ (CIE $Y_u'v'$) distances.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.8 Color

1.3.8-11 Redundant Color Coding

Color coding should be redundant with some other display feature.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.8-12 Unplanned Patterns from Color Coding

Color coding should not create unplanned or obvious new patterns on the screen:

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.8-13 Red-Green Combinations

Whenever possible, red and green colors should not be used in combination.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.8-14 Chromostereopsis

Simultaneous presentation of both pure red and pure blue on a dark background should be avoided.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.8-15 Pure Red

Dominant wavelengths above 650 nanometers in displays should be avoided.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3 Display Elements

1.3.9 Size, Shape, and Pattern Coding

1.3.9-1 Limited Use of Size Coding

Size coding should be used only for applications where displays are not crowded.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.9-2 Size Variations

A maximum of three size levels should be used. The major dimensions of the larger symbol should be at least 150 percent of the major dimension of the smaller symbol.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.9-3 Size Coding Proportional to Data Value

When the symbol size is to be proportional to the data value, the scaled parameter should be the symbol area rather than a linear dimension such as diameter.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.9-4 Geometric Area Coding

For area coding, the maximum number of levels should be six (preferably no more than three).

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.9-5 Length Coding

For length coding, the maximum number of levels should be six (preferably no more than three).

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3 Display Elements

1.3.9 Size, Shape, and Pattern Coding

1.3.9-6 Establishing Standards for Shape Coding

When shape coding is used, codes should be based on established standards or conventional meanings.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.9-7 Clearly Discriminable Shapes

Shapes used in coding for data groups should be clearly discriminable.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.9-8 Simple Pattern Codes

When patterns are used to code displayed areas, simple rather than elaborate patterns should be used.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.9-9 Pattern Coding of Extreme Values

Pattern density should vary with the value of the coded variable so that the least dense pattern is associated with one extreme and the most dense pattern with the other extreme.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.10 Highlighting by Brightness and Flashing

1.3.10-1 Easily Recognizable Highlighting

Highlighting should be easily recognizable and used to attract the user's attention to special conditions, items important to decision-making or action requirements, or as a means to provide feedback.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.10-2 Minimal Highlighting

Highlighting of information should be minimized.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.10-3 Consistency

A particular highlighting method should be used consistently.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.10-4 Removing Highlighting

If highlighting is used to emphasize important display items, it should be removed when it no longer has meaning.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.10-5 Appropriate Use of Brightness Coding

Coding by differences in brightness should be used for applications that require discrimination between only two categories of displayed items.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.10 Highlighting by Brightness and Flashing**1.3.10-6 Significance of Brightness Levels**

High brightness levels should be used to signify information of primary importance, and lower levels should be used to signify information of secondary interest.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.10-7 Brightness Coding Intensities

Levels approximating 33 percent and 100 percent of the display luminance should be used for brightness coding.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.10-8 Image Reversal

Image reversal should be used primarily for highlighting in dense data fields or to indicate selection of on-screen objects and information.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.10-9 Appropriate Use of Flash Coding

Flashing should be used when a displayed item implies an urgent need for attention or action, but not in displays requiring attention to detail or reading of text.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.10-10 Flash Coding for Text

When a user must read a displayed item that is flash coded, an extra symbol such as an asterisk or arrow to mark the item should be used, and the marker symbol should flash rather than the item itself.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

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1.3.10 Highlighting by Brightness and Flashing

1.3.10-11 Small Area

Only a small area of the screen should flash at any time.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.10-12 Coding by Flash Rate

No more than two flash rates should be used.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.10-13 Flash Suppression

Event acknowledgement or flash suppression keys should be provided.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.10-14 Long-Persistence Phosphor Displays

Flashing should not be used with long-persistence phosphor displays.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.10-15 Flash Rate for Critical Information

When two rates are used, the higher rate should apply to the more critical information.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3 Display Elements

1.3.11 Auditory Coding

1.3.11-1 Appropriate Use of Auditory Signals

Auditory signals should be provided to alert the operator to situations that require attention, such as an incorrect input action by the operator or a failure of the HSI to process an input from the operator.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.11-2 Dedicated Use

Systems used to transmit non-verbal auditory signals should be used only for that purpose.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.11-3 Localization

Auditory signals should provide localization cues that direct operators to those control room work stations where operator attention is required.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.11-4 Selection

Auditory signals should be selected to avoid interference with other auditory sources, including verbal communication.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.11-5 Signal Priority Distinction

Caution signals should be readily distinguishable from warning signals and used to indicate conditions requiring awareness, but not necessarily immediate action.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

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1.3 Display Elements

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1.3.11 Auditory Coding

1.3.11-6 Association with Visual Warnings

Auditory alerts, as well as caution and warning sounds, should accompany visual displays.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.11-7 Unique Signal-Event Association

Once a particular auditory signal code is established for a given operating situation, the same signal should not be designated for some other display.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.11-8 Total Number of Simple Signals

If the audio signal varies on one dimension only (such as frequency), the number of signals to be identified should not exceed four.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.11-9 Use with Several Visual Displays

One audio signal may be used in conjunction with several visual displays, provided that immediate discrimination is not critical to personnel safety or system performance.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.11-10 Confusable Signals

Audio warning signals that might be confused with routine signals or with other sounds in the operating environment should not be used.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.11 Auditory Coding

1.3.11-11 Signal Compatible with Environment

The intensity, duration, and source location of the signal should be compatible with the acoustical environment of the intended receiver as well as with the requirements of other personnel in the signal area. [AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.11-12 Turning Off Non-Critical Auditory Signals

Noncritical auditory signals should be capable of being turned off at the discretion of the user.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.11-13 Indicating Who is to Respond

When the signal must indicate which user (of a group of users) is to respond, a simple repetition code should be used.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.11-14 Direction of Sound

Sound sources (speakers or buzzers) should direct sound toward the center of the primary operating area.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.11-15 Signal Bending Around Obstacles

When an audio signal must bend around major obstacles or pass through partitions, its frequency should be less than 500 Hz.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

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1.3.11 Auditory Coding

1.3.11-16 Audibility

Auditory alert and warning signals should be audible in all parts of the control room.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.11-17 Signal Intensity

The intensity of auditory signals should be set to unmistakably alert and get an operator's attention.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.11-18 Signal Travel Over 1000 ft

When an audio signal must travel over 1000 feet, its frequency should be less than 1000 Hz.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.11-19 High or Unknown Noise Environments

When the noise environment is unknown or expected to be difficult to penetrate, audio signals should have a shifting frequency that passes through the entire noise spectrum and/or be combined with a visual signal.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.11-20 Masking

Audio warning signals should not interfere with any other critical functions or warning signals, or mask any other critical audio signals.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

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1.3.11 Auditory Coding

1.3.11-21 Failure of Auditory Signals

The audio display device and circuit should be designed to preclude warning signal failure in the event of system or equipment failure and vice versa.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.11-22 False Alarms

Auditory alarm systems should be designed so that false alarms are avoided.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ●	Reason:

1.3.11-23 Distinctive Coding

Coding methods should be distinct and unambiguous, and should not conflict with other auditory signals.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.11-24 Not Contradictory

Similar auditory signals must not be contradictory in meaning with one another.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.11-25 Pulse Coding

Auditory signals may be pulse coded by repetition rate. Repetition rates should be sufficiently separated to ensure operator discrimination.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ●	Reason:

1.3 Display Elements

1.3.11 Auditory Coding

1.3.11-26 Frequency Change Coding

If modulation of the frequency (Hz) of a signal denotes information, center frequencies should be between 500 and 1000 Hz.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.11-27 Discrete Frequency Coding

If discrete-frequency codes are used for audible signal coding, frequencies should be broad band and widely spaced within the 200 to 5000 Hz range (preferably between 500 and 3000 Hz).[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.11-28 Coding by Intensity

Coding by intensity is not recommended.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.3.11-29 Testing

It should be possible to test the auditory signal system.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.4-1 Display Update Rate Requirements

The maximum update rate should be determined by the time required for the user to identify and process the changed feature of the display.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

1.4-2 User Control of Display Update Rate

The user should be capable of controlling the rate of information update on the display, but the allowable rate should not exceed that capable of being met by the information source and the processing equipment.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

1.4-3 Changing Values

Changing alphanumeric values which the user must reliably read should not be updated more often than once per second.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

1.4-4 Initial Erasure to Replace Changed Data

When the computer generates a display to update changed data, the old items should be erased before adding new data items to the display.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

1.4-5 Display Motion

Items on a graphic display should not move faster than 60 degrees of visual angle per second, with 20 degrees per second preferred.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

1 INFORMATION DISPLAY

1.4 Data Quality and Update Rate

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1.4-6 Data Sampling Rate

The sampling rate for each critical plant variable should result in no meaningful loss of information in the data presented.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.4-7 Time Delay

The time delay from when the sensor signal is sampled to when it is displayed should be consistent with the user's task performance requirements.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.4-8 Accuracy

Each variable should be displayed with an accuracy sufficient for the users to perform their tasks.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.4-9 Data Verification for Critical Plant Variables

Redundant sensor readings should be compared before displaying the critical plant variable.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.4-10 Analytical Redundancy

Analytical redundancy among different critical plant parameters should be used.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

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1.4 Data Quality and Update Rate

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1.4-11 Data Quality Display

Variables that are subject to validation (e.g., checks for accuracy) should be identified and an indication should be provided when these data are invalid. When data fails to meet the specified criteria for validity and thus is suspected of being of poor quality, an indication of validation failure should be provided. Data entered by personnel should be identified such that it is easily distinguished from validated data.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

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1.5 Display Devices

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1.5.1 Video Display Units

1.5.1-1 VDU Resolution

The display should have adequate resolution; i.e., users can discriminate all display elements and codes from maximum viewing distance.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.5.1-2 VDU Contrast

The contrast ratio of the display should be greater than 3:1; a contrast ratio of 7:1 is preferred.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.5.1-3 Flicker

The display should be "flicker free." [AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.5.1-4 Geometric Stability

The display should be free of "jitter." [AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.5.1-5 Image Continuity

The display should maintain the illusion of a continuous image, i.e., users should not be able to resolve scan lines or matrix spots.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.5.1 Video Display Units

1.5.1-6 VDU Image Linearity

The display should be free of geometric distortion.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.5.1-7 VDU Display Luminance

The display should have adequate luminance.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.5.1-8 Luminance Uniformity

All luminances that are supposed to be the same should appear the same.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.5.1-9 VDU Controls

Frequently used controls should be easily visible and accessible to the VDU user from the normal working position.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.5.1-10 VDU Luminance Control

A control to vary the VDU luminance from 10 percent of minimum ambient luminance to full luminance should be provided.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.5.2 Large Screen Displays

1.5.2-1 Control of Critical Information Display

Control of large-screen group display systems should be such that critical information cannot be modified or deleted inadvertently or arbitrarily.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.5.2-2 Resolution

Users should be able to resolve all important display detail at the maximum viewing position.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.5.2-3 Size of Characters

The height of letters and numerals should not subtend less than 15 minutes (4.5 mrad) of visual angle as measured at the maximum viewing distance.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.5.2-4 Contrast Polarity

Contrast should be either light on a dark background or vice-versa, except where superposition is used.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.5.2-5 Projected Display Luminance Ratio

The luminance ratio provided by the projection system should be adequate for the type of material being projected.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.5.2 Large Screen Displays

1.5.2-6 Projected Display Image Luminance

Image luminance and light distribution should be uniform. The luminance of the screen center at maximum viewing angle should be at least half its maximum luminance.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

1.5.2-7 Minimize Keystone Effects

If projected displays are used, projector and screen should be arranged so as to minimize "keystone effect," i.e., distortion of projected data proportions due to non-perpendicularity between projector and screen.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

1.5.2-8 Minimum Viewing Distance

The display should not be closer to any observer than half the display width or height, whichever is greater.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

1.5.2-9 Interruption of View

Large screen displays should be located relative to critical observers so that the view is not obscured by other people.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

1.5.2-10 Seating Area

Off-centerline viewing for large-screen optical projection displays should not exceed 30 degrees (525 mrad); an angle of less than 20 degrees (350 mrad) is preferred.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

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1.5 Display Devices

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1.5.3 Printers, Recorders, and Plotters

1.5.3-1 Use

As a general rule, printers/plotters should be used to record alarm data, trend information, and other process data which may be needed for later reference.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.5.3-2 Placement of Printers

In principle, printers should be located within the primary operating area because they must be verified and attended by the operator.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.5.3-3 Legibility

Print output should be free from character line misregistration, character tilt, smear, or glare.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.5.3-4 Contrast

A minimum contrast ratio of 4:1 should be provided between the printed material and the background on which it is printed.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.5.3-5 Illumination

The printer should be provided with internal illumination if the printed matter is not legible in the planned operational ambient illumination.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.5.3 Printers, Recorders, and Plotters

1.5.3-6 Visibility

When used for real-time applications, the printed matter should not be hidden, masked or obscured in a manner that impairs direct reading.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

1.5.3-7 User Annotation Capability

When used in real-time applications, printing devices should be mounted so that the users may write on or mark the printed matter (e.g., paper or metalized paper) while still in the printer.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

1.5.3-8 Take-up Provision

A take-up device should be provided for printed material.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

1.5.3-9 Indication of Supply of Materials

A positive indication should be provided of the remaining supply of printing materials (e.g., paper, toner, and ribbons).

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

1.5.3-10 Quality of Expendable Materials

Pens, inks, and paper should be of a quality to provide clear, distinct, and reliable marking.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

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1.5 Display Devices

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1.5.3 Printers, Recorders, and Plotters

1.5.3-11 Availability of Expendable Material

Paper, ink, and other operator-maintained expendables should be provided and accessible in the control room.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.5.3-12 Ease of Routine Replenishment

Printer design should permit quick and easy replenishment of paper, toner, ribbons, or ink.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.5.3-13 Smudging/Smearing

The hardcopy should be resistant to smudging or smearing when handled by users.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.5.3-14 Job Aids

Graphic overlays should be provided where these may be critical to proper interpretation of graphic data as it is being generated.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.5.3-15 Scale Design

Plotter scales should be numbered and marked according to the principles of display design and scale marking given in Sections 1.1 and 1.3.6.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.5.3 Printers, Recorders, and Plotters

1.5.3-16 Scale Compatibility

Scales printed on the recording paper should be the same as the scales shown on the recorder.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

1.5.3-17 Paper Takeup and Cutoff

A take-up spool should be provided to receive completed recordings and a means should be provided for tearing off completed records for storage.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

1.5.3-18 Paper-Speed Adjustability

Provide a high paper-speed option to run out records for detachment and a selection of lower speed options to permit adjustment of the time scale so that rate-of-change information can be indicated.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

1.5.3-19 Annotation

It should be convenient to annotate recordings with date and time markings, with paper speed if varied from normal, with parameter identification, or with any other relevant information.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

1.5.3-20 Labeling

Labels should identify the parameters recorded.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

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1.5 Display Devices

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1.5.3 Printers, Recorders, and Plotters

1.5.3-21 Ink Colors

Each pen should use a different colored ink to permit channel identification from line color.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.5.3-22 Channel Overload

The recorder should not be loaded beyond its designed channel capacity because this adds complexity to the analysis and prolongs sampling cycle time.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.5.3-23 Channel Identification on Instrument

Discrete recorders should be equipped to display the channel being plotted in an easily-viewed manner.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.5.3-24 Channel Identification on Recording

Number-printing mechanisms should be designed and maintained to provide clear, sharp, and small numbering to avoid crowding of data and consequent analysis problems.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.5.3-25 Channel Selection Capability

Provisions should be made to select any single channel for immediate display without awaiting completion of a sampling cycle.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

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1.5.4 Audio Display Devices

The guidelines for audio display devices are contained in Section 6.2, Speech-Based Communication.

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1.5.5 Meters

1.5.5-1 Circular Scales

Scale values should increase with clockwise movement of the pointer.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.5.5-2 Vertical Straight Scales

Scale values should increase with upward movement of the pointer.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.5.5-3 Horizontal Straight Scales

Scale values should increase with pointer movement to the right.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.5.5-4 Pointer Tip Form

Pointer tips should be simple.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.5.5-5 Pointer Positioning Relative to Scale

Pointer tip should extend to within about 1/16 inch of (but not overlap) the smallest graduation marks on the scale.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.5 Display Devices

1.5.5 Meters

1.5.5-6 Pointer Visibility

Pointer/background contrast and pointer size should be adequate to permit rapid recognition of pointer position.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.5.5-7 Distinctiveness

Zone markings should be conspicuous and distinctively different for different zones.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.5.5-8 Consistency

To facilitate reading of meters and prevent misreading, the orientation of scale markings should be consistent.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.5.5-9 Numerical Orientation

Individual numerals on any type of fixed scale should be vertical.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.5.5-10 Zero-Point Orientation

Where pointer movement is more than 360 degrees, the zero point should be located at the 12 o'clock position.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.5.5 Meters

1.5.5-11 End-Point Indication on Partial-Revolution Scales

Where the scale covers less than a full rotation of the pointer, scale end-points should be indicated by a break in scale.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.5.5-12 Moving-Scale Meters Versus Fixed-Scale Moving-Pointer Types

Moving-scale fixed-pointer meters should be avoided in favor of the more effective fixed-scale moving-pointer types.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.5 Display Devices

1.5.6 Light Indicators

1.5.6-1 Precautions to Assure Availability

Dual-bulb or dual-filament light assemblies should be used.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return >	Reason:

1.5.6-2 Precautions to Assure Unambiguous Sensing by Operators

Lights should not appear to be glowing when in fact they are off, or vice versa.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ●	Reason:

1.5.6-3 Precautions to Avoid Misinterpretation

System/equipment status should be inferred by illuminated indicators, and never by the absence of illumination.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return >	Reason:

1.5.6-4 Use as Alerting Indicators

Alerting the operators to unfavorable status should be a function of the annunciator system and not assigned to light indicators.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return >	Reason:

1.5.6-5 Identification of Meaning

Where meaning is not apparent, labeling must be provided close to the light indicator showing the message intended by its glowing.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return >	Reason:

1.5 Display Devices

1.5.6 Light Indicators

1.5.6-6 Light Intensity

The illuminated indicator should be at least 10 percent greater in light intensity than the surrounding panel as measured by a spot photometer.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.5.6-7 Visibility Factors

When using legend light indicators, make sure contrast and ambient/transilluminated conditions are considered.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.5.6-8 Legend Design

General legend design should be consistent throughout the control room.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.5.6-9 Distinguishability from Legend Pushbuttons

Illuminated legend indicators should be readily distinguishable from legend pushbuttons by form, size, or other factors.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.5.6-10 Color Coding

The color of the legend background under transillumination should conform to the general color code established for the control room.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.5.7 Numeric Readouts

1.5.7-1 Orientation

Multi-digit numbers formed by several elements (e.g., drums and LED arrays) should be read horizontally from left to right.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.5.7-2 Width-to-Height Ratio in Drum Displays

To compensate for the distortion imposed by the curved surface of the drum, counter numerals should reflect a width-height ratio of 1:1.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.5.7-3 Grouping of Numerals

If more than four digits are required, they should be grouped and the groupings separated as appropriate by commas, by a decimal point, or by additional space.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

1.5.7-4 Display of Changing Values

Numerals should not follow each other faster than one per second when the operator is expected to read the numerals consecutively.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.1-1 Selection of Dialogue Types

The selection of dialogue types should be based on anticipated task requirements, user skills, and anticipated system response time.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return	Reason:

2.1-2 Consistent Procedures

Procedures for entering commands or information should be consistent in form and consequences.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return	Reason:

2.1-3 Consistent Wording of Commands

All terms employed in the user-system interface, and their abbreviations, should be consistent in meaning from one transaction to another, and from one task to another.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return	Reason:

2.1-4 Wording Consistent with User Guidance

The wording and required format of information or command entry functions should be consistently reflected in the wording of user guidance, including all labels, messages, and instructional material.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return	Reason:

2.1-5 Minimal Demands on the User

Entry of information or commands should not require the user to remember special codes or sequences or to perform translations or conversions.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return	Reason:

2.1-6 Minimal User Actions

User input actions should be simple, particularly for real-time tasks requiring fast user response.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.1-7 Unnecessary Entry of Information

A user should not be required to re-enter information already available to the system.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.1-8 Availability of Information

Information necessary to accomplish a specific entry (e.g., labels, annotations, prompts, or options lists) should be available to the user when that transaction action is appropriate.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.1-9 Logical Transaction Sequences

An information entry sequence should be designed so that its organization reflects the user's view of the task, and should provide all control options that may be required.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.1-10 Flexible User Entry

Flexible means of entering information or commands should be provided so that users can accomplish necessary transactions, and can obtain guidance as needed in connection with any transaction.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.1-11 Control by Explicit User Action

Users should be allowed to control the processing of information or commands by explicit action.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

2.1-12 Compatibility with User Expectations

The results of any entry should be compatible with user expectations, so that the system changes in a "natural" way in response to user actions.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

2.1-13 Feedback for User Entries

The computer should acknowledge every entry immediately.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

2.1-14 Periodic Feedback

When system functioning requires the user to stand-by, periodic feedback should be provided to indicate normal system operation.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

2.1-15 Indicating Completion of Processing

When processing in response to an entry is lengthy, the user should be given some positive indication of subsequent completion.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

2.1-16 Indicating Control Lockout

If entries must be delayed pending computer processing of prior entries, the delay should be indicated to the user.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.1-17 Interrupt to End Control Lockout

In situations where control lockout does occur, an auxiliary means of control entry should be provided, such as a special function key, to abort a transaction causing extended lockout.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.1-18 Entry via Primary Display

When data entry is a significant part of a user's task, entered data should appear on the user's primary display.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.1-19 Entry of Corrections

The same explicit ENTER action should be required for entry of corrections as used for the original entry.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.1-20 Editing Capabilities During Text Entry

Users should be able to perform simple editing during text entry without having to invoke a separate edit mode.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.1-21 Entries Distinct from Text

If entries are made by keying onto the display, such as by keyed menu selections or commands, they should be distinguishable from displayed text.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.1-22 Variable Length Data Area

Users should not have to remove unused underscores or otherwise enter keystrokes for each position within a variable length entry area.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.1-23 Optional Versus Required Entry

Optional versus required data entries within fields on input forms should be distinct.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.1-24 Display of User Annotations

Annotations added by users to displayed text should be distinguishable from the text itself.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.1-25 Flexible Interaction Design

When information or command entry requirements may change, some means for the user (or a system administrator) to make necessary changes to available functions should be provided.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.1-26 Guidance Information

Users should be able to request guidance information regarding requirements for information of command entry (e.g., syntax, parameters, and options).

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.1-27 Entry Procedures Matched to User Skill

The means of entering information or commands should be compatible with user skills, permitting simple step-by-step actions by beginners, but permitting more complex entries by experienced users.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.1-28 Stacked Entries

Users should be allowed to key a sequence of commands or option codes as a single "stacked" entry.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.1-29 Consistent Order in Entry Stacking

For control entry stacking, entries should be required to be in the same order as they would normally be made in a succession of separate control entry actions.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.1-30 Abbreviation in Entry Stacking

For control entry stacking, command names, their abbreviations, or option codes should be accepted just as if those control entries had been made separately.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.1-31 Minimal Punctuation of Stacked Entries

Users should be allowed to stack control entries without any punctuation other than spaces between words or option codes.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

2.1-32 Standard Delimiter in Entry Stacking

If punctuation other than spaces is needed to separate entries in a stacked control entry, a single standard symbol should be used for that purpose.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

2.1-33 Distinctive Display of Control Information

All displays should be designed so that features relevant to user entries are distinctive in position and/or format.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

2.1-34 Displayed Context

If the consequences of a user entry will differ depending upon context established by a prior action, then some continuous indication of current context should be displayed for reference by the user.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

2.1-35 Consistent Display of Context Information

Information displayed to provide context for user entries should be distinctive in location and format, and consistently displayed from one transaction to the next.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

2.1 General User Input Guidelines

2.1-36 Record of Prior Entries

Users should be permitted to request a summary of prior entries to help determine present status, and should be allowed to review any parameters that are currently operative.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.1-37 Standard Display Area for Command Entry

A command entry area in a consistent location should be provided on every display, preferably at the bottom.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.1-38 General List of Options

A general list of basic options should be provided and always be available to serve as a "home base" or consistent starting point for user input.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.1-39 Displaying Option Codes

When users must select options by code entry, the code associated with each option should be displayed in a consistent and distinctive manner.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.1-40 Organization and Labeling of Listed Options

The general options list should show control entry options grouped, labeled, and ordered in terms of their logical function, frequency, and criticality of use, following the general guidelines for menu design.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.1-41 Indicating Appropriate Control Options

Users should be provided with a list of the control options that are specifically appropriate for any transaction.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.1-42 Only Available Options Offered

Only control options that are actually available for the current transaction should be offered to users.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.1-43 Provide Further Available Action

Transactions should never leave the user without further available action and should provide next steps or alternatives.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.1-44 Prompting Command Entries

Users should be provided with whatever information may be needed to guide command entries at any point in a sequence of transactions, by incorporating prompts in a display and/or by providing prompts in response to requests for HELP.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.1-45 Control by Simultaneous Users

When several users must interact with the system simultaneously, control entries by one user should not interfere with those of another.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.1-46 Highlighting Selected Data

When a user is performing an operation on some selected display item, that item should be highlighted.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.1-47 User Control of Processing

Users should be allowed to control processing of a command or request.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.1-48 Distinctive Interrupt Options

If different kinds of user interrupt are provided, each interrupt function should be designed as a separate control option with a distinct name.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.1-49 User Transaction Interrupts

User interrupts and aborts should not modify or remove stored or entered data.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.1-50 User Control of Entry

Users should be allowed to control the pace and sequence of their entry of information or commands.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.1 General User Input Guidelines

2.1-51 User-Specified Transaction Timing

When appropriate to task requirements, users should be allowed to specify the timing of transactions.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.1-52 Indicating PAUSE/SUSPEND Status

If PAUSE or SUSPEND options are provided, some indication of the status should be displayed whenever such an option is selected by a user.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.1-53 Consistent CONTINUE Option

At any step in a defined transaction sequence, if there is only a single appropriate next step, then a consistent control option to continue to the next transaction should be provided.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.1-54 Data Manipulation

The user should be able to manipulate information without concern for internal storage and retrieval mechanisms of the system.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.1-55 Default Values

When likely default values can be defined for the information to be entered in a particular task, those default values should be offered to speed entry.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.1-56 Display of Default Values

At the start of an input transaction, currently defined default values should be displayed in their appropriate data fields.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.1-57 Easy Confirmation to Enter Default Values

Users should be provided with some simple means to confirm acceptance of a displayed default value.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.1-58 User Definition of Default Values

Users should be permitted to define, change, or remove default values for any input field.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.1-59 Indicating Control Defaults

When keyed command or option code entries are used and a default is defined for a null control entry, the default should be indicated to the user.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.1-60 Single Method for Input

Input transactions and associated displays should be designed so that a user can stay with one method of entry, and not have to shift to another.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.1-61 Upper and Lower Case Equivalent

For interpreting user-composed control entries, upper and lower case letters should be treated as equivalent.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.1-62 Justification of Entries

Unless otherwise required by processing or display requirements, alphabetic input should be left justified, and numeric input should be right justified for integer data or decimal point justified for decimal data.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ●	Reason:

2.1-63 Automatic Justification of Entries

Automatic justification of tabular data entries should be provided.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.1-64 Maintaining Significant Zeros

When a user must enter numeric values that will later be displayed, all significant zeros should be maintained.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.1-65 Significance of Numeric Values

Numeric values should be displayed to the level of significance required of the data, regardless of the value of individual input data.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.1-66 Overwriting Characters

Data entry by overwriting a set of characters within a field should be avoided.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2 User Input Formats

2.2.1 Command Language

2.2.1-1 Layered Command Language

A command language should be designed so that its functions are organized in groups (or "layers") for ease in learning and use.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.1-2 General List of Commands

A general list of basic commands, with appropriate command format guidance, should be provided to serve as a "home base" or consistent starting point for composing command entries.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.1-3 Distinctive Meaning for Commands

Words in a command language should be distinctive from one another, and emphasize significant differences in function.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.1-4 Distinctive Spelling for Commands

Words and abbreviations in a command language should have distinctive spelling, so that simple spelling errors will be recognized as such rather than invoking a different command.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.1-5 Abbreviation of Commands

Users should be allowed to abbreviate commands.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2 User Input Formats

2.2.1 Command Language

2.2.1-6 Recognizing Command Synonyms

The computer should recognize a variety of synonyms for each word defined in the command language.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.1-7 Interpreting Misspelled Commands

Where the set of potential command entries is well defined, the computer should recognize and execute common misspellings of commands, rather than requiring re-entry.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.1-8 Recognizing Alternative Syntax

The computer should recognize probable alternative forms of command syntax.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.1-9 User-Assigned Command Names

A command language should have flexibility to permit a user to assign personal names to frequently used commands.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.1-10 User-Requested Prompts

Users should be allowed to request computer-generated prompts as necessary to determine required parameters in a command entry, or to determine available options for an appropriate next command.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2 User Input Formats

2.2.1 Command Language

2.2.1-11 Minimal Punctuation

Users should be allowed to enter commands without any punctuation other than the spaces between words.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return	Reason:

2.2.1-12 Ignoring Blanks in Command Entry

Single and multiple blanks between words should be treated as equivalent when processing command entries.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return	Reason:

2.2.1-13 Standard Delimiter

If command punctuation other than spaces is required, a single standard delimiter symbol should be used for that purpose.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return	Reason:

2.2.1-14 Graphic Examples in Guidance Information

Where possible, guidance information should be accompanied with graphic examples of command content and syntax.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return	Reason:

2.2.2 Menu Selection

2.2.2-1 Logical Ordering of Menu Options

Menu options should be ordered and grouped logically.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.2-2 Labeling Grouped Options

If menu options are grouped in logical subunits, each group should have a descriptive label that is distinctive in format from the option labels themselves.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.2-3 Hierarchic Menus for Sequential Selection

When menu selection must be made from a long list, and not all options can be displayed at once, a hierarchic sequence of menu selections should be provided rather than one long multipage menu.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.2-4 Consistent Design of Hierarchic Menus

The display format and selection logic of hierarchic menus should be consistent at every level.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.2-5 Labeling in Hierarchic Menus

Hierarchic menus should be organized and labeled to guide operators within the hierarchic structure.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2 User Input Formats

2.2.2 Menu Selection

2.2.2-6 Menu Selection by Keyed Entry

When menu selection is a secondary (occasional) means of control entry, and/or only short option lists are needed, then selection by keyed entry should be provided.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.2-7 Explicit Option Display

When control entries for any particular transaction will be selected from a small set of options, those options should be displayed in a menu added to the working display, rather than requiring a user to remember them or to access a separate menu display.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.2-8 Systematic Organization of Items on Menu Bar

The categories listed across the menu bar should be organized systematically.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.2-9 Category Labels on Menu Bar

Category labels on menu bars should be centered in the vertical dimension. Horizontally, category labels on the menu bar should be separated by enough space to be distinguishable as separate items, i.e., by at least two standard character widths.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.2-10 Height of Menu Bar

The height of a menu bar should be sufficient to contain standard text characters which serve as menu category labels, as well as space above and below the text characters.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2 User Input Formats

2.2.2 Menu Selection

2.2.2-11 Consistent Display of Menu Options

When menus are provided in different displays, they should be designed so that option lists are consistent in wording and ordering.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.2-12 Standard Area for Code Entry

When menu selection is accomplished by code entry, a standard command entry area (window) should be provided where users enter the selected code.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.2-13 Consistent Location for Menus

Menus should be displayed in consistent screen locations for all modes, transactions, and sequences.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.2-14 Menu Options Worded as Commands

The wording of menu options should consistently represent commands to the computer, rather than questions to the user.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.2-15 Option Wording Consistent with Command Language

If menu selection is used in conjunction with or as an alternative to command language, the wording and syntactic organization of displayed menu options should correspond consistently to defined elements and structure of the command language.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.2 Menu Selection

2.2.2-16 Format Consistency

Where ordering cannot be determined by the above, alphabetic ordering should be used.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.2-17 Consistent Coding of Menu Options

If letter codes are used for menu selection, those letters should be consistently used in designating options from one transaction to another.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.2-18 Key Coded Menu Selection

The code associated with each option should be displayed in a consistent and distinctive manner.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.2-19 Visual Representation of Path

Users should be able to access a visual representation of their paths through a hierarchy of menus.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.2-20 Minimal Steps in Sequential Menu Selection

When users must step through a sequence of menus to make a selection, the hierarchic menu structure should be designed to minimize the number of steps required.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.2 Menu Selection

2.2.2-21 Return to Higher-Level Menus

Users should have to take only one simple key action to return to the next higher level in hierarchic menus.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.2-22 Indicating Current Position in Menu Structure

When hierarchic menus are used, the user should have some indication of current position in the menu structure.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.2-23 Distinct Subordinate Menus

If hierarchical branching is used, each subordinate menu should be visually distinct from each previous superordinate menu.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.2-24 Control Options Distinct from Menu Branching

The display of hierarchic menus should be formatted so that options which actually accomplish control entries can be distinguished from options, which merely branch to other menu frames.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.2-25 Consistent Entry Prompt

When permanent menus are used, there should be one standard design for the input prompt that is used across all tasks.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.2 Menu Selection

2.2.2-26 Permanent Menus Minimized

The use of permanent menus should be minimized.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.2-27 Activation of Pull-Down and Pop-Up Menus

Pull-down and pop-up menus should be activated only by a specific user action that requests the display of the menu.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.2-28 User Requested Menus: Pull-Downs and Pop-Ups

User requested menus should be used whenever possible.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.2-29 Hiding Menus After a Command is Carried Out

When a pull-down or pop-up menu item(s) has/have been selected, the menu should revert to its hidden state as the selected command is carried out.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.2-30 Programmable Keys

If menu items are selectable via activation of programmable function keys, the arrangement of the menu list should be compatible with the arrangement of the keys to the greatest degree possible.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.2 Menu Selection

2.2.2-31 Menu Color

The same color for menus should be used within the same group.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.2-32 Explanatory Title for Menu

An explanatory title should be provided for each menu that reflects the nature of the choice to be made.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.2-33 Letter Codes for Menu Selection

If menu selections are made by keyed codes, each code should be the initial letter or letters of the displayed option label, rather than assigning arbitrary letter or number codes.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.2-34 Complete Display of Menu Options

A menu should be designed to display all options appropriate to any particular transaction.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.2-35 No Scrolling in Menus or Menu Bars

All menu items should be visible to the user without scrolling.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2 User Input Formats

2.2.2 Menu Selection

2.2.2-36 Menu Options Dependent on Context

A menu should be designed to display only those options that are actually available in the current context for a particular user.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.2-37 Return to General Menu

Users should have to take only one simple key action to return to the general menu at the top level in hierarchic menus.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.2-38 Stacking Menu Selections

Users should be able to combine a series of selections into a single "stacked" entry.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.2-39 Bypassing Menu Selection with Command Entry

Experienced users should be able to bypass a series of menu selections and make an equivalent command entry directly.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.2-40 Menu Selection by Pointing

When menu selection is the primary means of command entry, and especially if choices must be made from extensive lists of displayed control options, option selection by direct pointing should be provided.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.2 Menu Selection

2.2.2-41 Acknowledgement of Selection from Keyboard

When a menu item is chosen by a keyboard entry, there should be some acknowledgement from the system that the item has been chosen.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.2-42 Function of Menu Should Be Evident

Menus should be designed so that the function of the menu is evident to the user.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.2-43 Single-Column List Format

When multiple menu options are displayed in a list, each option should be displayed on a new line, i.e., format the list as a single column.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.2-44 Non-Selection of Conflicting Menu Items

Users should not be able to select menu items that are in conflict.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.2-45 Non-Selectable Menu Items

When menu items are not selectable, they should be identified as such to the user.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.2 Menu Selection

2.2.2-46 Menus Distinct from Other Displayed Information

If menu options are included in a display that is intended also for data review and/or data entry, the menu options should be distinct from other displayed information.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

2.2.2-47 Breadth and Depth of Menu Items

Menus should have a limited number of items in breadth and in depth.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

2.2.2-48 Dual Activation for Pointing

If menu selection is accomplished by pointing, dual activation should be provided, in which the first action designates the selected option, followed by a separate second action that makes an explicit control entry.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

2.2.2-49 Large Pointing Area for Option Selection

If menu selection is accomplished by pointing, the acceptable area for pointing should be as large as consistently possible, including at least the area of the displayed option label plus a half-character distance around that label.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

2.2.2-50 Highlighting When Cursor Passes Over Item

For all types of menus, menu items that are available to be selected should be highlighted whenever the cursor passes over them and the selection button is down.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

2.2.2 Menu Selection

2.2.2-51 Number of Options

Each menu option list should have 4 to 8 options.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.2-52 Equivalent Keyboard Commands

When equivalent keyboard commands are provided, they should be displayed as part of the menu option label.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.2-53 ON/OFF Menu Items

For menu items that can be in an "On" or "Off" state, the "On" state should be indicated by making the item perceptually distinct.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.2-54 Selection of ON/OFF Items

Selection of menu items with "On" and "Off" states should change their state.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.3 Function Keys

2.2.3-1 Function Keys for Interim Command Entries

Function keys should be provided for interim command entries, i.e., for actions taken before the completion of a transaction.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.3-2 Distinctive Labeling of Function Keys

Each function key should be labeled informatively to designate the function it performs.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.3-3 Distinctive Location

Function keys should be grouped in distinctive locations on the keyboard to facilitate their learning and use.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.3-4 Consistent Assignment of Function Keys

A function assigned to a particular key in a given task context should be assigned to the same key in other contexts.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.3-5 Single Key for Continuously Available Functions

When a function is continuously available, its function should be assigned to a single key.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2 User Input Formats

2.2.3 Function Keys

2.2.3-6 Single Keying for Frequent Functions

Keys controlling frequently used functions should permit single key action and should not require double (control/shift) keying.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.3-7 Consistent Functions in Different Operational Modes

When a function key performs different functions in different operational modes, equivalent or similar functions should be assigned to the same key.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.3-8 Logical Pairing of Double-Keyed Functions

If double (control/shift) keying is used, the functions paired on one key should be logically related.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.3-9 Consistent Logic for Double Keying

If double (control/shift) keying is used, the logical relation between shifted and unshifted functions should be consistent from one key to another.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.3-10 Labeling Multifunction Keys

If a key is used for more than one function, the function currently available should always be indicated to the user.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2 User Input Formats

2.2.3 Function Keys

2.2.3-11 Easy Return to Base-Level Functions

If the functions assigned to a set of keys change as a result of user selection, the user should be provided with an easy means to return to the initial, base-level functions.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.3-12 Feedback for Function Key Activation

When function key activation does not result in any immediately observable natural response, users should be provided with some other form of computer acknowledgment.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.3-13 Disabling Unneeded Function Keys

When function keys are not needed for any current transaction, they should be temporarily disabled under computer control.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.3-14 Indicating Active Function Keys

If some function keys are active and some are not, the current subset of active keys should be indicated in some noticeable way, such as by brighter illumination.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.3-15 Multiple Presses of Function Key

Pressing a function key in a sequence of key presses unrelated to the function should result in a message asking the user if s(he) meant to select that function.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.4 Macros/Programmable Function Keys

2.2.4-1 User Definition of Macro Commands

Users should be allowed to assign a single name to a defined series of entries, and then to use that named "macro" for subsequent command entry.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.4-2 Index of Macros

Users should have access to an index of their macros and programmable function keys with their respective composition of commands.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.4-3 Limiting User-Definable Macros and Programmable Keys

The use of user definable macros and programmable function keys should be limited.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.4-4 Modification of Defined Macros

A user should be restricted from modifying a macro or programmable function key as defined by a different originating user.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.4-5 No Duplication of Macro Names

Users should not be allowed to duplicate macro names.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.5 Forms

2.2.5-1 Form Filling for Command Entry

Form filling should be provided as an aid for composing complex command entries.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.5-2 Defaults for Command Entry

Form filling should be used as a means of displaying default values for the parameters in complex command entries.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.5-3 Consistent Format for Command Forms

Forms for command entry should be consistent in format.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.5-4 Forms for Information Entry

Form filling should be used for tasks where some flexibility in information entry is needed, such as the inclusion of optional as well as required items, and/or where computer response may be slow.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.5-5 Grouping Data Fields

Where no source documents or forms exist to support information entry, then fields should be logically grouped, by sequence and frequency of use, importance, and functional associations.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2 User Input Formats

2.2.5 Forms

2.2.5-6 Combined Entry of Related Data

Just one explicit entry action at the end of the transaction sequence should be required, rather than separate entry of each item.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.5-7 Data Field Labels

For each data field, an associated label should be displayed to help users understand what entries can be made.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.5-8 Minimal Use of Delimiters

Whenever possible, entry of multiple data items should be allowed without keying special separator or delimiter characters.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.5-9 Standard Delimiter Character

When a field delimiter must be used for data entry, a standard character should be employed consistently for that purpose.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.5-10 Flexible Interrupt

When multiple data items are entered as a single transaction, as in form filling, the user should be allowed to REVIEW, CANCEL, or BACKUP and change any item before taking a final ENTER action.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2 User Input Formats

2.2.5 Forms

2.2.5-11 Deferring Input of Information

When entry of information in a field is deferred or omitted, the system should identify the field by highlighting or other means. Before the information is filed or accessed, the user should be reminded that information has not been entered.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return	Reason:

2.2.5-12 Use of Tabular Displays

When sets of data items must be entered sequentially, in a repetitive series, a tabular display format should be provided where data sets can be keyed row by row.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return	Reason:

2.2.5-13 Distinctive Label Formats

Distinctive formats should be provided for column headers and row labels, so that users can distinguish them from data entries.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return	Reason:

2.2.5-14 Aiding Entry of Duplicated Data

For entry of tabular data, when entries are frequently repeated, users should be provided with some easy means to copy duplicated data.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return	Reason:

2.2.5 Forms

2.2.5-15 Tabbing to Advance to Subsequent Fields

Where the number of fields is limited, screen traversal distances are short, and when data fields will be accessed sequentially, users should be allowed to tab directly from one data field to the next, so that the cursor can move freely back and forth across rows or columns.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.5-16 Direct Pointing Devices for Selecting Fields

Direct pointing devices, such as a mouse or lightpen, should be available (1) for selecting fields in complicated forms, or (2) when field entry will be less predictable (as in database update).[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.5-17 Row Scanning Cues

For long forms, those with many rows, some extra visual cue should be provided to help a user scan a row accurately across columns.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.6 Direct Manipulation

2.2.6-1 When to Use Direct Manipulation

Direct manipulation should be used primarily in tasks with actions and objects that lend themselves to pictographic representation, and in which the actions and objects need not be modified for the successful interpretation of the command by the system.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.6-2 Pointing

When user input involves frequent pointing on a display surface, the interface should be designed so that other actions (e.g., display control) are also accomplished by pointing, in order to minimize shifts from one entry device to another.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.6-3 Highlighting the Selected Item

Selection of an icon, menu, or application-specific capability from a function area should be acknowledged by highlighting the selected item.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.6-4 Other Features of the Direct Manipulation Interface

The direct manipulation interface should include (1) windows for containing the data files, (2) menus for additional objects and actions that are not easily represented by pictographic icons.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.6-5 Fast Computer Response with Direct Manipulation

Direct manipulation should not be used when the computer response is slow.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2 User Input Formats

2.2.6 Direct Manipulation

2.2.6-6 Supplementary Text Labels

If icons are used to represent control actions in menus, a text label should be displayed with each icon to help assure that its intended meaning will be understood.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.6-7 Graphic Display of Control Context

Graphic means should be provided for displaying the context of current control actions to users.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.6-8 Graphic Display of Control Prompting

Prompting aids and other guidance pertaining to current control actions should be displayed graphically to the user.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.6-9 "Opening" an Icon

A user should be able to "open" an icon with a simple, explicit action.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.6-10 Size of Icons

Items on the screen that are displayed for selection should be a minimum of 5 millimeters on a side and separated by at least 3 millimeters.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.6 Direct Manipulation

2.2.6-11 Text Selection Area

When functions are represented by text labels, a large area for pointing should be provided, including the area of the displayed label, plus a half-character distance around the label.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.6-12 Zooming for Precise Positioning

When data entry requires exact placement of graphic elements, users should be allowed to request expansion of the critical display area ("zooming") to make the positioning task easier.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.6-13 Selecting Graphic Elements

Users should be provided some means for designating and selecting displayed graphic elements for manipulation.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.6-14 Highlighting Selected Elements

When a user has selected a displayed graphic element, that element should be highlighted in some way so that the user can anticipate the consequences of any proposed action involving that selection.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.6-15 Displaying Current Attributes

During graphic data entry/editing, the selected attributes that will affect current actions should be displayed for ready reference by the user.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2 User Input Formats

2.2.6 Direct Manipulation

2.2.6-16 Automatic Data Registration

Automatic registration or alignment of computer-generated graphic data should be provided, so that variable data are shown properly with respect to fixed background or map data at any display scale.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.6-17 Automated Data Plotting

When complex graphic data must be entered quickly, computer aids should be provided to automate that process.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.6-18 Plotting Stored Data

Automated plotting of computer-stored data should be provided at user request, with provision for subsequent editing by a user.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.6-19 Predefined Graphic Formats

When graphic data must be plotted in predefined standard formats, templates or skeletal displays for those formats should be provided to aid data entry.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.6-20 Aids for Graph Construction

When graphs must be constructed for data plotting, computer aids should be provided for that purpose.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.6 Direct Manipulation

2.2.6-21 Aids for Scaling

Computer aids should be provided to help users specify appropriate scales for graphic data entry.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.6-22 Grouping Elements

Users should be allowed to designate a group of elements to which graphic editing operations will be applied in common.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2 USER-SYSTEMS INTERACTION

2.7 User Input Formats

2.2.7 Natural Language

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No guidelines are currently available in this section.

2.2.8 Query Language

2.2.8-1 Natural Organization of Data

A query language should reflect a single, natural data structure or organization.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.8-2 Task-Oriented Wording

The wording of a query should simply specify what data are requested.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ●	Reason:

2.2.8-3 Flexible Query Formulation

Users should be allowed to employ alternative forms when composing queries, corresponding to common alternatives in natural language.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.8-4 Minimal Need for Quantifiers

A query language should minimize the need for quantifiers in query formulation.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.8-5 Logic to Link Queries

A query language should include logic elements that permit users to link sequential queries as a single entry.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.8 Query Language

2.2.8-6 Confirming Large-Scale Retrieval

If a query will result in a large-scale data retrieval, the user should be informed and required to confirm the transaction or to narrow the query before processing.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2 User Input Formats

2.2.9 Question and Answer

2.2.9-1 Request for Information

The system should provide the user with a specific request for information.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.9-2 Questions Displayed Singly

Each question should be displayed separately.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.9-3 Stacking Related Questions

The system should be able to stack questions and their associated answers if a series of questions are concerned with the same topic.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.9-4 Contextual Information Should Be Supplied

The system should provide the user with contextual information required for answering the question.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.9-5 Unlimited Room for Answers

The system should accept as much information from the user as s(he) provides in an answer.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2 User Input Formats

2.2.9 Question and Answer

2.2.9-6 Recapitulating Prior Answers

When a series of computer-posed question are interrelated, answers to previous questions should be displayed when those will provide context to help a user answer the current question.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.9-7 Removing and Recalling Questions

The user should have the ability to remove a question and answer from the screen or recall a question and answer to the screen.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.9-8 Sequence Compatible with Source Documents

When questions prompt entry of data from a source document, the question sequence should match the data sequence in the source document.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.9-9 Question Mark Delimiter

A question mark should be the delimiter of the question and answer dialogue.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2 User Input Formats

2.2.10 Speech

2.2.10-1 Speech Input

Spoken input should be used only when entry cannot be accomplished through more reliable methods such as keyed entry or pointing.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

2.2.10-2 Limited Vocabulary for Speech Input

The vocabulary used for spoken input should be constructed so that only a few options are needed for any transaction.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

2.2.10-3 Feedback and Error Correction for Speech Input

Feedback and simple error correction procedures should be provided for speech input, so that when a spoken entry has not been correctly recognized by the computer, the user can cancel that entry and speak again.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

2.2.10-4 Alternative Entries for Speech Input

When speech input is the only form of input available, alternatives forms for critical entries should be allowed, so that if the system cannot recognize an entry after repeated attempts, another entry form can be substituted.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

2.2.10 Speech

2.2.10-5 Activation and Deactivation

Speech recognition systems should have an external, non-speech means of activation and deactivation (e.g., PAUSE and CONTINUE options) so that conversation between users is not taken as command input.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.10-6 Vocabulary Items

The vocabulary items should (1) consist of words that are meaningful and familiar to the user, (2) be phonetically distinct from one another; and (3) consist of 2-5 syllables.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.10-7 Vocabulary Sets

Application vocabularies should be divided into sets based on the hierarchy of the application and recognition accuracy requirements.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.10-8 Testing the Recognition of Individual Vocabulary Items

The user should be able to test the recognition of any individual vocabulary item without the entire interactive system being on-line. Feedback on the word recognized and the corresponding confidence score should be available immediately after each use of a word.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.10 Speech

2.2.10-9 User-Adjustable Features

When the consequences of errors are not significant, the speech amplitude and rejection levels required for input should be user-adjustable.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.10-10 Word Boundaries

Where word boundaries (pauses between words) are required for system interpretation, boundaries of 100 milliseconds or more should be allowed by the system.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.10-11 Confidence Rating

An indication of the similarity of each spoken command to the recorded template should be available to the user.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.2.10-12 Speaker-Dependent Voice Recognizer

If an application functions with a speaker-dependent voice recognizer, the user should be able to retrain or update any or all vocabulary templates at any time.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.3 Cursors

2.3.1 Appearance

2.3.1-1 Distinctive Cursor

Cursors should have distinctive visual features (shape, blink, or other means of highlighting).[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.3.1-2 Display of Cursor

The cursor should not move beyond the display boundaries or disappear from sight.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.3.1-3 Non-Distracting Design

The cursor should not be so distracting as to impair the searching of the display for information unrelated to the cursor.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.3.1-4 Stable Cursor

The displayed cursor should be stable.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.3.1-5 Initial Cursor Placement

On the initial appearance of a data entry display, the cursor should appear automatically at some consistent and useful location.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.3 Cursors

2.3.1 Appearance

2.3.1-6 Consistent HOME Position

When there is a predefined HOME position for the cursor, that position should be consistently defined on all displays of a given type.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.3.1-7 Automatic Return of Cursor

When the user must repeatedly return the cursor to the origin or other specific screen location, automatic return or repositioning of the cursor should be provided.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.3 Cursors

2.3.2 Controls

2.3.2-1 Cursor Control - General

The user should be able to adjust the sensitivity of the cursor movement to be compatible with the required task and user skills.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.3.2-2 Compatible Control of Cursor Movement

Control actions for cursor positioning should be compatible with movements of the displayed cursor, in terms of control function and labeling.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.3.2-3 Easy Cursor Positioning

Users should be provided with an easy, accurate means of positioning a displayed cursor to point at different display elements and/or display locations.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.3.2-4 Consistent Positioning

Where cursor positioning is incremental by discrete steps, the step size of cursor movement should be consistent horizontally (i.e., in both right and left directions), and vertically (in both up and down directions).

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.3.2-5 Cursor Control Key Functions

At the minimum, keys for cursor control should allow horizontal and vertical cursor movement.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

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2.3 Cursors

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2.3.2 Controls

2.3.2-6 Cursor Control at Keyboard

When position designation is required in a task emphasizing keyed data entry, cursor control should be provided by some device integral to the keyboard (function keys, joystick, and trackball).[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.3.2-7 Location of Cursor Control Keys

If cursor movement is accomplished by depressing keys, the keys should be located on the main keyboard.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.3 Cursors

2.3.3 Movement

2.3.3-1 Cursor Movement

If the cursor is moved by depressing a key, releasing the key should cause the cursor to stop moving.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.3.3-2 Responsive Cursor Control

For arbitrary position designation, moving a cursor from one position to another, the cursor control should permit both fast movement and accurate placement.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.3.3-3 Precise Pointing

When fine accuracy of positioning is required, as in some forms of graphic interaction, the displayed cursor should include a point designation feature.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.3.3-4 Selectable Rate Aiding

The user should be able to turn rate aiding of the cursor movement on or off.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.3.3-5 User Selectable Speed

Users should be able to select at least two speeds (normal and fast) for the movement of the cursor when the keys for cursor control are held down.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.3 Cursors

2.3.3 Movement

2.3.3-6 Variable Step Size

When character size is variable, the incremental cursor positioning should vary correspondingly, with a step size matching the size of currently selected characters.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

2.3.3-7 Easy Cursor Movement to Data Fields

If a cursor must be positioned sequentially in predefined areas, such as displayed data entry fields, this should be accomplished by simple user action.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

2.3.3-8 Explicit Activation

Users should be required to take a separate, explicit action, distinct from cursor positioning, for the actual entry (enabling, activation) of a designated function.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

2.3.3-9 Display Format Protection

When there are areas of a display in which data entries cannot be made (such as blank spaces or protected field labels), those areas should be insensitive to pointing actions and the cursor should be prevented from entering those areas.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

2.3.3-10 Free Cursor Movement

For text editing, users should be allowed to move the cursor freely over a displayed page of text to specify items for change, and to make changes directly to the text.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

2.3 Cursors

2.3.3 Movement

2.3.3-11 Proportional Spacing

If proportional spacing is used for displayed text, computer logic should make necessary adjustments automatically when the cursor is being positioned for data entry or data change.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.3.3-12 Cursor Movement by Units of Text

Users should be able to move the cursor by specific units of text, as well as one character at a time.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.3.3-13 Data Entry Independent of Cursor Placement

An ENTER action for multiple data items should result in entry of all items, regardless of where the cursor is placed on the display.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.3 Cursors

2.3.4 Multiple Cursors

2.3.4-1 Minimal Use of Multiple Cursors

Multiple cursors on a single display should be used only when it can be demonstrated that they are required by the task.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.3.4-2 Multi Monitor/Multi Controller Cursor Characteristics

In a multitasking environment with multiple monitors, controllers, or cursors, the location of the active cursor should be obvious to the user.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.3.4-3 Distinctive Multiple Cursors

If multiple cursors are used, they should be visually distinctive from one another.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.3.4-4 Compatible Control of Multiple Cursors

If multiple cursors are controlled by different devices, their separate controls should be compatible in operation.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.3.4-5 Distinctive Control of Multiple Cursors

If multiple cursors are controlled by a single device, a clear signal should be provided to the user to indicate which cursor is currently under control.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

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2.3 Cursors

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2.3.4 Multiple Cursors

2.3.4-6 Multiple Pointing Cursor Control Devices

When there are multiple cursor control/pointing devices, a unique pointing cursor shape should be associated with each device.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.3.4-7 Unique Shapes

Cursors of different shapes should be used for different purposes.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.3 Cursors

2.3.5 Pointing Cursors

2.3.5-1 Pointing Cursor Visibility

The pointing cursor should be visible to the user at all times and may obscure characters unless it interferes with performance within an application.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.3.5-2 Pointing Cursor Blink

The pointing cursor should not blink.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.3.5-3 Pointing Cursor: Image Quality

Pointing cursors should maintain image quality throughout an entire range of motion within the display. The position of the pointing cursor should be clearly visible during movement from one screen position to another. Flicker should be minimized.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.3.5-4 Pointing Cursor Design

To the greatest degree possible, pointing cursors should be completely graphic and should not contain a label.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.3.5-5 Pointing Cursor: Size Constancy

The pointing cursor should maintain its size across all screen and display locations.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.3.5 Pointing Cursors

2.3.5-6 Pointing Cursor: Movement

The movement of the pointing cursor should appear to the user to be smooth and continuous, with smooth and continuous movement of the cursor control device. The pointing cursor should not move in the absence of any input from the user.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.3 Cursors

2.3.6 Text Entry Cursors

2.3.6-1 Text Entry Cursor Visibility

The text entry cursor should only be visible when text entry is possible.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.3.6-2 Identification of Text Entry Cursor

At the initiation of a task, an application, or a new display, the user should be able to immediately determine the location of the text entry cursor. Following the initial placement of the text entry cursor, the position of the cursor should be under the user's control.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ●	Reason:

2.3.6-3 Text Entry Cursor Blink

If text entry cursor blinking is to be used to direct the user's attention, the default blink rate should be 3 Hz.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.3.6-4 Nonobscuring Text Entry Cursor

The placeholder cursor should not obscure any other character displayed in the position designated by the cursor.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.3.6-5 Number of Text Entry Cursors

There should be only one text entry cursor per window.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

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2.3 Cursors

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2.3.6 Text Entry Cursors

2.3.6-6 Text Entry Cursor Size

The text entry cursor should assume the height and/or width of the text characters adjacent to it.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.4 System Response

2.4.1 General

2.4.1-1 Standard Display Location

System messages should appear in standard locations.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.4.1-2 Consistent Format for System Messages

Consistent grammatical construction should be used in system messages.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.4.1-3 Familiar Wording

System messages should use familiar terminology.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.4.1-4 Concise Wording of System Messages

System messages should be concise and clearly worded.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.4.1-5 Speaking Directly to Operators

Wording for system messages should be directed at the operator.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

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2.4 System Response

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2.4.1 General

2.4.1-6 Only Necessary Information Displayed

No extraneous information should be displayed.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.4.1-7 Anthropomorphism

Presenting the system as a person should be avoided.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.4 System Response

2.4.2 Prompts

2.4.2-1 Prompting User Entries

Operators should be provided with clear and specific information to guide entries during LOG-ON/OFF or command or information entry.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.4.2-2 Prompting Address Entry

When an operator must specify the address for a message, prompting should be provided.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.4.2-3 Standard Symbol for Prompting Entry

Standard symbols should be used for input prompting.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.4.2-4 Prompting Command Correction

When a command entry is not recognized or inappropriate, operators should be prompted to correct, rather than re-enter the command.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.4.2-5 Prompting Field Length

Cues should be provided to indicate the size of a fixed-length data entry field.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ●	Reason:

2.4 System Response

2.4.2 Prompts

2.4.2-6 Data Format Cuing in Labels

Additional cuing of data format should be included in a field label when that seems helpful.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.4.2-7 Operator-Requested Prompts

Operators should be able to request computer generated prompts to determine required parameters or available options for a command.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.4.2-8 Prompting Data Entry

Prompting should be provided for required formats and acceptable values for data entries.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.4.2-9 Graphic Display of Control Prompting

Graphic means may be provided for displaying to operators prompting aids and other guidance pertaining to current control actions.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.4 System Response

2.4.3 Feedback

2.4.3-1 Feedback During Data Entry

Feedback should be displayed for all user actions during data entry; keyed entries should be displayed stroke by stroke.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.4.3-2 Feedback for Completion of Data Entry

The computer should acknowledge completion of a data entry transaction with a confirmation message if data entry was successful, or else with an error message.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.4.3-3 Feedback for Repetitive Data Entries

For a repetitive data entry task that is accomplished as a continuing series of transactions, successful entry should be indicated by regenerating the data entry display, automatically removing the just-entered data in preparation for the next entry.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.4.4 Advisory Messages

2.4.4-1 Distinctive and Consistent Advisory Messages

Advisory messages should be distinctive.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.4.4-2 Redundant Display

Important information should be presented through both visual and auditory means.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.4.4-3 Informing Operators of Potential Data Loss

Protection against data loss should be provided.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.4.4-4 Time-Consuming Processes

Users should be informed when a command will be time-consuming to process.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.4 System Response

2.4.5 Error Messages

2.4.5-1 Informative Error Messages

When the computer detects an entry error, an error message should be displayed stating the error and possible subsequent operations.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.4.5-2 Task-Oriented Error Messages

Wording for error messages should be appropriate to the task.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.4.5-3 Neutral Wording for Error Messages

Error messages should use neutral wording.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.4.5-4 Non-Disruptive Error Messages

The computer should display an error message only after completion of an entry.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.4.5-5 Invalid Action

Where an entry is invalid or inoperative at the time of selection, no action should result except a display of an advisory message indicating the error and the appropriate functions, options, or commands.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.4 System Response

2.4.5 Error Messages

2.4.5-6 Advisory Error Messages

Where data or control entry is made from a small set of alternatives, error messages should indicate the correct alternatives.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return	Reason:

2.4.5-7 Displaying Erroneous Entries

When an entry error has been detected, the erroneous entry should remain displayed until the error has been corrected.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return	Reason:

2.4.5-8 Cursor Placement Following Error

In addition to providing an error message, the location of a detected error should be marked by positioning the cursor at that point on the display, i.e., at that data field or command word.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return	Reason:

2.4.5-9 Indicating Repeated Errors

If a operator repeats an error, a noticeable change should exist in the displayed error message.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return	Reason:

2.4.5-10 Errors in Stacked Commands

If an error is detected in a group of entries, the system should process correct commands until the error is displayed.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return	Reason:

2.4 System Response

2.4.5 Error Messages

2.4.5-11 Multilevel Error Messages

Following the output of a simple error message, operators should be able to request a more detailed explanation of the error.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.4.5-12 Cautionary Messages

When a data or command entry error is suspected but cannot be determined (in terms of system error logic), a cautionary message asking for confirmation should be displayed.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.4.5-13 Multiple Error Messages

Notification should be made for each error when multiple errors are detected.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.4.5-14 Error Message Placement

Error messages should be presented at the point of the error or in a consistent area of the display.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.4.5-15 Documenting Error Messages

As a supplement to on-line guidance, system documentation should include a listing and explanation of all error messages.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

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2.4.6 User Guidance/Help

2.4.6-1 On-Line Guidance

Reference material describing system capabilities, procedures, and commands and abbreviations, should be available on-line.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.4.6-2 Access to Guidance

Explicit actions should be required to access or suppress user guidance.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.4.6-3 HELP Request

At any point in an interaction, users should be able to access on-line user guidance by means of a simple action that is consistent throughout the interface.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.4.6-4 HELP Guidance

Advisory messages or prompts should be available to guide users in accessing help messages.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.4.6-5 Synonyms for Standard Terminology

When a user requests HELP on a topic, the computer should accept synonyms and abbreviations.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.4 System Response

2.4.6 User Guidance/Help

2.4.6-6 Context-Sensitive HELP

The information presented in response to a HELP request should be tailored to the task context.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

2.4.6-7 Clarifying HELP Requests

When a request for HELP is ambiguous in context, the computer should initiate a dialogue to specify what data, message, or command requires explanation.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

2.4.6-8 Automatic HELP

When appropriate, HELP should be automatically provided.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

2.4.6-9 Multilevel HELP

When a HELP display provides summary information, more detailed explanations should be available.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

2.4.6-10 Browsing HELP

Users should be able to browse on-line HELP.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

2.4 System Response

2.4.6 User Guidance/Help

2.4.6-11 Return from HELP

The user should be able to easily return to the task after accessing HELP.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.4.6-12 Hardcopy Procedures

A complete hardcopy set of computer system operating procedures and contingency procedures should be available in the control room.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.4.6-13 Computer System Procedures

Procedures should be prepared from the point of view of the control room operator.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.4.6-14 Display Indices

Cross-indices of the available data displays should be available in the control room in hardcopy form.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.4 System Response

2.4.7 System Response Time

2.4.7-1 Appropriate Computer Response Time

The speed of computer response to user entries should be appropriate to the transaction involved.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.4.7-2 Display Average System Response Time

Average system response time, if affected by the number of on-line users, should be displayed at time of LOG-ON.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.4.7-3 Response Time Consistent with Requirements

System response times should be consistent with operational requirements.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.4.7-4 Processing Delay

Where system overload or other system conditions will result in a processing delay, the system should acknowledge the data entry and provide an indication of the delay to the user.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.4.7-5 Indicating Completion of Processing

When processing in response to a control entry is lengthy, the user should be given a positive indication of subsequent completion time and appropriate related information.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.4 System Response

2.4.7 System Response Time

2.4.7-6 Response Time Induced Keyboard Lockout

If computer processing time requires delay of concurrent user inputs and no keyboard buffer is available, keyboard lockout should occur until the computer can accept the next transaction. An alert should be displayed to indicate to the user that lockout has occurred.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.4.7-7 Keyboard Restoration

A signal should be presented when the computer is ready to continue following response time-induced keyboard lockout.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.4.7-8 Variability of Response Time

Response time deviations should not exceed more than half the mean response time.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.4.7-9 Maximum System Response Times

Maximum system response times for real-time systems should not exceed the values presented in Table 2.4.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

Table 2.4 Maximum and preferred system response times

User Activity	Response Time (sec)	
	Maximum	Preferred
Control Activation (for example, keyboard entry, cursor controller movement)	0.10	< 0.10
System Activation (system initialization)	3.0	< 0.50
Request for given service: Simple	2.0	< 0.25
Complex	5.0	< 2.0
Loading and Restart	15-60.0	< 6.0
Error Feedback (following completion of input)	2.0	< 0.25
Response to I.D.	2.0	< 0.25
Information on next procedure	< 5.0	< 2.0
Response to simple inquiry from list	2.0	< 0.25
Response to simple status inquiry	2.0	< 0.25
Response to complex inquiry in table form	2-4.0	< 0.25
Request for next page	0.5-1.0	< 0.25
Response to "execute problem"	< 15.0	< 6.0
Light pen entries	1.0	< 0.25
Drawings with light pens	0.1	< 0.10
Response to complex inquiry in graphic form	2-10.0	< 0.25
Response to dynamic modeling	---	---
Response to graphic manipulation	2.0	< 0.25
Response to user intervention in automatic process	4.0	< 1.50

2.5 Managing Displays

2.5.1 Display Selection and Navigation

2.5.1-1 Information for Navigating

The user interface should provide users with information and actions needed to navigate the interface.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.5.1-2 Navigation Among Displays

Users should be able to easily move among displays.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.5.1-3 Sequential Steps on Multipage Displays

When actions on a new display in a sequence require completion of actions on a previous display, the user should be able to move to the new display only when all of the conditions have been met or when an intentional override procedure has been confirmed.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.5.1-4 Navigation Messages

A message should be available that provides explicit information to the user on how to move from one frame to another or how to select a different display.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.5.2 Display Control

2.5.2-1 Display Control

Users should be able to specify the information to be displayed and select the format in which it is presented.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.5.2-2 Display of Control Options

Screen control locations and control options should be clearly and appropriately indicated.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.5.2-3 Information Displayed as Available

Information that the user must manipulate should be displayed as it becomes available.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.5.2-4 Zooming for Display Expansion

The user should be provided with a zooming capability that allows the user to expand the display of any selected area.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.5.2-5 Functional Labeling for Display Framing

Display framing should be described (e.g., in user instructions and key labels) in functional terms, and wording that implies spatial orientation should be avoided.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.5 Managing Displays

2.5.2 Display Control

2.5.2-6 Easy Paging

When requested data exceeds the capacity of a single display frame, users should be given some easy means to move back and forth over displayed material by paging or panning/scrolling.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.5.2-7 Show Changing Scale

When a display is expanded from its normal coverage, a scale indicator of the expansion factor should be provided.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.5.2-8 Show Overview Position of Visible Section

When a display is panned and/or expanded from its normal coverage, some graphic indicator of the position in the overall display of the currently visible section should be provided.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.5.2-9 Return to Normal Display Coverage

If a user is allowed to pan over an extended display, or zoom for display expansion, an easy means for the user to return to normal display coverage should be provided.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.5 Managing Displays

2.5.3 Display Update/Freeze

2.5.3-1 Automatic Display Update

Users should be able to request automatic update (computer regeneration) of changed data, and should be able to control the update rate.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

2.5.3-2 Readability of Changing Data

Changing data values that must be read should be displayed in a fixed position and updated no more than once per second. If users need only to monitor general trends in changing data values, and do not need to take exact readings, faster update rates may be acceptable.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

2.5.3-3 Visual Integration of Changing Graphics

When a user must visually integrate changing patterns on a graphic display, the data should be updated at a rate appropriate to human perceptual abilities for that kind of data change.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

2.5.3-4 Refresh Rate for Free-drawn Graphics

For free-drawn graphics, the refresh rate on the monitor should be high enough to produce the appearance of a continuous track.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

2.5.3-5 Display Freeze

The user should be able to "freeze" automatically updated data at any point. This is necessary in order for the user to examine changed data more deliberately.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

2.5 Managing Displays

2.5.3 Display Update/Freeze

2.5.3-6 Labeling Display Freeze

When a display is "frozen," the display should be appropriately labeled to remind users of its "frozen" status.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.5.3-7 Signaling Changes to Frozen Data

When a display being updated in real-time has been frozen, the user should be advised if some significant, but not displayed, change should be detected in the computer processing of new data.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.5.3-8 Resuming Update After Display Freeze

When the user elects to resume update after a display being updated in real time has been frozen, the resumed display update should be positioned at the current real-time point.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.5.4 Display Suppression

2.5.4-1 Temporary Suppression of Displayed Data

The user should be able to temporarily suppress standard data displays.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.5.4-2 Labeling Display Suppression

A data display that has been suppressed should be annotated with an appropriate label to remind users that data have been suppressed.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.5.4-3 Signaling Changes to Suppressed Data

Users should be advised if some significant (but not displayed) change is detected in the computer processing of new data when data have been suppressed from a display.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.5.4-4 Resuming Display of Suppressed Data

Data that has been suppressed from a display should be able to be quickly restored to its complete, originally generated form.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.5.4-5 Dedicated Function Key

Function keys used to restore suppressed data should have no other use.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.5 Managing Displays

2.5.5 Scrolling and Paging

2.5.5-1 Continuous Text Data

Paging and windowing should not be used when searching through continuous text data.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.5.5-2 Consistent Orientation

A consistent orientation for display framing should be used.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.5.5-3 Panning with Free Cursor Movement

In applications where a user moves a cursor freely about a page of displayed data, panning should be adopted rather than scrolling as the conceptual basis of display framing.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.5.5-4 Framing Consistently for All Data

Framing functions should be performed consistently so that panning and/or zooming affect all displayed data in the same way.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.5.5-5 Paging Controls

Users should be allowed to move easily from one page to another for displays which are partitioned into separately displayable pages.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.5.5 Scrolling and Paging

2.5.5-6 Horizontal Scrolling

The user should have the ability to shift the text information shown when the user cannot view all of the characters in the horizontal line.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.5.5-7 Appropriate Scrolling/Paging Structures

Structures for horizontal scrolling/paging should appear only on displays for which horizontal movement is appropriate. Similarly, structures for vertical scrolling/paging should appear only on displays for which vertical movement is applicable.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.5.5-8 Common Display Structure

Display structure used for scrolling and paging should be common to all files.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.5.5-9 Scrolling/Paging Techniques

Users should have the ability to scroll or page using several different techniques.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.5.5-10 One Structure for Vertical, One for Horizontal Movement

Only one scrolling/paging structure should be used for vertical movement in a display and one for horizontal movement in a display.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.5 Managing Displays

2.5.5 Scrolling and Paging

2.5.5-11 Labeling Scrolling Function

The function of the scrolling/paging structure should be clearly indicated by either a textual or graphic label.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.5.5-12 Evident Direction of Paging

The direction that a user must page (toward the top or bottom, left or right) should be evident to the user before s(he) begins to page.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.5.5-13 Paging in One or Multiple Page Increments

Users should be able to page in one page or multiple page increments.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.5.5-14 Discrete Paging

When moving over multiple pages, the movement should be discrete with no display of intermediate pages between the starting page and the selected page.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.5.5-15 Indicate Absolute and Relative Positions of User

Scrolling/paging structures should indicate both the absolute and relative positions of the user in the data file.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.5 Managing Displays

2.5.5 Scrolling and Paging

2.5.5-16 Graphic Indication of Scroll Position

Large display outputs which are viewed by continuous panning/scrolling should be provided with a graphic indicator inset at the margin of the display frame to indicate current location.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

2.5.5-17 Scroll by Line or Display Unit

The scroll motion rate should allow the user to scroll by line or by display unit.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

2.5.5-18 Display Window

ROLL and SCROLL commands should refer to the display window, not the text/data.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

2.5.5-19 Parameters Refer to Data not Window

The parameters of roll/scroll functions should refer to the data being inspected, not to the window.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

2.5 Managing Displays

2.5.6 Windows

2.5.6-1 Window Identification

Windows should be identified by a label consistently located at the top of the window's border.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.5.6-2 Window Selection and Display

Users should be able to select separate data windows that will share a single display screen.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.5.6-3 Displaying Multiple Windows

When multiple windows are open simultaneously, the user should have the capability to easily tile, layer, or sequentially view the windows.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.5.6-4 Managing Open Windows

The system should keep track of the windows that are open (but not necessarily active or displayed), and provide a means of displaying the list of open windows to the user.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.5.6-5 Window Demarcation

Windows should be visually separated from each other and from their background, preferably by borders or similar demarcation.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.5 Managing Displays

2.5.6 Windows

2.5.6-6 Distinction Between Window Types

Window types should be perceptually distinct.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return	Reason:

2.5.6-7 Active Windows Priority

Under normal operating conditions, active windows should be frontmost on the display.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return	Reason:

2.5.6-8 Caution and Warning Window Priority

Caution and warning windows should be frontmost on the display.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return	Reason:

2.5.6-9 Default Window Size

The size and shape of the initial presentation of a window should be consistent with its contents (amount of information, number of menus, and data fields).[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return	Reason:

2.5.6-10 Minimum Height for Text Windows

The default height for text windows and windows used for scanning data should be at least four lines of information.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return	Reason:

2.5 Managing Displays

2.5.6 Windows

2.5.6-11 Minimum Width for Text Windows

The default width for a generic text window should enable 50 to 80 characters to be displayed.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.5.6-12 Consistent Window Control

User control of windows should operate consistently from one display to another for each type of window.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.5.6-13 Window Control Functions

As appropriate to the user task, windows should be capable of the following operations: scrolling/panning, resizing, moving, hiding, activating, deactivating, copying to/from, zooming in/out, tabbing, and undo-last.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.5.6-14 Consistent Control Within Windows

When control actions such as command entry may be taken by a user working within a window, those control actions should be consistent from one window to another.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.5.6-15 Window Opening Methods

The user should be able to open a window by performing any of a set of simple actions.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.5 Managing Displays

2.5.6 Windows

2.5.6-16 Closing Windows

Users should be able to close a window with a single action.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.5.6-17 Easy Shifting Among Windows

If several windows are open, several easy means should be provided for a user to shift among them.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.5.6-18 Activating a Previously Opened Window

The user should be able to put a window in the interactive state by performing any of a set of simple actions in that window or related to that window.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.5.6-19 Activation of Window Cursor

The action that puts a window into the interactive state should automatically position the placeholder cursor in that window so that the user can provide inputs through that window.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.5.6-20 Multi-Modal Window Designation

If windows are capable of different modes, the system should provide immediate and unambiguous feedback concerning which mode is active.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.5 Managing Displays

2.5.6 Windows

2.5.6-21 Movable Windows

Window movement capability should be provided such that the user can move windows to different areas of the display.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.5.6-22 Window Position

It should not be possible to position windows in such a way that menu bars, access to the command area, or caution and warning messages are obscured.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.5.6-23 Smooth Window Movement

Movement of a window should appear to be smooth and continuous to the user.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.5.6-24 Indicate Active Window

If several windows are displayed at once, the window(s) in which action can be taken should be indicated.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.5.6-25 Update of Hidden Windows

A window that is not displayed should be capable of receiving information from the system.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.5 Managing Displays

2.5.6 Windows

2.5.6-26 Alerting User to Information Availability

The system should alert the user to critical information that becomes available in an inactive or non-displayed window.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.5.6-27 Window Activates Upon Opening

The action that opens a window should automatically make that window active.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.5.6-28 Varying Window Size

Users should be able to change the horizontal and vertical dimensions of a window independently or together.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.5.6-29 Accessibility to Partially Removed Windows

Windows partially moved off the display should be made readily accessible with a single action.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.5.6-30 Scrollable Windows

The user should have the ability to scroll through the contents of a window both horizontally and vertically.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.5 Managing Displays

2.5.6 Windows

2.5.6-31 User Control of Automatic Update

Automatically updated windows should have display freeze capability.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.6 Managing Information

2.6.1 Editing Documents

2.6.1-1 Natural Units of Text

Users should be allowed to specify segments of text in whatever units are natural for entry/editing.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

2.6.1-2 Text Displayed as Printed

Users should be allowed to display text exactly as it will be printed.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

2.6.1-3 Format Control by User

Easy means should be provided for users to specify required format control features (e.g., margin and tab settings) during text entry/editing.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

2.6.1-4 Establishing Predefined Formats

When text formats must follow predefined standards, the standard format should be provided automatically and not rely on users to remember and specify proper formats.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

2.6.1-5 Storing User-Defined Formats

When text formats cannot be predicted in advance, users should be able to specify and store for future use the formats that might be needed for particular applications.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

2.6 Managing Information

2.6.1 Editing Documents

2.6.1-6 Consistent Word Spacing

Unless otherwise specified by the user, entered text should be left-justified to maintain constant spacing between words, leaving right margins ragged if that is the result.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.6.1-7 Hyphenation by Users

In the entry/editing of text, automatic pagination and line breaks by the computer should keep words intact, and hyphenation should only be introduced where specified by users.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.6.1-8 Changing Physical Characteristics of Text

The user should have the ability to change the physical characteristics of text.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.6.1-9 Tabs

A tab function should be available for paragraph indentation and for moving the cursor to a preselected location.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.6.1-10 Tab Controls

For editing programs or tabular data, cursor tab controls or other provisions for establishing and moving readily from field to field should be provided.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.6.1 Editing Documents

2.6.1-11 Margins

The user should have the ability to change margins for a text file.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.6.1-12 Automatic Line Break

For entry/editing of unformatted text, an automatic line break ("return") should be provided when text reaches the right margin, with provision for user override.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.6.1-13 Automatic Pagination Aids

Automatic pagination for text entry/editing should be provided, allowing users to specify the page size.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.6.1-14 User Control of Pagination

When automatic pagination is provided, users should be allowed to override that pagination in order to specify page numbers at any point in a document.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.6.1-15 Controlling Integrity of Text Units

When automatic pagination is provided, users should be allowed to specify how many lines in a paragraph can stand alone at the bottom or top of a page ("widows" and "orphans"), and to specify any text that should not be divided between two pages, such as lists or tables.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.6 Managing Information

2.6.1 Editing Documents

2.6.1-16 Protecting Text During Page Overruns

When a user is inserting text into a document that has already been paginated, no text should be lost if the user inserts more text than a page can hold.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.6.1-17 Head- and Foot-of File

The means should be provided to readily move the cursor to the head (beginning) or the foot (end) of the file.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.6.1-18 Inserting

When inserting words or phrases, items to be inserted should be displayed as the final copy will appear.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.6.1-19 String Search

Users should be allowed to specify a string of text and request the computer to advance (or back up) the cursor automatically to the next (or last previous) occurrence of that string.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.6.1-20 Multiple Methods of Searching

Users should have multiple methods for searching for lines or alphanumeric strings.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.6 Managing Information

2.6.1 Editing Documents

2.6.1-21 Search for Line Numbers

Users should have the ability to search for and move to a specific line number in a file.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.6.1-22 Upper and Lower Case Equivalent in Search

Unless otherwise specified by a user, upper and lower case letters should be treated as equivalent in searching text.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.6.1-23 Specifying Case in Search

When case is important, users should be allowed to specify case as a selectable option in string search.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.6.1-24 Global Search and Replace

When systematic editing changes will be made throughout a long document, a "global search and replace" capability should be provided.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.6.1-25 Case in Global Search and Replace

If a global search and replace capability is provided, the case of the replacement string should match the case of the old string, unless otherwise specified by the user.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.6 Managing Information

2.6.1 Editing Documents

2.6.1-26 Moving Text

Users should be allowed to select and move text segments from one place to another within a document.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.6.1-27 Pasting Text into a Graphical File and Vice Versa

The user should be able to paste (1) alphanumeric data cut or copied from a text file or table into a graphical display, and (2) graphical data into a text or tabular file.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.6.1-28 Cutting Graphical Objects and Areas of Graphical Displays

Users should be able to cut both graphical objects and areas of a graphical display.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.6.1-29 Viewing Text Prior to Pasting

Users should be able to view text that has been cut or copied prior to pasting.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.6.1-30 Placing Cut Text in Compatible Files

Users should be able to insert copied text at any location in the current file or other files created with the same application.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.6.1 Editing Documents

2.6.1-31 Placement of Pasted Text

The pasted text should be inserted at the location immediately before the cursor (in a text file), or at the approximate location of the cursor (in a graphical file).[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.6.1-32 Pasting the Same Text More than Once

Pasting the most recently cut or copied text should have no effect on the users' ability to paste the same text again.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.6.1-33 Cutting Without a Gap in the Text

No gap should be left in the file at the point from which cut text was removed.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.6.1-34 Storing Frequently Used Text

Users should be allowed to label and store frequently used text segments, and to later recall (copy into current text) stored segments identified by their assigned labels.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.6.1-35 Vertical Scrolling When Selecting Text

If the selected text, table, or graphics area extends beyond the bottom of the displayed page, the screen should automatically scroll until the user stops selecting.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

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2.6.1 Editing Documents

2.6.1-36 Non-Contiguous Blocks of Text

Users should not be able to select non-contiguous blocks of text when cutting and pasting.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.6.2 Saving Files

2.6.2-1 Saving to a Data File

The user should be able to save the information entered into a file by a single action that will permit the user to continue interacting with that file.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.6.2-2 Exit With Save

After finishing the interaction with any type of file, the user should be able to save the information and stop interacting with the file by a single action.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.6.2-3 Exiting a File

After finishing the interaction with any type of file, the user should be able to stop interacting with the file by a single action (e.g., selecting a menu item) without saving the changes to the file.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.6.2-4 Distinct Commands for Exit With and Without Save

The command used to "exit with save" should differ from the commands for "save" (without exit) and for "exit without save."

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.6.2-5 Protection Against Exiting a File Without Saving

The user should be protected against exiting a file without the opportunity to save the file contents.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.6 Managing Information

2.6.2 Saving Files

2.6.2-6 Recovery of Replaced File

Information from a file that has been modified and stored with the "save" or "exit with save" actions should be retrievable with a single action.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.6.2-7 Automatic Saving of a File

The system should save a file automatically at frequent intervals while being edited.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.6.2-8 Automatic Backup

Users should have the option of invoking an automatic backup function that retains previous versions of files. The specific number of previous versions saved should be selectable by the user.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.6.2-9 Access of Modified Information After Exit Without Save

Information from a file that has been modified by new input should be retrievable with a single action even after exiting without saving new input.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.6.3 Temporary Editing Buffer

2.6.3-1 Automatic Placement of Cut Data in Buffer

When selected data is cut or copied from a text file, tabular file, and/or graphics file and placed in a temporary editing buffer, the data should be placed in the buffer automatically, with the only specific action required by the user being the cut or copy action.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.6.3-2 Contents of Temporary Buffer

The contents of the temporary editing buffer should remain intact after the application from which the contents were taken is closed.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.6.3-3 Default Conditions of Buffer

The default condition should be that additions to the temporary editing buffer are not cumulative.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.6.3-4 Access to Contents of Temporary Buffer

The user should be able to access the contents of the temporary editing buffer in a window with a single action.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.6 Managing Information

2.6.4 Excerpt File

2.6.4-1 Accessing Information Across Applications

The capability to accept and maintain information, independent of application, should be provided for holding relevant information across displays or applications.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.6.4-2 Excerpt File

Users should have the capability to create multiple excerpt files.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.6.4-3 Integrating Data

The user should have the capability to integrate new data with data already in the file.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.6.4-4 Copying Excerpt File

The user should be able to cut or copy data from the excerpt file and paste it to any other file.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.6.4-5 Saving Excerpt File

The user should be able to save the excerpt file.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2 USER-SYSTEM INTERACTION

2.7 Prevention/Detection/Correction of Errors

2.7.1 Validating User Input

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2.7.1-1 Automatic Data Validation

Software for automatic data validation should be provided to check any item whose entry and/or correct format or content is required for subsequent data processing.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.7.1-2 Validation

Data entries should be validated by the system for correct format, legal value, or range of values. Where repetitive entry of data sets is required, data validation for each set should be completed before another transaction can begin.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.7.1-3 Stroke-By-Stroke Echo

Data being entered through a keyboard should be echoed on the screen on a stroke-by-stroke basis, except when applied to passwords or other security measures.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.7.1-4 System Validation

Where possible, when a command entry does not meet validation logic, a cautionary message should be displayed asking the user to confirm data entry.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.7.1-5 Data Verification by User Review

When verification of prior data entries is required, users should be allowed to review and confirm the data, rather than re-entering the data.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2 USER-SYSTEM INTERACTION

2.7 Prevention/Detection/Correction of Errors

2.7.1 Validating User Input

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2.7.1-6 Cross Validation of Related Data

For the entry of related data items, automatic cross validation should be provided to ensure that the data set is logically consistent.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.7.1-7 Displaying Default Values

Currently operative default values should be displayed for data entry, so that users can review and confirm them for computer processing.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.7.1-8 Non-Disruptive Error Messages

If data validation detects a probable error, an error message should be displayed to the user at the completion of data entry.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.7.1-9 Timely Validation of Sequential Transactions

In a repetitive data entry task, the data for one transaction should be validated, and the user should be allowed to correct errors before beginning another transaction.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.7.1-10 Optional Item-by-Item Validation

Optional item-by-item data validation within a multiple-entry transaction should be provided.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2 USER-SYSTEM INTERACTION

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2.7 Prevention/Detection/Correction of Errors

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2.7.1 Validating User Input

2.7.1-11 Deferral of Required Data Entry

If a user wishes to defer entry of a required data item, the user should be required to enter a special symbol in the data field to indicate that the item has been temporarily omitted rather than ignored.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.7.1-12 Reminder of Deferred Entry

If a user has deferred entry of required data but then requests processing of entries, that omission should be signaled to the user, and immediate entry (or perhaps further deferral) of missing items should be allowed.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.7.1-13 User Validation

The user should be able to obtain a paper copy (screen dump) of the contents of alphanumeric or graphic displays.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2 USER-SYSTEM INTERACTION

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2.7 Prevention/Detection/Correction of Errors

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2.7.2 Correction Information/Command Entries

2.7.2-1 Acknowledging Corrections

All error corrections by the user should be acknowledged by the system either by indicating a correct entry has been made or by another error message.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.7.2-2 UNDO to Reverse Control Actions

Any user action should be immediately reversible by an UNDO command.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.7.2-3 User Review and Editing of Entries

For all inputs, whether data entries or commands, users should be allowed to edit composed material before requesting computer processing.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.7.2-4 Immediate Error Correction

When the system detects an error in a user input, the user should be allowed to make an immediate correction.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.7.2-5 Editing Entries After Error Detection

Following error detection, users should be allowed to edit entries by rekeying only those portions that were in error.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.7.2 Correction Information/Command Entries

2.7.2-6 Explicit Entry of Corrections

Users should be required to take an explicit ENTER action for computer processing of error corrections.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.7.2-7 Automated Correction Aid

When inappropriate or unrecognized commands are detected, a list should be provided to the user showing permissible commands, anticipating the command intended.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ●	Reason:

2.7.2-8 Flexible BACKUP for Error Correction

Users should be allowed to BACKUP easily to previous steps in a transaction sequence in order to correct an error or make any other desired change.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.7.2-9 Errors in Stacked Commands

If an error is detected in a stacked series of command entries, the computer should either consistently execute to the point of error, or else consistently require users to correct errors before executing any command.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.7.2 Correction Information/Command Entries

2.7.2-10 Partial Execution of Stacked Commands

If only a portion of a stacked command can be executed, the user should be notified and provided appropriate guidance to permit correction, completion, or cancellation of the stacked command.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.7.2-11 Replacing Erroneous Commands

If a user makes a command entry error, after the error message has been displayed, the user should be allowed to enter a new command.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.7.2-12 Correcting Command Entry Errors

If a command entry is not recognized, the user should be allowed to revise the command rather than rejecting the command outright.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2 USER-SYSTEM INTERACTION
2.7 Prevention/Detection/Correction of Errors
2.7.3 Confirming Entries

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2.7.3-1 User Confirmation of Destructive Entries

When a control entry will cause any extensive change in stored information, procedures, and/or system operation, and particularly if that change cannot be easily reversed, the user should be notified and confirmation of the action should be required before implementing it.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.7.3-2 Informing Users of Potential Information Loss

For conditions which may require special user attention to protect against information loss, an explicit alert and/or advisory message should be provided to prompt appropriate user action.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.7.3-3 Preventing Data Loss at LOG-OFF

When a user requests LOG-OFF, pending transactions should be checked and if any pending transaction will not be completed, or if data will be lost, an advisory message requesting user confirmation should be displayed.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.7.3-4 Displaying Data to be Changed

If a user requests change (or deletion) of a stored data item that is not currently being displayed, both the old and new values should be displayed so that the user can confirm or nullify the change before the transaction is completed.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2 USER-SYSTEM INTERACTION

2.7 Prevention/Detection/Correction of Errors

2.7.4 Protecting Data

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2.7.4-1 Protection from Computer Failure

Automatic measures should be provided to minimize data loss from computer failure.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.7.4-2 Protection from Interrupts

When a proposed user action will interrupt a current transaction sequence, automatic means to prevent data loss should be provided.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.7.4-3 Protection from Data Change

When information must not be changed, users should not be permitted to change controlled items.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.7.4-4 Explicit Action to Select Destructive Modes

Users should take explicit action to select any operational mode that might result in data loss.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.7.4-5 Safe Defaults

If automatic defaults are provided for control entries, those defaults should protect against data loss, or at least not contribute to the risk of data loss.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

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2.7 Prevention/Detection/Correction of Errors
2.7.4 Protecting Data

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2.7.4-6 Protecting Physical Controls

If activation of function keys (and other control devices) may result in data loss, they should be located separately and/or physically protected to reduce the likelihood of accidental activation.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.7.4-7 Disabling Unneeded Controls

When function keys and other devices are not needed for current control entry, and especially when they may have destructive effects, they should be temporarily disabled by the software so that they cannot be activated by a user.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.7.4-8 Distinctive File Names

When data files may be deleted (or overwritten) by name, the names of different files should be distinctive.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.7.4-9 Feedback for Mode Selection

When the result of user actions will be contingent upon prior selection among differently defined operational modes, a continuous indication of the current mode should be provided, particularly when user inputs in that mode might result in data loss.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.7.4-10 Protection from Interference by Other Users

Data should be protected from inadvertent loss caused by the actions of other users.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

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2.7 Prevention/Detection/Correction of Errors
2.7.4 Protecting Data

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2.7.4-11 Segregating Real from Simulated Data

When simulated data and system functions are displayed or provided (perhaps for user training), real data should be protected and real system use should be clearly distinguished from simulated operations.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.7.4-12 Data Entry/Change Transaction Records

In situations where unauthorized data changes may be possible, users (or a system administrator) should be able to request a record of data entry/change transactions.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.8 System Security

2.8.1 User Identification

2.8.1-1 Automated Security Measures

When required, automated measures to protect data security should be provided, relying on computer capabilities rather than on more fallible human procedures.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

2.8.1-2 Notification of Threats to Security

Messages or signals should be provided in order to notify users (and system administrators) of potential threats to data security (i.e., of attempted intrusion by unauthorized users).[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

2.8.1-3 Auxiliary Tests to Authenticate User Identity

When system security requires more stringent user identification than is provided by password entry, auxiliary tests should be devised that authenticate user identity without imposing impractical demands on the user's memory.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

2.8.1-4 Easy LOG-ON

The LOG-ON process and procedures for user identification should be as simple as possible, consistent with protecting data from unauthorized use.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

2.8.1-5 Private Entry of Passwords

When a password must be entered by a user, password entry should not be displayed.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

2.8 System Security

2.8.1 User Identification

2.8.1-6 User Choice of Passwords

When passwords are required, users should be allowed to choose their own passwords and to change their passwords as needed.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.8.1-7 Limiting Unsuccessful LOG-ON Attempts

A maximum limit on the number and rate of unsuccessful LOG-ON attempts should be imposed.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.8.1-8 Continuous Recognition of User Identity

Once a user's identity has been authenticated, any authorized data access/change privileges are for that user should continue throughout a work session.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.8.1-9 Single Authorization for Data Entry/Change

User authorization for data entry/change should be established at initial LOG-ON.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.8.1-10 LOG-ON

When users must LOG-ON to a system, LOG-ON should be a separate procedure that is completed before a user may select any operational options.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.8.1 User Identification

2.8.1-11 LOG-ON Frame

The LOG-ON frame should appear as soon as possible on the display with no additional user involvement.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.8.1-12 LOG-ON Delays

LOG-ON delays should be accompanied by an advisory message to tell the user its current status and when the system will become available.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.8.1-13 Immediate Start of Productive Work

After completing the sign-on process, the user should be able to start productive work immediately.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.8.1-14 LOG-OFF

If there are pending actions and the user requests a LOG-OFF, the system should inform the user that these actions will be lost and allow the user to cancel either the pending actions or the LOG-OFF.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.8.1-15 Saving Open Files in Automatic LOG-OFF

Where possible, in the event of automatic LOG-OFF, open files should be saved to some defined file name.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

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2.8 System Security

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2.8.1 User Identification

2.8.1-16 Automatic LOG-OFF

Interactive timesharing systems should allow some specified time between keyboard actions before automatic LOG-OFF unless a longer period is requested by the user.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.8.1-17 Audible Signal for Automatic LOG-OFF

An audible signal should be presented at specified intervals prior to automatic LOG-OFF.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.8 System Security

2.8.2 Information Access

2.8.2-1 Encryption

When sensitive data may be exposed to unauthorized access, a capability for encrypting those data should be provided.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.8.2-2 Ensuring Reversible Encryption

Encrypted data should be protected from any change that might prevent successful reversal of their encryption.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.8.2-3 Displayed Security Classification

When displayed data are classified for security purposes, a prominent indication of security classification should be included in each display.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.8.2-4 Display Suppression for Security

When confidential information is displayed at a work station that might be viewed by casual onlookers, the user should be provided with some rapid means of temporarily suppressing a current display if its privacy is threatened, and then resuming work later.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.8.2-5 Protecting Printed Data

As required for security, procedures to control access to printed data should be established, rather than simply prohibiting the printing of sensitive data.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.8 System Security

2.8.2 Information Access

2.8.2-6 Protecting Display Formats

Display formatting features, such as field labels and delimiters, should be protected from accidental change by users.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.8.2-7 Protecting Displayed Data

When protection of displayed data is essential, computer control over the display should be maintained.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.8.2-8 Indicating "Read-Only" Displays

When users are not authorized to change displayed data, "read-only" status should be indicated on the display.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

2.8.2-9 Automatic Records of Data Access

When records of data access are necessary, the records should be maintained automatically.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.1 General Control Guidelines

3.1.1 Design Principles

3.1.1-1 Appropriate Use of Input Devices

Input and control devices provided for interacting with the HSI should be appropriate for the user's task requirements.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.1.1-2 Input Device Stability

Input and control devices should be stable during normal usage, i.e., they should not slip or rock, unless such actions are a part of the controller operation.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.1.1-3 Feedback

Visual or auditory feedback should be provided to indicate that a controller input has been registered.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.1.1-4 Accidental Input or Actuation Prevention

The system should be located and designed to prevent the accidental manipulation of control and input devices which could result in changes to the status of the system functions, components, or data.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.1.1-5 Location

Controls should be operable from the location where the operator is most likely to need to interact with the system.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.1 General Control Guidelines

3.1.1 Design Principles

3.1.1-6 Speed

Controls should provide rapid positioning of cursors or selection of choices.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.1.1-7 Accuracy

Device or method accuracy should be commensurate with the functions to be served.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.1.1-8 Displacement

Control design should allow the operator freedom of movement to perform other duties.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.1.1-9 Adequacy

Each control should provide a sufficient range of control.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.1.1-10 Economy

Each control or input device should be necessary, use minimal space, and be the simplest effective control for the task concerned.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.1 General Control Guidelines

3.1.1 Design Principles

3.1.1-11 Human Suitability

Controls and input devices should be suitable for operator use in a control room environment.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.1.1-12 Compatibility with Emergency Gear

If used while wearing protective equipment (e.g., oxygen masks and protective gloves), controls and input devices should be easy to identify and activate, or use.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.1.1-13 Durability

Controls and input devices should be sufficiently rugged to withstand normal and emergency use.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.1.1-14 Control Activation

Controls and input devices should require distinct or sustained effort for activation.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.1.1-15 Sequential Activation

When a strict sequential activation is necessary, controls should be provided with locks to prevent the controls from passing through a position.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3 PROCESS CONTROL & INPUT DEVICES

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3.1 General Control Guidelines

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3.1.1 Design Principles

3.1.1-16 Population Stereotypes

To minimize operator error, control movements should conform to population stereotypes.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.1 General Control Guidelines

3.1.2 Coding of Controls

3.1.2-1 Consistency

The coding system should be uniform throughout the control room.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.1.2-2 Size Coding Levels

No more than three different sizes of controls should be used for discrimination by absolute size.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.1.2-3 Size Coding Uniformity

Controls used for performing the same function on different items of equipment should be the same size.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.1.2-4 Shape Coding

When possible, controls should be differentiated by shape.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.1.2-5 Color Coding Contrast

The color of the control should contrast with the panel background.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.1.2 Coding of Controls

3.1.2-6 Color Coding Between Control and Display

When color coding is used to relate a control to its corresponding display, the same color should be used for both the control and the display.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.1.2-7 Location Coding by Function

Controls should be located so as to be easily related to functions and functional groupings.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.1.2-8 Location Coding Across Panels

Controls with similar functions should be in the same location from panel to panel.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.2 Input Devices

3.2.1 Alphanumeric Keyboards

3.2.1-1 General Keyboard Layout

An ANSI standard (QWERTY) layout should be used for the typing keyboard.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.2.1-2 Numeric Keypad

When users must enter numeric data, keyboards should be equipped with a numeric keypad.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.2.1-3 Numeric Keypad Layout

Keypads used for numeric entry should be consistently designed.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.2.1-4 Cursor Control Capability

Horizontal and vertical cursor control keys should be provided for text processing applications.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.2.1-5 Cursor Key Layout

Cursor control keys should be arranged in a two-dimensional layout so that their orientation is compatible with the cursor motion they produce.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.2 Input Devices

3.2.1 Alphanumeric Keyboards

3.2.1-6 Overlays

Mechanical overlays, such as coverings over the keyboard, should be not used.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.2.1-7 Keyboard Surfaces

A matte finish should be used for keyboard surfaces.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.2.1-8 Keyboard Thickness

The thickness of the keyboard, i.e., base to the home row of keys, should be less than 2 inches (50 mm); 1.25 inches (30 mm) or less is preferred.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.2.1-9 Keyboard Slope Adjustment

The slope of the keyboard should be adjustable by the operator.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.2.1-10 Standard Keyboard Placement

The operator should be able to reposition the standard keyboard on the worksurface.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.2 Input Devices

3.2.1 Alphanumeric Keyboards

3.2.1-11 Keytop Size

The minimum horizontal strike surface of the keytop should be at least 0.47 inches (12 mm) in width.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.2.1-12 Key Symbol Size and Contrast

Nomenclature for the primary symbols on the keys should be a minimum of 0.1 inches (2.5 mm) in height and has a contrast ratio of 3:1.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.2.1-13 Keytop Symbol Marking

Key symbols should be etched (to resist wear) and colored with high contrast lettering.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.2.1-14 Key Spacing

Center line distances between adjacent keys should be between 0.71 and 0.75 inches (18 and 19 mm) horizontally and between 0.71 and 0.82 inches (18 and 21 mm) vertically.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.2.1-15 Key Height

Key height for alphanumeric keyboards should be between 0.35 and 0.5 inches (10 and 13 mm).

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.2 Input Devices

3.2.1 Alphanumeric Keyboards

3.2.1-16 Key Force

The maximum force required to depress keys should be between 0.9 and 5.4 ounces (0.25 and 1.5 N); a key force of between 1.8 and 2.2 ounces (0.5 and 0.6 N) is preferred.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.2.1-17 Key Displacement

Keys should have a maximum vertical displacement between 0.05 and 0.25 inches (1.5 mm and 6.0 mm); the preferred displacement is between 0.1 and 0.15 inches (2.0 and 4.0 mm).[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.2.1-18 Keying Feedback

The actuation of a key should be accompanied by tactile or auditory feedback or both.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.2.1-19 Repeat Capability

A repeat capability for alphanumeric, symbol character, and cursor keys should be provided.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.2.1-20 Multiple-Key Rollover

Multiple-key (N-key) rollover capability should be provided for the reduction of keying errors.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.2 Input Devices

3.2.1 Alphanumeric Keyboards

3.2.1-21 Keystroke Commands

When it is necessary to distinguish command entries from text input, a specially designated key should be one of the keys used for keystroke commands.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return	Reason:

3.2.1-22 Simultaneous Keystrokes

Keystroke commands should require the user to press both keys simultaneously, not in close temporal sequence.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return	Reason:

3.2.1-23 Inadvertent Operation

Keys with major or fatal effects should be located so that inadvertent operation is unlikely.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return	Reason:

3.2.1-24 Alternate Key Definitions

When the keyboard is redefined, a display of the alternate characters and their locations should be available to the operator.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return	Reason:

3.2 Input Devices

3.2.2 Function Keys

3.2.2-1 Availability

Fixed function keys should be available to control functions that are often utilized and continuously available.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.2.2-2 Inactive Function Keys

Unneeded function keys, either fixed or programmable, should be disabled so that no other action occurs upon their depression except an advisory message.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.2.2-3 Inactive Keys

Non-active fixed function keys should not be present on the keyboard.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.2.2-4 Grouping

Fixed function keys should be logically grouped and placed in distinctive locations on the keyboard.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.2.2-5 Function Labels

Key assignments should be displayed at all times, preferably through direct marking.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.2 Input Devices

3.2.2 Function Keys

3.2.2-6 Consistency

Fixed function keys should be used consistently throughout the system.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.2.2-7 Actuation

Fixed function keys should require only a single actuation to accomplish their function.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.2.2-8 Repeat for Special Functions

Function keys (except for the delete key) should not repeat upon prolonged depression.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ●	Reason:

3.2.2-9 Status Display

When the effect of a function key varies, the status of the key should be displayed.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.2.2-10 Easy Return to Initial Functions

Where the functions assigned to a set of function keys change as a result of user selection, the user should be given an easy means to return to the initial functions.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.2 Input Devices

3.2.2 Function Keys

3.2.2-11 Reprogrammable or Inactive Default Functions

When keys with labeled default functions are reprogrammed or turned off, a visual indication should alert the user that the standard function is not currently accessible via that key.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.2.2-12 Shifted Characters

Shift keys should be not required to operate variable function keys.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.2 Input Devices

3.2.3 Trackballs, Joysticks, and Mice

3.2.3-1 Dynamic Characteristics

The controller should be able to produce any combination of x-and y-axis output values.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

3.2.3-2 Positive Centering

If there is a "home position," the capability for an automatic return to that point should be provided.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

3.2.3-3 Single Monitor/Single Controller Cursor Travel Limits

In a single monitor/single controller environment, movement of the controller should drive the follower to the edge of the screen only and not off the screen.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

3.2.3-4 Separation of Selectable Screen Items

Selectable screen items or regions should be separated from each other by a sufficient distance to minimize inadvertent activation of adjacent items or regions.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

3.2.3-5 Selectable Tracking Speed

The controller tracking speed (control-display ratio) should be user selectable from a predefined list of alternatives; there should be a moderate default speed.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

3.2 Input Devices

3.2.3 Trackballs, Joysticks, and Mice

3.2.3-6 Selectable Inter-Click Interval

If multiple clicks are required on a selection button, the user should be able to select the inter-click interval from a predefined list of alternatives. There should be a moderate default setting.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.2.3-7 Limb Support for Trackballs and Mice

When trackballs and mice are used to make precise or continuous adjustments, hand, wrist, or arm supports should be provided.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.2.3-8 Mouse Shape

The mouse should have no sharp edges but should be shaped roughly as a rectangular solid.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.2.3-9 Use of Mouse by Either Hand

The controller should be operable with either the left or right hand.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.2.3-10 Appropriate Use of Displacement (Isotonic) Joysticks

Displacement joysticks are preferred over force joysticks when positioning accuracy is more critical than positioning speed.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.2 Input Devices

3.2.3 Trackballs, Joysticks, and Mice

3.2.3-11 Appropriate Use of Force (Isometric) Joysticks

Force joysticks are preferred over displacement joysticks when precise or continuous control in two or more related dimensions is required.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ●	Reason:

3.2.3-12 Force Joysticks Dynamic Characteristics

The output of the force joystick should be proportional to and in the same direction as the user's perceived applied force. Maximum force for full output should not exceed 27lb (118N).[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.2.3-13 Displacement Joystick Dynamic Characteristics

The output of the displacement joystick should be proportional to and in the same direction as the displacement of the joystick from the center. Movement should not exceed 45 degrees from the center position.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.2.3-14 Hand-Operated Joysticks Dimensions and Clearance

The hand grip length should be between 4.25 to 7 inches (110 to 180 mm). The grip diameter should not exceed 2 inches (50 mm). Clearances of 4 inches (100 mm) to the side and 2 inches (50 mm) to the rear should be provided to allow for hand movement.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.2 Input Devices

3.2.4 Touch Screens, Light Pens, and Graphic Tablets

3.2.4-1 Appropriate Use of Touch-Screens

Touch screens are not recommended if the task requires holding arm up to the screen for long periods of time.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.2.4-2 Appropriate Use of a Light Pen

A light pen may be used for non-critical input when precise positioning is not required; it should not be used when the task would require holding the pen up to the screen for long periods of time.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.2.4-3 Appropriate Use of a Graphics Tablet

Grid and stylus devices may be used for data pickoff from a display and entry of points on a display.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.2.4-4 Activation

Light pens and graphics tablets should be equipped with an actuating/deactuation mechanism.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.2.4-5 Feedback

Two forms of feedback should be provided: (1) feedback concerning the position of the follower, and (2) feedback that the pointer has actuated and the input has been received by the system.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.2 Input Devices

3.2.4 Touch Screens, Light Pens, and Graphic Tablets

3.2.4-6 Dynamic Characteristics

When used as a two-axis controller, movement of the pointer in any direction on the surface of the screen or tablet should result in smooth movement of the follower in the same direction.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.2.4-7 Follower Visibility

For touch screens and light pens, the follower should be visible on screen while the pointer is touching the screen.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.2.4-8 Serial Command Response

The system should accept only one command at a time.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.2.4-9 Feedback for Multiple Workstations

Discriminable audible beeps (used to supply feedback) should be used when more than one touch screen, light pen, or graphics tablet is employed.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.2.4-10 Dimensions and Separation of Touch Zones

To allow for finger size and parallax inaccuracy, the dimensions of response areas of touch screens should be a maximum height and width of 1.5 inches (40 mm) and a minimum height and width of 0.6 inches (15 mm), with a maximum separation distance of 0.25 inches (6 mm) and minimum of 0.1 inches (3 mm).

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.2 Input Devices

3.2.4 Touch Screens, Light Pens, and Graphic Tablets

3.2.4-11 Touch Screen Resistance

Force required to operate force-actuated touch screens should be a maximum of 5.3 ounces (1.5 N) and minimum of 0.9 ounces (0.25 N).

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.2.4-12 Neutral Tint of Touch Overlays

Touch screen overlays should have a neutral tint to avoid alteration of color codes.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.2.4-13 Touch Screen Luminance Transmission

Touch screen displays should have sufficient luminance transmission to allow the display with touch screen installed to be clearly readable in the intended environment.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.2.4-14 Light Pen Dimensions and Mounting

The light pen should be between 4.75 to 7 inches (120 to 180 mm) long with a diameter of 0.3 to 0.75 inches (7 to 20 mm). A conveniently located clip should be provided to hold the pen when not in use.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.2 Input Devices

3.2.4 Touch Screens, Light Pens, and Graphic Tablets

3.2.4-15 Graphic Tablet Size and Orientation

Transparent grids which are used as display overlays should conform to the size of the display.

Grids which are displaced from the display should approximate the display size and should be mounted below the display in an orientation to preserve directional relationships to the maximum extent.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

Guidelines for speech input devices are included in Section 6.2, Speech-Based Communication.

3.3 Conventional Control Devices

3.3.1 Pushbutton Controls

3.3.1.1 General

3.3.1.1-1 Position

Pushbuttons in a row or matrix should be positioned in a logical order, or in an order related to the procedural sequence.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.3.1.1-2 Indication of Activation

To ensure that the operator knows that a pushbutton has been pressed far enough for activation, a positive indication should be provided.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.3.1.1-3 Pushbutton Surface

The surface of a pushbutton should offer slip resistance or be concave.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ■	Reason:

3.3 Conventional Control Devices

3.3.1 Pushbutton Controls

3.3.1.2 Round Pushbuttons

3.3.1.2-1 Dimensions and Resistance

Round pushbuttons should conform to the dimensions given in Figure 3.4. Resistance should be 10 to 40 ounces (2.8 to 11.1 N) for fingertip operation and 10 to 80 ounces (2.8 to 22.2 N) for thumb or palm operation.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.3 Conventional Control Devices

3.3.1 Pushbutton Controls

3.3.1.2 Round Pushbuttons

Figure 3.4 Recommended dimensions for unguarded and non-recessed pushbuttons (finger or hand operated)

3.3 Conventional Control Devices

3.3.1 Pushbutton Controls

3.3.1.3 Legend Pushbuttons

3.3.1.3-1 Discriminability

Legend pushbuttons should be readily distinguishable from legend lights.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return	Reason:

3.3.1.3-2 Legend

The legend should be readable under all environmental conditions.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return	Reason:

3.3.1.3-3 Lamp Failure

A provision should be made for lamp failure.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return	Reason:

3.3.1.3-4 Barriers

Barriers should be used when legend pushbuttons are contiguous.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return	Reason:

3.3.1.3-5 Dimensions and Resistance

Legend pushbuttons should conform to the dimensions shown in Figure 3.5. Resistance should be 10 to 60 ounces (2.8 to 16.7 N).

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return	Reason:

3.3 Conventional Control Devices

3.3.1 Pushbutton Controls

3.3.1.3 Legend Pushbuttons

	Size (S) (inches)	Displacement (A) (inches)	Barriers (inches)	
			B _w	B _d
Minimum	0.75*	0.125**	0.125	0.188
Maximum	1.5	0.250	0.250	0.250

* 0.625 inches when switch is not depressed beyond the panel surface.

** 0.188 inches for switches having positive indication of activation.

Figure 3.5 Recommended dimensions of legend pushbuttons

3.3 Conventional Control Devices

3.3.2 Rotary Controls

3.3.2.1 General

3.3.2.1-1 Direction of Activation

Rotary control settings should increase in value with a clockwise rotation.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.3.2.1-2 Rotary Control Shape Coding

Shape coding should be employed if rotary controls used for widely different functions are placed on the same panel.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.3.2.1-3 Coding Specifications

Shape-coded rotary controls should be visually and tactually identifiable.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.3.2.1-4 Rotating Knob Shape Options

Rotating knob controls for different types of control actions should be distinguishable by sight and touch and not easily confused with each other.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.3.2.1-5 Rotary Action Control

Rotary action controls should be used in situations where linear or pushbutton controls would be subject to inadvertent activation and fixed protective structures are impractical or inappropriate.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.3 Conventional Control Devices

3.3.2 Rotary Controls

3.3.2.2 J-Handles

3.3.2.2-1 Dimensions and Resistance

High torque J-handles should conform to the dimensions shown in Figure 3.9. Resistance should be 6 to 12 inch-pounds (0.7 to .14 N-m).

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.3.2.2-2 Low-Torque Designs

When using smaller scale J-handles, the handle portion usually has a flattened or flared tip for finger placement, and the clearance between handle and panel surface can be less.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.3.2 Rotary Controls

3.3.2.2 J-Handles

Figure 3.9 High-torque J-handle dimensions

3.3 Conventional Control Devices

3.3.2 Rotary Controls

3.3.2.3 Key-Operated Controls

3.3.2.3-1 Use

Key-operated controls should be used when system requirements dictate that the function being controlled should be secured against activation by unauthorized personnel.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.3.2.3-2 Teeth: Single Row

Keys with a single row of teeth should be inserted into the lock with the teeth pointing up or forward.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.3.2.3-3 Teeth: Double Row

Keys with teeth on both edges should fit the lock with either side up or forward.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.3.2.3-4 Off Orientation

Locks should be oriented so that the OFF or SAFE state is in effect when the key is in the vertical position.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.3.2.3-5 Key Removal

Operators should not normally be able to remove the key from the lock unless the switch is turned to the OFF or SAFE position.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.3 Conventional Control Devices

3.3.2 Rotary Controls

3.3.2.3 Key-Operated Controls

3.3.2.3-6 Labeling

Control positions should be labeled.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.3.2.3-7 Actuation of Key Switch

Actuation of an item by a key operated switch should be accomplished by turning the key clockwise from the vertical OFF (i.e., upright) position.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.3.2.3-8 Dimensions and Resistance

Key-operated control dimensions should conform to the dimensions shown in Figure 3.10.

Resistance should be 1 to 6 inch-pounds.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

	Displacement (A) (degrees)	Height (H) (inches)
Minimum	80	0.5
Maximum	90	3.0

Figure 3.10 Key-operated control dimensions

3.3 Conventional Control Devices

3.3.2 Rotary Controls

3.3.2.4 Continuous Adjustment Controls

3.3.2.4-1 Knobs

Knobs for continuous adjustment controls should be round in shape, with knurled or serrated edges.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.3.2.4-2 Position Indication

When an indication of position is desirable, it should allow the user to easily recognize the position.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.3.2.4-3 Knob Dimensions

Fingertip grasp knobs should be between 0.5 and 1 inch (13 and 25 mm) in height and between 0.375 and 4 inches (10 and 100 mm) in diameter. Thumb and forefinger encircled knobs should be between 1 and 3 inches (25 and 75 mm) in diameter.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.3.2.4-4 Torque

Knob torque should be within the range of 4.5 to 6.0 inch-ounces.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.3.2.4-5 Dimensions of Knobs with Skirts

Knobs with skirts should conform to the dimensions shown in Figure 3.11.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.3 Conventional Control Devices

3.3.2 Rotary Controls

3.3.2.4 Continuous Adjustment Controls

	Knob (k)	F-Stop (f)	Skirt (s)
Diameter (D)	0.75	1.25	2.0
Height (H)	Combined 0.75		0.25

Figure 3.11 Minimum dimensions for rotary controls with finger stops and skirts
(in inches)

3.3 Conventional Control Devices

3.3.2 Rotary Controls

3.3.2.5 Rotary Selector Controls

3.3.2.5-1 Selection

Rotary selector controls should be used when three or more detented positions are required, and may also be used for two-detented position operation.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.3.2.5-2 Positioning

Detents should be provided at each control position to ensure proper positioning of a discrete rotary control.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.3.2.5-3 Readability

Rotary controls should have a moving pointer and fixed position settings to maximize readability.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.3.2.5-4 Position Indication

Position indication should be provided.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.3.2.5-5 Dimensions and Resistance

Rotary selector controls should conform to the dimensions shown in Figure 3.12. Resistance should be 1 to 6 inch-pounds.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.3 Conventional Control Devices

3.3.2 Rotary Controls

3.3.2.5 Rotary Selector Controls

	Length (L) (inches)	Width(W) (inches)	Depth(H) (inches)	Displacement (A) (degrees)	Displacement (A) (For special requirements)*
Minimum	1.0	—	0.625	15	30
Maximum	4.0	1.0	3.0	40	90

* When special engineering requirements (such as protective clothing) or when tactually ("blind") positioned controls demand large separation.

Figure 3.12 Recommended dimensions for rotary selector switches

3.3 Conventional Control Devices

3.3.2 Rotary Controls

3.3.2.5 Rotary Selector Controls

3.3.2.5-6 Momentary Contact Rotary Selector Controls

Knobs for spring-loaded momentary contact rotary selector controls should be large enough to be easily held against the spring torque, without fatigue, for as long as necessary to accomplish the control action.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.3 Conventional Control Devices

3.3.3 Other Controls

3.3.3.1 Thumbwheels

3.3.3.1-1 Visibility

To minimize error, thumbwheel readouts should be visible from the thumbwheel operating position.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return	Reason:

3.3.3.1-2 Coding

If the thumbwheel is used as an input device, the OFF, zero, or normal position should be coded to facilitate visual recognition of status.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return	Reason:

3.3.3.1-3 Continuous Adjustment Thumbwheels

Continuous adjustment thumbwheels should conform to ergonomic recommendations.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return	Reason:

3.3.3.1-4 Dimensions and Resistance

Discrete thumbwheel controls should conform to the dimensions shown in Figure 3.13.

Resistance should be 6 to 20 ounces (1.7 to 5.6 N).

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return	Reason:

3.3 Conventional Control Devices

3.3.3 Other Controls

3.3.3.1 Thumbwheels

	Diameter (D) (inches)	Trough Distance (L) (inches)	Width (W) (inches)	Depth (H) (inches)	Separation (S) (inches)
Minimum	1.125	0.45	0.125	0.125	0.45
Maximum	3.0	0.75		0.5	

Figure 3.13 Recommended dimensions for discrete thumbwheel controls

3.3 Conventional Control Devices

3.3.3 Other Controls

3.3.3.2 Slide Switches

3.3.3.2-1 Surface

The surface of slide switches should be serrated or knurled.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.3.3.2-2 Detents

Detents should be provided for each slide switch setting.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.3.3.2-3 Accidental Actuation

Channel guards or other preventive features should be provided when accidental actuation would have undesirable consequences.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.3.3.2-4 Orientation

Slide switches should be vertically oriented.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.3.3.2-5 Positive Indication

Slide switches involving more than two positions should be designed to provide positive indication of the control setting, preferably a pointer located on the left side of the slide handle.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

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3.3 Conventional Control Devices

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3.3.3 Other Controls

3.3.3.2 Slide Switches

3.3.3.2-6 Dimensions of Slide Switches

Slide switches should conform to the dimensions shown in Figure 3.14.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

Figure 3.14 Recommended dimensions for slide switches (in inches)

3.3 Conventional Control Devices

3.3.3 Other Controls

3.3.3.3 Toggle Switches

3.3.3.3-1 Positioning

To minimize the possibility of inadvertent activation or setting between control positions, toggle switches should have an elastic resistance that increases as the control is moved and drops as the switch snaps into position.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.3.3.3-2 Feedback

Toggle switches should emit an audible click, or provide some other source of feedback on activation.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.3.3.3-3 Dimensions and Resistance

Toggle switches should conform to the dimensions shown in Figure 3.15. Resistance should be 10 to 16 ounces (2.8 to 4.4 N) for small switches and 10 to 40 ounces (2.8 to 11.1 N) for large switches.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

	Arm Length (L) (inches)		Tip Diameter (D) (inches)	Displacement (A) (degrees)	
	*	**		Two Position	Three Position
Minimum	0.5	1.5	0.125	30	17
Maximum	2.0	2.0	1.0	80	40
Desired	—	—	—	—	25

* Use by Bare Finger

** Used by Gloved Finger

Figure 3.15 Recommended dimensions for toggle switches

3.3 Conventional Control Devices

3.3.3 Other Controls

3.3.3.4 Rocker Switches

3.3.3.4-1 Orientation

Rocker switches should ordinarily be oriented vertically.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.3.3.4-2 Indication of Activation

Activation should be indicated by a snap feel, an audible click, or an integral light.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.3.3.4-3 Resistance

Control resistance should gradually increase, then drop to zero when the control snaps into position.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.3.3.4-4 Inadvertent Activation

If it controls a critical function, the switch should be protected by channel guards or other means to prevent inadvertent activation.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.3.3.4-5 Dimensions and Resistance

Rocker switches should conform to the dimensions shown in Figure 3.16. Resistance should be 10 to 40 ounces (2.8 to 11.1 N).

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

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3.3 Conventional Control Devices
3.3.3 Other Controls
3.3.3.4 Rocker Switches

	Width (W) (inches)	Length (L) (inches)
Minimum	0.25	0.50
Maximum	1.5	0.75

	Displacement (A) (degrees)	
	2-Position	3-Position
Minimum	30	18
Optimum	—	25

Figure 3.16 Recommended dimensions for rocker switches

3.4 Control-Display Integration

3.4.1 Control-Display Relationships

3.4.1.1 General

3.4.1.1-1 Proximity

A visual display that will be monitored during control manipulation should be located sufficiently close that an operator can read it clearly and without parallax from a normal operating posture.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.4.1.1-2 Obscuration

Controls and displays should be located so that displays are not obscured during control operation.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.4.1.1-3 Association

Related controls and displays should be easily identified as being associated.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.4 Control-Display Integration

3.4.1 Control-Display Relationships

3.4.1.2 Multiple Controls, Single Display

3.4.1.2-1 Controls Mounted Below Display

Multiple controls should be mounted below the single display.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.4.1.2-2 Alternative Control Position

If it is not feasible to mount multiple controls directly below the single display, controls should be mounted to the right of the display.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.4.1.2-3 Controls Centered on Display

Multiple controls should be centered on the single display.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.4.1.2-4 Grouping of Controls

Multiple controls should be grouped in a line or matrix.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.4.1.2-5 Arrangement of Controls

Where there is a normal order of use, multiple controls should be arranged for use in left-to-right, top-to-bottom, or other natural sequence.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.4 Control-Display Integration

3.4.1 Control-Display Relationships

3.4.1.2 Multiple Controls, Single Display

3.4.1.2-6 Enhancement of Control Layout

Layout enhancement techniques should be employed where the above techniques cannot apply, or where for other reasons the relationships are not readily apparent.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.4 Control-Display Integration

3.4.1 Control-Display Relationships

3.4.1.3 Single Control, Multiple Displays

3.4.1.3-1 Displays Located Above Control

Multiple displays should be located above the single control.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return	Reason:

3.4.1.3-2 Alternative Position for Displays

If it is not feasible to mount multiple displays above the single control, they should be mounted to the left of the control.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return	Reason:

3.4.1.3-3 Control Centered Below Displays

The single control should be placed as near as possible to the display, and preferably underneath the center of the display array.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return	Reason:

3.4.1.3-4 Grouping of Displays

Multiple displays should be arranged horizontally or in a matrix.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return	Reason:

3.4.1.3-5 Arrangement of Displays

Where there is normal order of use, multiple displays should read from left-to-right, top-to-bottom, or in other natural sequence.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return	Reason:

3.4 Control-Display Integration

3.4.1 Control-Display Relationships

3.4.1.3 Single Control, Multiple Displays

3.4.1.3-6 Visibility During Control Manipulation

Multiple displays should not be obscured during control manipulation.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.4.1.3-7 Enhancement of Display Layout

Layout enhancement techniques should be employed where the above techniques cannot apply, or where for other reasons the control-display relationship is not clearly apparent.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.4.1.3-8 Display Selector Motion

The display selector control should move clockwise from OFF (if appropriate) through settings 1, 2, 3...n.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.4.1.3-9 Display Selector Sequence

The display selector control position sequence should conform to the display sequence.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.4.1.3-10 Display Selector Labeling

Display selector control position indications should correspond with display labels.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.4 Control-Display Integration

3.4.1 Control-Display Relationships

3.4.1.3 Single Control, Multiple Displays

3.4.1.3-11 Display Selectors Scale

Displays should read off scale, not zero, when not selected, especially if zero is a possible parameter displayed.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return	Reason:

3.4 Control-Display Integration

3.4.2 Groups of Controls and Displays

3.4.2-1 Functional Integrity

Multiple controls or displays related to the same function should be grouped together.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.4.2-2 Sequence of Use

Sequence of use should be as follows: (1) left to right, (2) top to bottom, or (3) the above combined (normal reading order).

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.4.2-3 Display Above Each Control

The preferred configuration is with the display above each control.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.4.2-4 Controls and Displays in Rows

Displays may be arrayed in rows as the upper portion of a panel, matched to controls arrayed in similar rows below.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.4.2-5 Multi-Row Displays with Single-Row Controls

Two or more rows of displays may be arranged above a single row of controls.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.4 Control-Display Integration

3.4.2 Groups of Controls and Displays

3.4.2-6 Consistent Practice

Arrangements of functionally similar controls and displays should conform to the same convention throughout the control room.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.4.2-7 Control/Display Packages

Modules should be selected and arranged to achieve maximum conformity with the principles described above.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ●	Reason:

3.4.2-8 Separated Controls and Displays

Where displays are on separated panels, they should be on the adjacent upper panel from their associated controls.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.4.2-9 Facing Panels

Related controls and displays should not be located on separate panels that face each other.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.4 Control-Display Integration

3.4.3 Dynamic Control-Display Relationships

3.4.3-1 Rotary Controls

Rotary controls should turn clockwise to cause an increase in parameter value. Associated display movements should be: (1) Linear scales, up or to the right; (2) Digital displays, increasing in value; (3) Strings of indicator lights, bottom-to-top or left-to-right; and (4) Circular meter pointers, clockwise.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.4.3-2 Linear Controls

Linear controls should move up or to the right to cause an increase in parameter value. The associated display relationships should be: (1) Linear scales, up or to the right; (2) Digital displays, increasing in value; and (3) Strings of indicator lights, bottom-to-top or left-to-right.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.4.3-3 Display Response Time Lag

When there is a time lag between control actuation and ultimate system state, there should be an immediate feedback indication of the process and direction of parameter change.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.4.3-4 Controls

Controls should provide a capability to affect the parameter controlled easily, with the required level of precision.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.4 Control-Display Integration

3.4.3 Dynamic Control-Display Relationships

3.4.3-5 Displays

Displays should provide a capability to distinguish significant levels of the system parameter controlled.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

3.4.3-6 Excess Precision

The precision of displays and controls should not greatly exceed that required.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ●	Reason:

3.4.3-7 Feedback

Feedback from the display should be apparent for any deliberate movement of a control.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.1-1 VDU Alarm Message Lists

The alarm system should:

- Alert the operator to the fact that a system or process deviation exists;
- Inform the operator about the priority and the nature of the deviation;
- Guide the operator's initial response to the deviation; and
- Confirm, in a timely manner, whether the operator's response corrected the deviation.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.1-2 Alarm System Upgrade Functionality

A new alarm system that is installed into an existing control room should support all of the operator functions that the old system supported, in addition to satisfying the functional requirements of the SAR and various other functional criteria (such as those listed in Section 4.2).[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.1-3 Consistency with the Main HSI

The alarm system HSI should be consistent with the standards and conventions used for the HSIs for other displays and controls in the control room.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.1-4 Conformance to HSI Design Review Guidelines

Alarm system elements (e.g., displays and controls) should conform to general HSI guidance as well as alarm system guidelines.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4 ALARMS

4.1 General Guidelines

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4.1-5 Alarm System Validation

The effectiveness of the alarm system should be validated through real-time, dynamic simulation.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4 ALARMS

4.2 Alarm Definition

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4.2-1 Alarm Selection

The following criteria should be included in the basis for selecting alarm conditions:

- Monitoring critical safety functions and key parameters,
- Preventing personnel hazards,
- Avoiding significant damage to equipment having a safety function,
- Assuring that technical specifications are met, and
- Monitoring emergency procedure decision points.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.2-2 Timely Warning

Alarm set points should be determined to ensure that the operating crew can monitor and take appropriate action for each category of alarms, e.g., respond to out-of-tolerance conditions, in a timely manner.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.2-3 Nuisance Alarm Avoidance

The determination of alarm setpoints should consider the trade-off between the timely alerting of an operator to off-normal conditions and the creation of nuisance alarms caused by establishing setpoints so close to the "normal" operating values that occasional excursions of no real consequence are to be expected.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.2-4 Darkboard Configuration

Candidate alarms and setpoints should be chosen so that no alarms are active for the normal operating conditions of the plant.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4 ALARMS

4.3 Alarm Processing and Reduction

4.3-1 Assured Functionality Under High Alarm Conditions

The alarm processing system should ensure that alarms which require immediate operator action or indicate a threat to plant critical safety functions are presented in a manner that supports rapid detection and understanding by the operator under all alarm loading conditions.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.3-2 Alarm Reduction

The number of alarm messages presented to the crew during off-normal conditions should be reduced by alarm processing techniques (from a no-processing baseline) to support the crew's ability to detect, understand, and act upon all alarms that are important to the plant condition within the necessary time.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.3-3 Alarm Signal Validation

Sensor and other input signals should be validated to ensure that spurious alarms are not presented to plant personnel, due to sensor or processing system failure.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.3-4 Time Delay Processing

The alarm system should incorporate the capability to apply time filtering and/or time delay to the alarm inputs to allow filtering of noise signals and to eliminate unneeded momentary alarms.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.3-5 Alarm-Status Separation

Status indications, messages that indicate the status of plant systems but are not intended to alert the operator to the need to take action, generally should not be presented via the alarm system display because they increase the demands on the operators for reading and evaluating alarm system messages.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.3-6 First-Out Processing

As an aid to diagnostic procedures and root cause analysis, provision should be made for identifying the initiating event associated with automatic plant trips through the use of first-out alarms.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.3-7 Mode Dependence Processing

If a component's status or parameter value represents a fault in some plant modes and not others, it should be alarmed only in the appropriate modes.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.3-8 System Configuration Processing

If a component's status or parameter value represents a fault in some system configurations and not others, it should be alarmed only in the appropriate configurations.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4 ALARMS

4.3 Alarm Processing and Reduction

4.3-9 Logical Consequences Processing

If a single event invariably leads to subsequent alarmed events that are the direct consequence of this event, only the alarm message associated with the main event may be presented and the other alarm messages suppressed, so long as this does not interfere with the operators' use of alarm information.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.3-10 Exceptions to Expected Alarm Patterns

The system should notify the operator when "unexpected" alarms occur, if the alarm processing logic can support such an analysis.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.3-11 Absence of Expected Alarm Patterns

The system should notify the operator when "expected" alarms do not occur, if the alarm processing logic can support such an analysis.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.3-12 Intelligibility of Processed Alarm Information

Processing methods should not be so complex that operators have difficulty evaluating the meaning or validity of the resulting alarm messages.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.3-13 Access to Inputs

Operators should have the capability of viewing inputs to the alarm processing system (e.g., sensor data).[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.4-1 Prioritization Criteria

Alarm messages should be presented to the operators in prioritized form based on one or more prioritization dimensions to indicate immediacy of required operator action and challenges to plant safety.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.4-2 Number of Priority Levels

The number of priority levels within a dimension should be no greater than four.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.4-3 Access to Suppressed Alarms

When alarm suppression is used, the operator should be able to access the alarm information that is not displayed.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.4-4 Filtered Alarms

Alarm filtering should only be employed where alarm messages have no current operational significance to the crew's monitoring, diagnosis, decision making, procedure execution, and alarm response activities.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.5.1 General Alarm Display Guidelines

4.5.1-1 Display Functions

The alarm display should support the operator's ability to rapidly discern:

- Priority (e.g., urgency for operator action and importance to plant safety);
- Distinct alarm states: new, acknowledged, and cleared;
- The first-out alarms for reactor trip;
- The need to access other displays to verify or clarify the alarm state; and
- The difference between alarms which can be canceled through ongoing corrective actions (i.e., by operations personnel) and alarms that require significant maintenance intervention.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.5.1-2 Coordination of Alarm Alerting and Informing Functions

When alarm alerts are displayed separately from detailed alarm information, the design should support the operator in making rapid transitions between alerts and detailed information.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ●	Reason:

4.5.1-3 Presentation of Alarm Priority with Detailed Alarm Information

When alarm alerts are displayed separately from detailed alarm information, the detailed alarm information display should provide an indication of the priority and status of the alarm condition.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.5.1-4 Use of Spatially-Dedicated, Continuously-Visible Displays

Spatially-dedicated, continuously-visible (SDCV) alarm displays should be considered for:

- Regulatory Guide 1.97 Category 1 parameters,
- Alarms that require short-term response by the operators,
- Main alarms used by operators in diagnosing and responding to plant upsets, and
- Main alarms used by operators to maintain an overview of plant and system status.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.5.1 General Alarm Display Guidelines

4.5.1-5 Alarm Graphics

The graphics related to alarm presentation should be designed such that the display is fully contained in one VDU screen.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.5.1-6 Alarm Coding Consistency

Coding (e.g., flash-rate, intensity, and color coding) conventions should be consistently applied throughout alarm displays (e.g., on tiles and on VDUs).

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.5.1-7 Multi-Unit Alarms

Alarms for any shared systems in multiple-unit plants should be duplicated in all control rooms.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

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4.5 Display

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4.5.2 Display of High-Priority Alarms

4.5.2-1 Importance/Significance

The display of important alarms should override the display of alarms of lower importance.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.5.2-2 Simultaneous Display of High-Priority Alarms

For non-spatially dedicated alarm presentations such as VDU message lists, sufficient display area should be provided for the simultaneous viewing of all high-priority alarms.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.5.2-3 Coding of Alarm Priority

A method of coding the visual signals for the various priority levels should be employed.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.5.3 Display of Alarm Status

4.5.3-1 Indication of Alarm Status

New, acknowledged, and cleared alarm states should have unique presentations to support the operators' ability to rapidly distinguish them.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.5.3-2 New Alarms

New alarms should be indicated both by visual (e.g., flashing) and audible means.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.5.3-3 Notice of Undisplayed New Alarms

If the operator is not currently viewing the VDU display where new, unacknowledged alarm messages appear, the alarm system should notify the operator that a new alarm message is available, the priority of the alarm message, and the location where the alarm message can be found.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.5.3-4 Acknowledged Alarms

After the operator has acknowledged an alarm (e.g., pressed the acknowledge button), the alarm display should change to a visually distinct acknowledged state and the alerting function (e.g., audible tone) should cease.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

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4.5.3 Display of Alarm Status

4.5.3-5 Clearing Alarms/Ringback

If the operator is required to take action when an alarm clears (i.e., the parameter returns to the normal range from an abnormal range), the return to normal conditions should be indicated by visual and audible means.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4 ALARMS

4.5 Display

4.5.4 Display of Shared Alarms

4.5.4-1 Minimize Shared Alarms

Alarms with inputs from more than one plant parameter (shared alarms) should be minimized.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.5.4-2 Shared Alarm Identification

Operators should have the capability to access the individual alarm information when a shared alarm activates.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.5.4-3 Shared Alarm Reflash

If a new parameter deviation has occurred before a preceding alarm has cleared, the shared alarm should return to the new alarm state (e.g., flashing).[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

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4.5.5 Alarm Messages

4.5.5.1 Content

4.5.5.1-1 Alarm Information Content

The alarm should provide the following information:

- Alarm title or legend;
- Alarm source, i.e., the particular sensor or group of sensors supplying the signal;
- Alarm priority;
- Setpoint and parameter values;
- Required immediate operator actions; and
- Reference to procedure for more detailed follow-up actions.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.5.5.1-2 Alarm Text/Legend

Alarm text should be clearly understandable, use standard terminology, and address conditions specifically.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.5.5.1-3 Alarm Source

The content of each message should provide information that identifies the alarm source.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.5.5.1-4 Alarm Priority

Each alarm message should indicate its priority.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4 ALARMS

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4.5.5 Alarm Messages

4.5.5.1 Content

4.5.5.1-5 Setpoint Values

If an alarm condition requires verification before action is taken, the relevant setpoint limits should be included in the alarm message.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.5.5.1-6 Parameter Values

Deviant parameter values should be included in the alarm message when alarm information is presented on VDU or printer displays.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.5.5.1-7 Required Immediate Operator Actions

Immediate operator actions should be presented or made available directly upon operator request when alarm information is presented on VDU or printer displays.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.5.5.1-8 Reference to Procedures

When alarm information is presented on VDU or printer displays, references to alarm response procedures should be provided.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.5.5.1-9 Reference to Other Panels

Alarms which refer the operator to another, more detailed display located outside the primary operating area should be minimized.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4 ALARMS
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4.5.5 Alarm Messages
4.5.5.2 Format

4.5.5.2-1 Format for Tile Displays

The format of messages on alarm tiles or tile-like displays should be consistent for all alarms.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.5.5.2-2 Format of VDU and Printer Messages

The alarm message format should be consistent for VDU and printer message displays.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4 ALARMS

4.5 Display

4.5.6 Coding Methods

4.5.6.1 General

4.5.6.1-1 Coding Effectiveness

The coding scheme used by the alarm system should assure rapid detection and interpretation by the operators under all control room operating conditions.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.5.6.1-2 Coding Dimension Discriminability

Each level of a coding dimension should be easily and readily distinguishable from the other levels.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.5.6.1-3 Unique Coding Dimensions

For coding techniques being used to support detection and recognition of status within an alarm dimension, each coding technique should represent one dimension of alarm classification.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.5.6.1-4 Coding Complexity

The number of different coding techniques should be kept to a minimum, so that the overall coding system does not become difficult to understand.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

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4.5 Display
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4.5.6.2 Visual

4.5.6.2-1 Visual Signal for Important Alarms

A flashing visual signal should be included for all important alarms.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.5.6.2-2 Redundant Coding Dimensions

Redundant codes (e.g., fast flashing or bright) should be used for alarms that require rapid operator action.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.5.6.2-3 Flash Rate

Flash rates should be from three to five flashes per second with approximately equal on and off times.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.5.6.2-4 Brightness Levels for Transilluminated Displays

For transilluminated displays, such as lighted alarm tiles, the brightest state should be no more than 300 percent brighter than the inactivated state, and the dim state should be at least 10 percent brighter than the inactivated state.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.5.6.2-5 Brightness Levels for VDU Displays

For VDU displays, the bright state should be at least 100 percent brighter than the inactivated state.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

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4.5.6 Coding Methods

4.5.6.2 Visual

4.5.6.2-6 Color Detectability

Low-intensity indications (e.g., dark red) in the periphery of the visual field should be avoided where color coding is used, since they may not be readily detected.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.5.6.2-7 Spatial Coding

Spatial coding may be used to indicate alarm importance.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.5.6.2-8 Suppressed Visual Codes

If the visual coding used to indicate alarm status is automatically suppressed or delayed during high alarm volume conditions or the presence of more important alarms, they should be automatically presented after the more important alarms have been addressed.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

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4.5.6 Coding Methods

4.5.6.3 Audible Codes

4.5.6.3-1 Audio Signal for Important Alarms

An auditory signal should be used to alert the operator to the existence of a new alarm, or any other condition of which the operator must be made immediately aware.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.5.6.3-2 Auditory Coding of Remote Alarms

Auditory coding techniques should be used when the operator workstation associated with the alarm is not in the primary operating area.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.5.6.3-3 Distinguishable Auditory Signals

The auditory signal associated with a SDCV alarm should be easily distinguishable from the auditory signal associated with an alarm message displayed by other means (e.g., on a VDU message display).

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.5.6.3-4 Audible Signals for Alarm States

The tones used for incoming alarms should be separate and distinct from tones used to signify "clearing" alarms, which should be momentary or "self-silencing."

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ●	Reason:

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4.5.6.3-5 Reminder Audible Signals

If the tone to indicate an unacknowledged alarm automatically turns off after an interval of time, a reminder tone should be presented to alert the operator to the continued presence of an unacknowledged alarm.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.5.6.3-6 Reset of Auditory Alert

The auditory alert mechanism should automatically reset when it has been silenced.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.5.6.3-7 Interference Among Signals

Audio alarm signals should not conflict with other auditory codes or signals.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.5.6.3-8 Readily Identifiable Source

The operator should be able to quickly determine where to direct attention (e.g., which functional area of the plant or which station) from the characteristics of the auditory alert and/or the source from which the auditory alert originated.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.5.6.3-9 Signal Level

The signal intensity should be such that operators can reliably discern the signal above the ambient control room noise.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4 ALARMS

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4.5.6 Coding Methods

4.5.6.3 Audible Codes

4.5.6.3-10 Avoid Startle

The signal should capture the operator's attention but should not cause irritation or a startle reaction.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.5.6.3-11 Manual Disable/Adjustment of Signal Intensity

Manual disable or adjustment of auditory signal intensity (loudness) should be avoided.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.5.6.3-12 Sound Sources

The number and placement of loudspeakers should be such that auditory signals are free of distortion and are equally audible at any operator work station in the primary operating area.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.5.6.3-13 Auditory Signal Discriminability

Each audio signal should be unambiguous and easily distinguishable from every other tone in the control room.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.5.6.3-14 Number of Tonal Signals

When information is coded by the pitch of narrow-band signals (i.e., tones), no more than three frequencies should be used.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

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4.5.6 Coding Methods

4.5.6.3 Audible Codes

4.5.6.3-15 Frequency of Tonal Signals

Center frequencies should be widely spaced within a range of from 500 to 3,000 Hz, although a wider range of from 200 to 5,000 Hz may be acceptable.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.5.6.3-16 Pulse Codes

No more than three pulse repetition rates should be used for coding purposes.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.5.6.3-17 Number of Frequency Modulated Signals

No more than three modulated frequency codes for audible alarms should be used.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.5.6.3-18 Center Frequency of Frequency Modulated Signals

If modulation of frequency (Hz) of a signal is used to denote information, the center frequencies should be between 500 and 1000 Hz.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.5.6.3-19 Audio Pattern Codes

If sequences of tones are used to represent information, the patterns should be easily recognizable.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

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4.5.6.3-20 Compound Codes

A maximum of nine auditory signals should be used when coded in two or more dimensions.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.5.6.3-21 Intensity Coding

Coding of auditory signals by intensity (loudness) should not be used.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.5 Display

4.5.7 Organization of Alarms

4.5.7.1 Spatially Dedicated, Continuously Visible Alarm Displays

4.5.7.1-1 Functional Grouping of Alarms

Alarms within a display should be grouped by function, system, or other logical organization.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

4.5.7.1-2 Separation of Functional Groups

Alarm functional groups should be visually distinct from one another.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

4.5.7.1-3 Group Labels

System/functional groups should be clearly delineated and labeled such that the operating crew can easily determine which systems have alarms that have not yet cleared and which system is affected by a particular incoming alarm.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

4.5.7.1-4 Coordinate Designation Identifiers

If alarm displays are organized in matrices, the vertical and horizontal axes of the displays should be labeled with alphanumerics for ready coordinate designation of a particular visual element.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

4.5.7.1-5 Density of Alarm Elements

An alarm tile display matrix should contain a maximum of 50 alarms per matrix.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

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4.5.7 Organization of Alarms

4.5.7.1 Spatially Dedicated, Continuously Visible Alarm Displays

4.5.7.1-6 Logical Arrangement of Alarms

Alarms should be ordered to depict naturally occurring relationships.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.5.7.1-7 Consistent Ordering

Alarm parameters (e.g., level, flow, pressure, and temperature) arranged in one order on one panel should be arranged in the same order on other panels.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.5.7.1-8 Alarm Display Identification Label

Each group of alarm displays should be identified by a label above the display.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.5 Display

4.5.7 Organization of Alarms

4.5.7.2 Alarm Message Lists

4.5.7.2-1 Listing by Priority

Lists of alarm messages should be segregated by alarm priority with highest priority alarms being listed first.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.5.7.2-2 Message Listing Options

In addition to priority grouping, operators should have the capability to group alarm messages according to operationally relevant categories, such as function, chronological order, and status (unacknowledged, acknowledged/active, cleared).[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.5.7.2-3 Blank Lines

Alphanumeric alarm lists should have a separation (blank row) every four or five alphanumeric messages.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.5.7.2-4 Scrolling of Message List

The method of adding alarm messages to the list should preclude message scrolling.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.5.7.2-5 Message Overflow

Alphanumeric alarm messages that overflow the first page of alarm messages should be kept on subsequent alarm pages.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4 ALARMS

4.6 Control

4.6.1 General Alarm Control Guidelines

4.6.1-1 Provisions for Control Functions

Separate controls should be provided for silence, acknowledgment, reset (acknowledging an alarm that has cleared and returning it to normal), and testing.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.6.1-2 Distinct Coding of Control Functions

Alarm system controls should be distinctively coded for easy recognition.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.6.1-3 Consistent Layout of Control Group

Each set of alarm system controls should have the functions in the same relative locations.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.6.1-4 Separate Controls for Tile and VDU Alarms

If the alarm system contains both alarm tiles and VDU alarm displays, each should have its own set of operator controls.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.6.1-5 Defeating Controls

Alarm system control designs should not allow the operator to defeat the control.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

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4.6.1 General Alarm Control Guidelines

4.6.1-6 Access to New Undisplayed Alarms

A VDU-based alarm system should provide rapid access to any new alarm messages that are not shown on the current display.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return	Reason:

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4.6 Control

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4.6.2 Silence Controls

4.6.2-1 Global Silence Capability

It should be possible to silence an auditory alert signal from any set of alarm system controls in the primary operating area.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.6.2-2 Manual Silencing

Auditory signals should be silenced manually by the operators unless this interferes with other more critical operator actions.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.6 Control

4.6.3 Acknowledge Controls

4.6.3-1 Effect of Acknowledge Control

An alarm acknowledgement control should terminate the flashing of an alarm and have it continue at steady illumination until the alarm is cleared.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.6.3-2 Acknowledgement Locations

Acknowledgement should be possible only from locations where the alarm message can be read.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.6.3-3 Acknowledgement of Alarm Messages

Non-SDCV alarms should only be acknowledged when the alarm message is on the screen.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

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4.6.4 Reset Controls

4.6.4-1 Effect of Reset Control

The reset control should place the alarm system in an unalarmed state after an alarm has cleared.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.6.4-2 Appropriate Use of Manual Reset

A manual reset sequence should be used where it is important to explicitly inform operators of a cleared condition that had once been deviant.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.6.4-3 Appropriate Use of Automatic Reset

An automatic reset sequence should be available where operators have to respond to numerous alarms or where it is essential to quickly reset the system.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.6.4-4 Reset Control Location

The reset control should be effective only from locations at which plant personnel know which alarm they are resetting.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.7-1 Automated Alarm System Configuration

If the alarm system automatically changes operational configurations under some alarm situations, then these configuration changes should be coupled with an alert to the operator and an indication that the configuration has changed.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

4.7-2 Operator-Selectable Alarm System Configuration

If the alarm system provides operator-selectable operational configurations, then these configuration changes should be coupled with an indication of the present configuration.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

4.7-3 Acknowledgement of Alarm System Configuration Changes

Operator acknowledgement (or confirmation) should be required if a significant alarm system configuration change is to be made either automatically or by operator selection.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

4.7-4 Operator-Defined Alarms/Setpoints

The alarm system may provide temporary, operator-defined alarms and operator-defined set points for specific conditions where such alarms are determined to be of assistance to the operators in selected evolutions (e.g., temporary alarms to support increased monitoring of a problem component, or at other times when the operator wants to know of a parameter trend that is approaching a limit).[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

4.7-5 Interference of Operator-Defined Alarms/Setpoints with Existing Alarms

Operator-defined alarms and setpoints should not override or interfere with the existing alarms and setpoints.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.7-6 Control of Operator-Defined Alarms/Setpoints

The alarm system should provide clear indication of operator defined alarms and setpoints as distinct from the alarm/setpoints designed into the system.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.7-7 Automatic Mode-Defined Setpoints

If an alarm system provides automatic adjustment of setpoints for different plant modes or conditions, it should be evaluated whether operator acknowledgement/confirmation of the significant changes is necessary.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

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4.8 Reliability, Test, Maintenance, and Failure Indication

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4.8.1 Reliability

4.8.1-1 Design for Reliability

The alarm system should be designed so that no single failure will result in the loss of a large number of alarms.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.8.1-2 VDU Reliability

Where alarms are presented on a VDU as the primary display, operators should be able to access the alarms from more than one VDU.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.8.1-3 Dual Light Bulbs

Annunciator tile-type displays should be designed with dual light bulbs so that a single bulb failure will not interfere with the operator's detection of the alarm condition.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.8.1-4 Flasher Failure Mode

In case of flasher failure of an active alarm element, the element should assume a highly salient state such as a high flash rate or a steady on (e.g., illuminated) state rather than a less salient state such as off.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

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4.8.2 Test

4.8.2-1 Test Availability

Test controls should be available to initiate operational test conditions for all essential aspects of the alarm system (including processing logic, audible alarms, and visual alarm indications).

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.8.2-2 Testing Requirement

Periodic testing of the alarm system should be required and controlled by administrative procedure.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

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4.8 Reliability, Test, Maintenance, and Failure Indication

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4.8.3 Maintenance

4.8.3-1 Design for Maintainability

The alarm system should be designed so that maintenance activities can be performed with minimal interference with the activities of the operators.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.8.3-2 Tagged-Out Alarms

Tagging out an alarm (taking it out of service) should require disabling of the associated visual and audio signals.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.8.3-3 Out-of-Service Alarm Indication

Cues for prompt recognition of an out-of-service alarm should be designed into the system.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.8.3-4 Extended Duration Illumination

If an alarm tile must be "ON" for an extended period during normal operations because of equipment repair or replacement, it should be (1) distinctively coded for positive recognition during this period, and (2) controlled by administrative procedures.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.8.3-5 Tile Cover Replacement

If a lamp replacement requires legend tile removal, there should be a way to ensure that the tile is replaced in the correct location.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

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4.8 Reliability, Test, Maintenance, and Failure Indication

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4.8.3 Maintenance

4.8.3-6 Hazard Avoidance

Lamp replacement should not pose an electrical shock hazard.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.8.3-7 Operator Aids for Lamp Replacement

Operator aids should be provided if needed for lamp replacement.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

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4.8 Reliability, Test, Maintenance, and Failure Indication

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4.8.4 Failure Indication

4.8.4-1 Alarm System Failure Indication

Operators should be given prompt indication of a failure of the alarm system or its major subcomponents.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.9-1 ARP Scope

ARPs should be available for alarm conditions that require an operator response which affects the plant process control system or plant equipment.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.9-2 ARP Access

Operators should have immediate access to ARPs from the location at which the alarm messages are read.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.9-3 ARP Content

ARPs should contain the following information:

- The system/functional group to which the alarm belongs,
- The exact alarm text or legend,
- The alarm source (i.e., sensor(s) sending the signal, including processing or signal validation logic, and the actuating device(s) for the alarm with a reference to a schematic diagram on which such devices can be found),
- Alarm setpoints,
- Priority,
- Potential underlying causes for the alarm (e.g., low water level -- feed flow deficient in the long term),
- Required immediate operator actions, including actions the operator can take to confirm the existence of the alarm condition,
- Actions which occur automatically when the alarm occurs (and which the operator should verify as having taken place),
- Followup actions, and
- Pertinent references.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.9-4 Consistency

Information in ARPs should be consistent with information on control boards, in the alarm system, in I&C procedures used to calibrate alarm setpoints, in controlling documents that determine setpoints (e.g., Technical Specifications and accident analyses), in P&IDs, and in other plant procedures.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.9-5 ARP Format

The ARP format should:

- Highlight the ARP identifier on each page of the procedure,
- Highlight important items,
- Locate information categories in the same position on each page,
- Consistently present information throughout the ARP, and
- Minimize the need for operators to page back and forth to obtain the information.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4 ALARMS

4.10 Control-Display Integration and Layout

4.10-1 Display and Line of Sight

Visible alarm indications should be located within about 60 degrees on either side of the direct line of sight of the operator's normal work position.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.10-2 Interference from Nearby Indicators

Indicator lights used to present information about the state of equipment should not be located near unilluminated display elements used to represent acceptable plant conditions.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.10-3 Location of Alarm System Displays and Controls

Alarm displays and controls should be located in close proximity so that the display can be read while operating the controls.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.10-4 Location of First-Out Alarms

First-out displays should be located at the main workstation for the system and/or at a plant overview display visible to the crew.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.10-5 Consistent Ordering

The ordering (e.g., left-to-right positioning) of displayed alarm groups should be consistent with the ordering of displays and controls of related plant systems and components.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

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4.10 Control-Display Integration and Layout

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4.10-6 Location for Prompt Response

Alarm displays and controls should be arranged and located such that the operating crew member(s) who must respond to an alarm can access the alarm information in sufficient time to respond adequately.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

4.10-7 Location for Access to Process Controls and Displays

Visual alarm panels should be located near the controls and displays which are required for corrective or diagnostic action in response to the alarm.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

5.1-1 Consistency with User Task Requirements

The support provided by the KBS should be consistent in content and format with the cognitive strategies and mental models employed by the user.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

5.1-2 Consistency with General HSI

The KBS should be fully integrated with and consistent with the rest of the HSI.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

5.1-3 Interaction With Ongoing Tasks

Use of the KBS should not require canceling ongoing tasks.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

5.1-4 Critical Information Alert

If critical information becomes available during KBS utilization, the system should alert the user to the critical information.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

5.1-5 Minimize Querying of User

KBS querying of the user for information should be minimized.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

5.1-6 Dialogue Sequencing Flexibility

The user-KBS dialogue should be flexible in terms of the type and sequencing of user input the KBS will accept.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

5.1-7 Strategy Planning Capability

The KBS should provide the capability to plan a strategy for addressing a problem.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

5.1-8 User Supported Strategy Selection

When the KBS is capable of a range of problem-solving strategies, it should be capable of accepting direction from the user in terms of which strategy to employ.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

5.1-9 Simulation Mode Command and Identification

If the KBS has a simulation mode, entering the simulation mode should require an explicit command and result in a distinguishable change in system output.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

5.1-10 Explanation Capability

The KBS should be capable of interactively explaining its rules, knowledge base, and problem solutions at any point during a user-KBS transaction.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

5.1-11 User Control of Explanation Detail

The level of detail of information presented as part of an explanation or justification should be under the control of the user.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

5.1-12 Indication of Certainty

The KBS should represent its certainty in the correctness of analyses and provide the rationale underlying the certainty estimation.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

5.1-13 Inadequate Knowledge Alert

The KBS should alert the user when a problem or situation is beyond its capabilities.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

5.1-14 Graphic Representation of Rules

The KBS should be able to graphically represent system relationships, its rules network, and reasoning process.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

5.1-15 Highlight of Status Changes After KBS Utilization

At the completion of a user-KBS session, the KBS should update and highlight changes in the status of important system information.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

5.1-16 Post Hoc Rule-Event Recall

The KBS explanation facility should have the capability to recall each invoked rule and associate it with a specific event (i.e., question or conclusion) to explain the rationale for the event.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

5.1-17 Rapid Interaction Retrieval

The system should permit rapid retrieval of previous exchanges between the user and the KBS.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

5.1-18 Hardcopy of KBS Utilization

The user should be capable of requesting a hardcopy of data including screen displays (text or graphics), data employed during a consultation, summaries of consultations, lists of rules/facts invoked during a consultation, and summaries of hypotheses tested.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

6 INTER-PERSONNEL COMMUNICATION

6.1 General Communication Guidelines

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6.1-1 Accessibility

Communications functions and/or equipment should be accessible from the user's normal working location.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

6.1-2 Instructions

Instructions should be provided for use of each communication system, including suggested alternatives if a system becomes inoperable.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

6.1-3 Outgoing Emergency Messages

Priority procedures should be established for the transmission of emergency messages from the control room by any of the communication systems.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

6.1-4 Incoming Emergency Messages

Procedures should be established for handling communications during an emergency, and these procedures must be known by all operators.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

6.1-5 Minimal User Actions

Communication procedures should be designed to minimize required user actions.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

6.1-6 Communication Flexibility

Users should have flexibility in communications methods.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

6.2 Speech-Based Communication

6.2.1 General Requirements

6.2.1-1 Comfort

Communication equipment to be worn should be designed to preclude discomfort.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

6.2.1-2 Hands-Free Operation

Communication equipment should be designed to permit hands-free operation.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

6.2.1-3 Frequency Response

Microphones and associated amplification equipment should be designed to respond optimally to that part of the speech spectrum most essential to speech intelligibility (i.e., 200 to 6,100 Hz).[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

6.2.1-4 Microphone Dynamic Range

The dynamic range of a microphone used with a selected amplifier should be great enough to admit variations in signal input of at least 50 dB.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

6.2.1-5 Microphone Noise Shields

When ambient noise is high (85 dB(A) or greater), the microphone should be put in a noise shield.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

6.2 Speech-Based Communication

6.2.1 General Requirements

6.2.1-6 Noise Canceling Microphones

In very loud, low frequency noise environments (100 dB overall), noise canceling microphones should be used.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

6.2.1-7 Signal Processing

If the environment or the speech transmission equipment are such that the signal-to-noise ratio of the speech is degraded, signal processing techniques should be used to maintain speech intelligibility.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

6.2.1-8 Speaker Frequency Range

Loudspeakers, earpieces, and headphone elements should respond uniformly (plus or minus 5 dB) over the range 100 to 4,800 Hz.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

6.2.1-9 Binaural Headsets For High Noise Environments

If listeners will be working in high ambient noise (85 dB(A) or above), binaural headsets should be provided rather than monaural headsets.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

6.2 Speech-Based Communication

6.2.1 General Requirements

6.2.1-10 Loudspeakers for Multi-Channel Monitoring

When several channels are to be monitored simultaneously by means of loudspeakers, the speakers should be mounted at least 10 degrees apart in the horizontal plane frontal quadrant, ranging radially from 45 degrees left to 45 degrees right of the operator's normal forward facing position.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

6.2.1-11 Volume Controls

Accessible volume or gain controls should be provided for each communication receiving channel (e.g., loudspeakers or headphones) with sufficient electrical power to drive sound pressure level to at least 100 dB overall when using two earphones.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

6.2.1-12 Squelch Control

When communication channels are to be continuously monitored, each channel should be provided with a signal-activated switching device (squelch control) to suppress channel noise during no-signal periods.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

6.2.1-13 Periodic Maintenance Tests

Periodic tests should be performed on all communication systems to ensure that messages remain intelligible under changes in ambient noise levels that may have occurred since the last check.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

6.2.2 Conventional Telephone Systems

6.2.2-1 Handset Size and Shape

The size and shape of handsets should be compatible with operator's hand size and mouth-ear distance (standard telephone dimensions are acceptable).

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

6.2.2-2 Handset Design

Handset earpieces should maintain firm ear contact while the transmitter is positioned in front of the mouth.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

6.2.2-3 Retractable Handset Cords

Cords should be of nonkink or self-retracting type.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

6.2.2-4 Handset Cord Length

Cords should be of sufficient length to permit reasonable operator mobility.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

6.2.2-5 Handset Cord Position

Cords should be positioned so as to avoid entangling critical controls or endangering passing traffic.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

6.2 Speech-Based Communication

6.2.2 Conventional Telephone Systems

6.2.2-6 Handset Cradles

Vertically mounted handset cradles should be designed and located to prevent the handset from being knocked out of the cradle by passing traffic.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

6.2.2-7 Multiple Instruments

Where multiple telephone instruments are located close together (e.g., on a single desk), they should be coded to indicate circuit or function.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

6.2.2-8 Press-to-Talk Button

If a press-to-talk button is used, the button should be convenient to both left-and right-hand operation.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

6.2.2-9 Switching Mechanism

Switching should be designed and/or programmed to minimize delay in making desired connections under both normal and emergency conditions.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

6.2.2-10 Telephone Ringing

The volume of ringing should be adjustable at the individual telephone instrument.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

6.2 Speech-Based Communication

6.2.2 Conventional Telephone Systems

6.2.2-11 Announcing Use

The transmitter should be compatible with the rest of the announcing system when used as the microphone input to the announcing system.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

6.2 Speech-Based Communication

6.2.3 Sound-Powered Telephone Systems

6.2.3-1 Feedback

Within engineering constraints imposed by sound-powering, the system should provide in-phase feedback to the user.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

6.2.3-2 Headsets

Headsets should reflect the following design requirements: (1) Earphone cushioning to provide comfort for extended periods of wear, (2) Earphones should cover the outer ear without causing uncomfortable pressure., (3) The earpiece should be held firmly in place, yet be easy to remove, and (4) A well-marked and accessible place should be provided for headset stowage.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

6.2.3-3 Ringing

If ringing is not installed, the user should be able to directly switch the sound-powered transmitter to the paging system so that a desired party can be called to the line.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

6.2.3-4 Jack Provisions

Plug-in jacks for the sound-powered system should be provided within the control room.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

6.2.3-5 Switching

When used, patch panels should be conspicuously marked and located in reasonably accessible places.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

6.2 Speech-Based Communication

6.2.4 Portable Radio Transceivers

6.2.4-1 Appropriate Use

Walkie-talkies should be used in both emergency and normal operations for two-way communications beyond the range of installed telephone connections or as a convenient alternative to the sound-powered telephone.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

6.2.4-2 Sound Quality

Walkie-talkies should realize the same quality desired throughout all of the communications systems within the engineering constraints imposed by radio frequency spectrum availability and by design for easy portability.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

6.2.4-3 Area Coverage

Modulation and a radio frequency should be chosen, as FCC regulations permit, to provide broad-area walkie-talkie communication to the control room.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

6.2.4-4 Packaging

To the extent permitted by design for effective electrical/radio frequency function, walkie-talkies should be small, light, and easy to carry. The microphone should be integrated into the transceiver package.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

6.2.4 Portable Radio Transceivers

6.2.4-5 Party Identification

Procedures should provide for unambiguous identification of the speaker when there are more than two parties on a channel operating at separate locations.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

6.2.4-6 Battery Replenishment

A supply of fresh replacement batteries should be stowed in an accessible, well-marked space.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

6 INTER-PERSONNEL COMMUNICATION

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6.2.5 Announcing Systems

6.2.5-1 Intelligibility and Coverage

The system should provide rapidly intelligible messages to all areas where personnel subject to a page may be located.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

6.2.5-2 Microphone Characteristics

If the powered telephone system is used to provide microphone input to the announcing system, the telephone system should contain transmitters of quality compatible with that of the announcing system.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

6.2.5-3 Loudspeaker Location

Speakers should be provided in the control room and other areas where control room personnel operations might be (e.g., restrooms, eating areas, and locker rooms).[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

6.2.5-4 Speech Clarity

Since proper speech over an announcing system differs from normal conversation, operators should be familiarized with the proper way to speak on the announcing system.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

6.2.5-5 Loudspeaker Volume

Speaker volume should be adjusted to ensure that speaker communications will not prevent detection of auditory alarms.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

6 INTER-PERSONNEL COMMUNICATION

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6.2.5 Announcing Systems

6.2.5-6 Priority

Control room inputs to the plant announcing system should have priority over any other input.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return	Reason:

6.2 Speech-Based Communication

6.2.6 Other Communications Systems

6.2.6-1 Fixed-Base UHF Transceivers

A fixed-base UHF transceiver may be used for normal emergency communications between the control room and the following locations similarly equipped with fixed-base transceivers:

Dispatcher, Security, and Utility Headquarters (if within UHF range).[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

6.2.6-2 Point-to-Point Intercom Systems

Intercom systems should be provided to interconnect the control room with important plant areas and other areas where control room or operating personnel might be.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

6.2 Speech-Based Communication

6.2.7 Emergency Communications

6.2.7-1 Backup Equipment

Provisions should be made to assure complete internal and external communications capabilities during emergencies.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ☐	Reason:

6.2.7-2 Equipment Usability

Communications equipment should be usable by personnel wearing protective gear without impediment to their tasks.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ☐	Reason:

6.2.7-3 Voice Communications with Masks

Emergency face masks should be equipped with diaphragms that are specially designed to transmit speech.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ☐	Reason:

6.3 Computer-Based Communication

6.3.1 General

6.3.1-1 Interactive Communication

Users should be able to communicate interactively with other users who are currently using the same system.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

6.3.1-2 Interaction With Ongoing Tasks

Users should be able to communicate with each other without canceling ongoing tasks.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

6.3.1-3 Functional Integration

Computer-based communications should be integrated with other information handling functions within a system.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

6.3.1-4 Consistent Procedures

Procedures for sending and receiving messages should be consistent from one transaction to another.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

6.3.1-5 Control by Explicit User Action

Both sending and receiving messages should be accomplished by explicit user action.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

6.3 Computer-Based Communication

6.3.1 General

6.3.1-6 Automatic Queuing

The computer should provide automatic queuing of outgoing messages pending confirmation of transmission, and incoming messages pending their review and disposition.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

6.3.1-7 Interrupt

Users should be able to interrupt message preparation, review, or disposition, and then resume any of those tasks from the point of interruption.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

6.3.1-8 Message Highlighting

Software capabilities should be provided to annotate transmitted data with appropriate highlighting to emphasize alarm/alert conditions, priority indicators, or other significant information that could affect message handling.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

6.3.1-9 Automatic Record Keeping

A log of data transmissions should be automatically maintained.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

6.3 Computer-Based Communication

6.3.2 Preparing Messages

6.3.2-1 Automatic Message Formatting

When message formats should conform to a defined standard or structure, prestored formats should be provided to aid users in message preparation.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

6.3.2-2 Message Composition Compatible with Data Entry

Procedures for composing messages should be compatible with general data entry procedures, especially those for text editing.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

6.3.2-3 Variable Message Length

Users should be able to prepare messages of any length.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

6.3.2-4 Incorporate Existing Files

Users should be able to incorporate an existing data file in a message, or to combine several files into a single message for transmission.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

6.3.2-5 Message Editing

Users should be able to save and edit messages prior to transmission.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

6.3 Computer-Based Communication

6.3.3 Sending Messages

6.3.3-1 Destination Selection

Users should be able to specify the destination(s) to which messages will be transmitted.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

6.3.3-2 Address Directory

Users should be provided with a directory showing all acceptable forms of message addressing for each destination in the system, and for links to external systems.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

6.3.3-3 Aids for Directory Search

Computer aids should be provided so that a user can search an address directory by specifying a complete or partial name.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

6.3.3-4 Extracting Directory Addresses

Users should be able to extract selected addresses from a directory or select a distribution list for direct insertion into a header in order to specify the destination(s) for a message.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

6.3.3-5 Automatic Addressing of Reply

The appropriate address(es) should be provided automatically for users responding to messages.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

6.3 Computer-Based Communication

6.3.3 Sending Messages

6.3.3-6 Assignment of Priority

When messages will have different degrees of urgency, the sender of a message should be allowed to designate its relative priority.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

6.3.3-7 Information About Communication Status

Users should be allowed access to status information concerning the identity of other system users currently on-line, and the availability of communication with external systems.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

6.3.3-8 Sender Identification

When a message is sent, the computer should show the sender's address, and the date and time of message creation and/or transmission.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

6.3.3-9 Deferring Message for Automatic Transmission

Users should be able to defer the transmission of prepared messages, to be released by a later action.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

6.3.3-10 Automatic Feedback

Automatic feedback for data transmission confirming that messages have been sent or indicating transmission failures should be provided to permit effective user participation in message handling.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

6.3 Computer-Based Communication

6.3.3 Sending Messages

6.3.3-11 Saving Undelivered Messages

If message transmission is not successful, automatic storage of undelivered messages should be provided.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

6.3.3-12 Message Cancellation

Users should be able to recall any message whose transmission has been initiated, if it has not yet been received by its addressee(s).

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

6.3.3-13 User Review of Data Before Transmission

When human judgment may be required to determine whether data are appropriate for transmission, users (or a system administrator) should be provided some means to review outgoing messages and confirm their release before transmission.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

6.3.3-14 Saving Transmitted Data Until Receipt is Confirmed

A copy of any transmitted message should be saved automatically until correct receipt has been confirmed.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

6.3 Computer-Based Communication

6.3.4 Receiving Messages

6.3.4-1 Message Notification at LOG-ON

When users log on to a system, they should be notified of any transmissions received since their last use of the system.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

6.3.4-2 Display of Messages

The display of messages from other users should be visually and spatially distinct from the display of system messages.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

6.3.4-3 Nondisruptive Message Notification

Notification of incoming messages should be nondisruptive.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

6.3.4-4 Indicating Priority of Received Messages

Where incoming messages will have different degrees of urgency, recipients should be notified of message priority and/or other pertinent information.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

6.3.4-5 Filters for Message Notification

Users should be able to specify "filters" based on message source, type, or content, that will control what notification is provided for incoming messages.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

6.3 Computer-Based Communication

6.3.4 Receiving Messages

6.3.4-6 Time-Stamp Messages

Messages should be time-stamped.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

6.3.4-7 Indicate Message Size

Some indication of message size should be included at the beginning of each message.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

6.3.4-8 Notification of Incomplete Message

The user should be informed when a message extends beyond the area provided.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

6.3.4-9 Message Storage and Retrieval

Messages should be stored in a message queue that is available to the user.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

6.3.4-10 Information about Queued Messages

Users should be able to review summary information about the type, source, priority, and size of queued incoming messages.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

6.3 Computer-Based Communication

6.3.4 Receiving Messages

6.3.4-11 User Selection of Messages

The user should be allowed to select any message from an ordered queue with a single action.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

6.3.4-12 Annotating Received Messages

Users should be able to append notes to a received message, and ensure that the annotation will be displayed so that it will be distinct from the message itself.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

6.3.4-13 Specifying Device Destination

Users should be able to choose the method of receipt, i.e., what device (file, display, printer) will be the local destination. If a specified receiving device is not operable, such as a printer that is not turned on, the user should be advised.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.1 Workstation Configuration

7.1.1 Stand-Up Console Dimensions

7.1.1-1 Console Height to See Over

Console height (with or without annunciator panels) should not exceed 58 inches when it is necessary for a standing operator to see over its top.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.1.1-2 Control Height

The highest control on a stand-up console should be within the highest reach of the 5th percentile female without stretching or using a stool or ladder, while the lowest control should be within the lowest reach of the 95th percentile male without bending or stooping, as shown in Table 7.1.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.1.1-3 Benchboard Slope

The benchboard slope, in conjunction with its depth, should result in all controls being within the reach radius of the 5th percentile female, as shown in Table 7.1 and illustrated in Figure 7.1.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.1.1-4 Control Distance from the Front Edge of the Console

Controls should be set back a minimum of 3 inches from the front edge to protect against accidental activation.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7 WORKPLACE DESIGN
7.1 Workstation Configuration
7.1.1 Stand-Up Console Dimensions

Table 7.1 Anthropometric data used to set limits for equipment dimensions

Standing (without shoes)	Bounding Measurements (inches)	
	5th percentile Adult Female	95th percentile Adult Male ¹
Stature	60.0	73.5
Eye height from floor	55.5	68.6
Shoulder height	48.4	60.8
Elbow height	37.4	46.8
Fingertip height ²	24.2	28.8
Functional reach ³	25.2	35.0
Extended functional reach ⁴	28.9	39.0
Distance from central axis of body to leading edge of console ⁵	5.0	5.3
Eye distance forward of central axis to body ⁵	3.0	3.4

(Source: MIL-STD-1472D, Section 5.6, see Note 2, Vol. 1, p. 427. Also, where indicated, Seminara et al., see Note 3, Vol. 1, p. 427.)

¹ MIL-STD-1472D gives separate values for male troops and aviators. The two were averaged for presentation here.

² Data for male aviators only, 5th and 95th percentiles.

³ Measured from wall to tip of right index finger, with right arm extended horizontal to floor, both shoulders against wall.

⁴ Measured as stated in note 3, except right shoulder extended out from wall as far as possible with left shoulder against wall.

⁵ These measurements are not given in MIL-STD-1472D. Values provided in Seminara et al. are presented although they are based on measures of a different population. Differences in other measurements between the MIL-STD population and the EPRI population are small enough that these EPRI values should provide reasonable approximations.

Table 7.1 Anthropometric data used to set limits for equipment dimensions (cont'd)

Seated	Bounding Measurements (inches)	
	5th percentile Adult Female	95th percentile Adult Male ¹
Popliteal height (bend at back of knee)	15.0	19.2
Sitting height above seat surface		
- Erect	31.1	38.5
- Relaxed	30.5	37.6
Eye height above seat, sitting erect	26.6	33.6
Shoulder height above seat surface	19.6	25.8
Elbow height above seat surface	6.4	11.3
Functional reach	25.2	35.0
Extended functional reach	28.9	39.0
Thigh clearance height	4.1	7.4
Buttock-popliteal length	17.1	21.5
Knee height	18.5	23.6
Distance from central axis of body to leading edge of console ⁵	5.0	5.3
Eye distance forward of central axis of body ⁵	3.0	3.4

(Source: MIL-STD-1472D, Section 5.6, see Note 2, Vol. 1, p. 427. Also, where indicated, Seminara et al., see Note 3, Vol. 1, p. 427.)

¹ MIL-STD-1472D gives separate values for male troops and aviators. The two were averaged for presentation here.

² Data for male aviators only, 5th and 95th percentiles.

³ Measured from wall to tip of right index finger, with right arm extended horizontal to floor, both shoulders against wall.

⁴ Measured as stated in note 3, except right shoulder extended out from wall as far as possible with left shoulder against wall.

⁵ These measurements are not given in MIL-STD-1472D. Values provided in Seminara et al. are presented although they are based on measures of a different population. Differences in other measurements between the MIL-STD population and the EPRI population are small enough that these EPRI values should provide reasonable approximations.

7 WORKPLACE DESIGN
7.1 Workstation Configuration
7.1.1 Stand-Up Console Dimensions

**Figure 7.1 Reach capabilities and control height for two stand-up consoles
(the console on the right includes a keyboard surface)**

7 WORKPLACE DESIGN
7.1 Workstation Configuration
7.1.1 Stand-Up Console Dimensions

Figure 7.2 Display height and orientation relative to standing operator line of sight

7.1 Workstation Configuration

7.1.1 Stand-Up Console Dimensions

7.1.1-5 Display Height and Orientation

All displays, including alarm indicators, should be within the upper limit of the visual field (75 degrees above the horizontal line of sight) of the 5th percentile female (see Table 7.1), and should be mounted so that the angle from the line of sight to the display face is 45 degrees or greater (see Figure 7.2).[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.1.1-6 Location of Frequently Monitored Display

Video displays which require frequent or continuous monitoring, or which may display important (e.g., alarm) information, should be located not more than 35 degrees to the left or right of the operator's straight-ahead LOS, and not more than 35 degrees above and 25 degrees below the operator's horizontal LOS, measured from the normal operator work station (see Figure 7.2).

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.1.1-7 Location of Infrequently Monitored Display

Video displays which do not require frequent or continuous monitoring, and which will not display important (e.g., alarm) information, should be located not more than 95 degrees to the left or right of the operator's straight-ahead LOS, as measured from normal operator work stations which permit full operator head and eye rotation.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.1.1-8 Lateral Spread of Controls and Displays

The maximum lateral spread of controls and displays at a single-operator work station should not exceed 72 inches.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

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7.1 Workstation Configuration

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7.1.1 Stand-Up Console Dimensions

7.1.1-9 Foot Room

Enough foot room should be provided to allow the operator to get close to the board without leaning.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

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7.1 Workstation Configuration

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7.1.2 Sit-Down Console Dimensions

7.1.2-1 Console Height to See Over

The console height should be no more than approximately 27 inches above the seat to accommodate the 5th percentile adult female when the seated operator must see over the console. Assuming seat height is adjusted to 18 inches, maximum console height therefore should be 45 inches above the floor.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.1.2-2 Control Height

All controls on a sit-down console should be within the reach radius of the 5th percentile female, as shown in Table 7.1 and illustrated in Figure 7.3.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.1.2-3 Benchboard Slope

The benchboard slope, in conjunction with its depth, should be such that all controls are within the functional reach radius of the 5th percentile female (as shown in Table 7.1 and illustrated in Figure 7.3) and all displays and markings can be read.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.1.2-4 Control Distance from the Front Edge of the Console

Controls should be set back a minimum of 3 inches from the front edge to protect against accidental activation.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

Figure 7.3 Reach capabilities for sit-down consoles

7.1.2 Sit-Down Console Dimensions

7.1.2-5 Display Height and Orientation

All displays, including alarm indicators, should be within the upper limit of the visual field (75 degrees above the horizontal line of sight) of the 5th percentile female (see Table 7.1) and should be mounted so that the angle from the line of sight to the display face is 45 degrees or greater (see Figure 7.4).[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.1.2-6 Location of Frequently Monitored Display

Video displays which require frequent or continuous monitoring, or which may display important (e.g., alarm) information, should be located not more than 35 degrees to the left or right of the operator's straight-ahead LOS, and not more than 20 degrees above and 40 degrees below the operator's horizontal LOS, as measured from the normal operator work station (see Figure 7.4).

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.1.2-7 Location of Infrequently Monitored Display

Video displays which do not require frequent or continuous monitoring, and which will not display important (e.g., alarm) information, should be located not more than 95 degrees to the left or right of the operator's straight-ahead LOS, as measured from normal operator work stations which permit full operator head and eye rotation.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.1.2-8 VDU Viewing Distance

The minimum design viewing distance should be equal to or greater than 12 inches (30 centimeters).[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

Figure 7.4 Display height and orientation relative to seated operator line of sight

7.1.2 Sit-Down Console Dimensions

7.1.2-9 Lateral Spread of Controls and Displays

For control and monitoring actions that must occur in sequence, all necessary controls and displays should be within the maximum extended reach and viewing range of the seated operator from a single reference point, as shown in Table 7.1 and illustrated in Figure 7.5.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

7.1.2-10 Leg and Foot Room

Sufficient leg and foot room should be provided to enable seated operators to avoid awkward and uncomfortable positions. Figure 7.6 shows the dimensions involved and gives minimums and ranges necessary to accommodate the 5th to 95th percentiles (defined in Table 7.1).

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

7.1.2-11 Writing Space on Consoles

If writing space is needed by operators working at consoles, an area at least 16 inches deep and 24 inches wide should be provided, where these dimensions in the total configuration would fit operator reach capabilities.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

7.1.2-12 Use of Procedures and Other Reference Materials at Consoles

Provision should be made so that the procedures, manuals, and other reference materials can be consulted easily while task sequences are performed at the consoles.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

¹ 28 inches forward of the eye point is the maximum distance for displays when viewing is limited by reach (control-display relationship). Viewing distance may be extended provided display is properly designed. Greater lateral spread of displays would require a wraparound panel.

² Based on 5th percentile male data; less for 5th percentile females.

³ Console edge approximately 4" to 6" forward of eye point for 5th-95th percentile.

Figure 7.5 Reach and visual range related to lateral and forward distance from center point

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7.1 Workstation Configuration

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7.1.2 Sit-Down Console Dimensions

Figure 7.6 Leg- and foot-room dimensions

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7.1 Workstation Configuration
7.1.3 Sit-Stand Work Stations

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7.1.3-1 Appropriate Use

Sit-stand combinations should be used when operators need mobility to monitor large panel areas but also need the stability of seated operation for precise task sequences.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.1.3-2 Control and Display Positioning

The height and lateral limits for controls and displays should conform to the guidelines given for stand-up consoles (see Section 7.1.1).

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.1.3-3 Chair Height

The operator should be provided with a high chair so that the seated eye height is approximately the same as standing eye height.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.1.3-4 Knee Room

Knee room and comfortable foot support should be provided.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

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7.1 Workstation Configuration
7.1.4 Vertical Panels

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7.1.4-1 Control Height

Controls should be placed in an area between 34 inches and 70 inches above the floor. Controls requiring precise or frequent operation and emergency controls should be placed in an area between 34 inches and 53 inches above the floor.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.1.4-2 Display Height

Displays should be placed in an area between 41 inches and 70 inches above the floor. Displays that must be read frequently or precisely should be placed in an area between 50 inches and 65 inches above the floor.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7 WORKPLACE DESIGN
7.1 Workstation Configuration
7.1.5 Desk Dimensions

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7.1.5-1 Working Space

Desks should provide enough clear working space for all materials required for task performance.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.1.5-2 Chair Positions

The desk should allow for different chair positions as required, with adequate knee space.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.1.5-3 Operator Comfort

The relationships of working surface height and area, knee room, and chair height should allow operators to work comfortably.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.1.5-4 Dimensions

Desk dimensions should conform with those shown in Figure 7.7.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

Figure 7.7 Recommended desk dimensions

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7.1 Workstation Configuration
7.1.6 Chairs

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7.1.6-1 Mobility

Chairs should pivot so that operators can readily adjust position.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

7.1.6-2 Backrests

Chairs should support at least the lower back curvature (lumbosacral region).[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

7.1.6-3 Armrests

Where personnel may remain seated for relatively long periods, chairs with armrests should be provided.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

7.1.6-4 Cushioning

The seat and backrest should be cushioned with at least 1 inch of compressible material, enough so that some resilience remains when the chair is occupied.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

7.1.6-5 Seat Area

The thighs and the backs of the knees should not be compressed so as to cause fatigue and circulation problems.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

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7.1 Workstation Configuration
7.1.6 Chairs

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7.1.6-6 Seat Adjustability

For chairs at sit-down stations, seat height should generally be adjustable from 16 to 20.5 inches. For chairs at sit-stand stations, seat height should be adjustable from 26 to 32 inches.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.1.6-7 Footrests

An adjustable footrest or heel catch should be provided to support the feet at a level no more than 18 inches below the seat surface.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.2 Control Room Configuration

7.2.1 Accessibility of Instrumentation/Equipment

7.2.1-1 Present in the Control Room

Control room instrumentation and equipment should include all controls and displays needed for (1) detection of abnormal conditions, and (2) bringing the plant to a safe shutdown condition.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return	Reason:

7.2.1-2 Arranged to Facilitate Coverage

Operators should not have to leave the primary operating area to attend to control room instrumentation on back panels during operational sequences in which continuous monitoring or the timing of control actions may be critical.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return	Reason:

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7.2 Control Room Configuration

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7.2.2 Consistency of Staffing with Equipment Layout

7.2.2-1 Coverage

Control room staffing and task assignments should ensure complete and timely coverage of controls, displays, and other equipment required during all modes of operation.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.2.2-2 Utilization of Additional Personnel

When additional onsite or offsite personnel are needed to augment the normal crew complement under certain conditions (e.g., refueling), activities and task assignments should be planned to ensure proper coordination.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.2.2-3 Nonessential Personnel

Provision should be made to limit the access and movement of nonessential but authorized personnel to prescribed areas within the control room.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7 WORKPLACE DESIGN
7.2 Control Room Configuration
7.2.3 Furniture and Equipment Layout

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7.2.3-1 Viewing

Desks and consoles placed in the primary operating area should permit operators at those desks and consoles full view of all control and display panels (including alarm displays) in the primary operating area.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return	Reason:

7.2.3-2 Communications

Desk and console placement should facilitate voice communications from operators seated at those work stations to any point in the primary operating area.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return	Reason:

7.2.3-3 Operator Access

Operators should be able to get to any work station without having to overcome obstacles such as tripping hazards, poorly positioned filing cabinets or storage racks, and maintenance equipment.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return	Reason:

7.2.3-4 Circulation Patterns

The control room arrangement should facilitate efficient, unobstructed movement and communication.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return	Reason:

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7.2 Control Room Configuration

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7.2.3 Furniture and Equipment Layout

7.2.3-5 Operator Maneuvering Space

Adequate space should be allowed between the back (operator's position) of desk/consoles and any surface or fixed object behind the operator for the operator to get into and out of a chair freely or to turn in the chair to view the equipment behind.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.2.3-6 Equipment-to-Opposing-Surface Distance

Enough space should be allowed so that personnel can perform all required tasks.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.2.3-7 Openings

Panels should be laid out and maintained, and equipment enclosures designed, so that there are no unguarded openings through which unwanted objects can be introduced.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.2.4 Document Organization and Storage

7.2.4-1 Accessibility

All procedures and other documents that may be needed for ready reference should be kept in the control room in places where they are easy to locate and extract for use.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.2.4-2 Location Aids

Clearly visible title labels should be provided to identify specific documents. Labels should distinguish documents as much as possible.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.2.4-3 Convenience of Use

Documents should not be fixed in racks; it should be possible to remove documents for use.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.2.4-4 Bound Documents

Documents should be bound so that they can be opened fully and will remain open at the desired place without holding.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.2.4-5 Protection

Documents should be protected from wear so that they do not become dog-eared, dirty, loose, torn, and difficult to read.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

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7.2 Control Room Configuration

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7.2.4 Document Organization and Storage

7.2.4-6 Dedicated Sets of Procedures

Sets of procedures should be stored separately for each unit in a multiunit control room.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

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7.2 Control Room Configuration

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7.2.5 Spare Parts, Operating Expendables, and Tools

7.2.5-1 Supply

There should be an adequate supply of expendables and spare parts (e.g., fuses, bulbs, ink and inking pens, recorder charts, and printer paper).[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.2.5-2 Accessibility

Expendables and spare parts should be readily accessible.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.2.5-3 Tools

All necessary or special replacement tools should be available to install expendables and spare parts.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.2.5-4 Storage Space

There should be adequate storage space for expendables and spare parts.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.2.5-5 Coding

When different types, sizes, or styles of expendables and spare parts are required, they should be clearly and distinctively marked to avoid misapplication.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

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7.2 Control Room Configuration

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7.2.5 Spare Parts, Operating Expendables, and Tools

7.2.5-6 Inventory

Records should be kept as to the status of expendables and spare parts.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7 WORKPLACE DESIGN
7.2 Control Room Configuration
7.2.6 Supervisor Access

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7.2.6-1 Access

The shift supervisor's office should be located so as to permit prompt physical access to the control room under all conditions, including control room isolation.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return	Reason:

7.2.6-2 Communications

Dedicated communications links between the primary operating area and the shift supervisor's office when the shift supervisor's office is not within the control room boundary should be provided.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return	Reason:

7 WORKPLACE DESIGN
7.2 Control Room Configuration
7.2.7 Multiunit Control Rooms

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7.2.7-1 Equipment Arrangement

Equipment should be arranged with movement and communication patterns in mind so that unit operations do not interfere with each other.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.2.7-2 Senior Operator Station

Senior operators who supervise and assist operations of more than one unit should be stationed so that they can communicate effectively with operators in each unit and have an unobstructed visual path to the control boards of each unit.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.2.7-3 Sharing of Personnel

Where operators may assist those of another unit, potential task loading should be evaluated to assure that each unit can be covered adequately in all situations.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.2.7-4 Sharing of Procedures

Each unit should have its own set of procedures and other reference documents as required to make sure that references are easily available to personnel in each unit, and to avoid conflicting needs for the same reference.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7 WORKPLACE DESIGN
7.2 Control Room Configuration
7.2.7 Multiunit Control Rooms

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7.2.7-5 Shared Equipment

When control of some plant equipment is shared by the control rooms of multiple-unit nuclear power plants, care must be taken to ensure that status and availability data for this equipment are available in each control room, and that equipment operation from the control room for one unit will not affect other unit operations.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.2.7-6 Dedicated Crews

When mirror image control rooms exist, operational crews should be committed to one or the other unit and should not be allowed to alternate between the two mirrored units.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ●	Reason:

7.2.7-7 Accentuate Differences

The distinction between the mirrored units should be heightened as much as possible so that there will be no confusion about where one unit ends and the other begins.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7 WORKPLACE DESIGN
7.2 Control Room Configuration
7.2.8 Emergency Equipment

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7.2.8-1 Types of Equipment

Protective equipment should include protective clothing and breathing apparatus.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.2.8-2 Anthropometry

Protective clothing and breathing equipment should be compatible with operator body sizes and tasks to provide adequate tactile sensitivity and ability to see, reach, move, communicate, and hear.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.2.8-3 Periodic Checks

Operator protective equipment should be periodically checked to determine if it is in good condition.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.2.8-4 Quantity

There should be protective equipment available in sufficient quantities and sizes for the required number of operators.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.2.8-5 Marking

Protective clothing sizes should be clearly identifiable.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

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7.2 Control Room Configuration
7.2.8 Emergency Equipment

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7.2.8-6 Expendables

There should be an adequate supply of personal protection equipment expendables, such as filters.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ☒	Reason:

7.2.8-7 Accessibility

All protective equipment should be easily and readily accessible.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ☒	Reason:

7.2.8-8 Training

Operators should be well practiced in donning protective equipment.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ☒	Reason:

7.2.8-9 Procedures

Instructions for donning, doffing, and controlling personal protective equipment should be provided.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ☒	Reason:

7.2.8-10 Periodic Checks

All equipment should be periodically checked to determine if it is in good condition.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ☒	Reason:

7 WORKPLACE DESIGN
7.2 Control Room Configuration
7.2.8 Emergency Equipment

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7.2.8-11 Accessibility

All equipment should be easily and readily accessible.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.2.8-12 Training

Operators should be trained in the use of all emergency equipment.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.2.8-13 Procedures

There should be a written, administratively approved procedure for each type of emergency or combination of emergencies.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.2.8-14 Automatic Warning System

There should be an automatic fire warning system for control room fires.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.2.8-15 Proper Storage

Provision should be made for the orderly storage in the control room of emergency equipment that is needed by control room personnel.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7 WORKPLACE DESIGN
7.2 Control Room Configuration
7.2.8 Emergency Equipment

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7.2.8-16 Storage Locations

The storage location(s) may be away from the primary operating area but should be accessible, clearly marked, and known to all personnel.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7 WORKPLACE DESIGN

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7.3 Environment

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7.3.1 Temperature and Humidity

7.3.1-1 Comfort Zone

The climate control system should be capable of maintaining a temperature between 65 and 85 degrees, with a range of 70 to 80 degrees preferred, and a relative humidity between 20 percent and 60 percent.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.3.1-2 Temperature Differential

Air temperature at floor level and at head level should not differ by more than 10 degrees (F).

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.3 Environment

7.3.2 Ventilation

7.3.2-1 Air Quantity

The ventilation system should be capable of introducing outdoor air into the control room at a rate of at least 15 cubic feet per minute per occupant.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.3.2-2 Air Velocity

Air velocities in the primary operating area should not exceed 45 feet per minute measured at operator head level and should not produce a noticeable draft.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

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7.3 Environment

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7.3.3 Illumination

7.3.3-1 Levels

The illumination levels should conform with those listed in Table 7.2.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.3.3-2 Uniformity

The level of illumination should not vary greatly over a given work station.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.3.3-3 Supplemental Light

Supplemental lighting should be provided for personnel performing specialized visual tasks in areas where fixed illumination is not adequate.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.3.3-4 Task Area Luminance Ratios

To ensure effective visual performance, the task area luminance ratios in Table 7.3 should not be exceeded.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.3.3-5 Shadowing

To reduce operator fatigue and eyestrain, shadows should be avoided.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

Table 7.2 Illumination levels

Work Area or Type of Task	Task Illuminance, footcandles		
	Minimum	Recommended	Maximum
Panels, primary operating area	20	30	50
Auxiliary panels	20	30	50
Scale indicator reading	20	30	50
Seated operator stations	50	75	100
Reading:			
- handwritten (pencil)	50	75	100
- printed or typed	20	30	50
Writing and data recording	50	75	100
Maintenance and writing areas	20	30	50
Emergency operating lighting	10	As above for area/task	

(Source: Illuminating Engineering Society of North America, see Note 4, Volume 1, p. 427.)

Table 7.3 Maximum task area luminance ratios

Areas	Luminance Ratio
Task area versus adjacent darker surroundings	3:1
Task area versus adjacent lighter surroundings	1:3
Task area versus more remote darker surfaces	10:1
Task area versus more remote lighter surfaces	1:10
Luminaires versus surfaces adjacent to them	20:1
Anywhere within normal field of view	40:1

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7.3 Environment

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7.3.3 Illumination

7.3.3-6 Glare

Glare should not interfere with the readability of displays, labels, or indicators.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.3.3-7 Reflectance

Reflectance should conform to the recommendations shown in Table 7.4.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.3.3-8 Color

Surface colors should be recognizable under both normal and emergency lighting conditions.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.3.3-9 Ambient Illumination and VDUs

The ambient illumination in the VDU area that is necessary for other visual functions (e.g., setting controls, reading instruments) should not degrade the visibility of signals on the VDU.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.3.3-10 Use of Colored Ambient Illumination

Colored ambient illumination should not be used if color coding is used in the workplace.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

Table 7.4 Recommended workplace reflectance levels

Surface	Reflectances	
	Preferred	Permissible
Ceiling ^a	80%	60-95%
Upper Wall	50%	40-60%
Lower Wall	15-20%	
Instruments/Displays	80-100%	
Cabinets/Consoles	20-40%	
Floor	30%	15-30%
Furniture	35%	25-45%

^a Recommended reflectances are for finish only. Overall average reflectance of acoustic materials may be somewhat lower. The upper walls (one to two feet below the ceiling) may be painted with the same paint as is used on the ceiling.

7.3.3 Illumination

7.3.3-11 Illuminance of Areas Immediately Surrounding VDUs

There should be no light source (direct or reflected) in the immediate surrounding area of the VDU that is of greater luminance than the VDU.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.3 Environment

7.3.4 Emergency Lighting

7.3.4-1 Automatic Action

A control room emergency lighting system should be automatically activated and immediately available upon failure of the normal control room lighting system.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.3.4-2 Operability

Failure of the normal control room lighting system should not degrade operability of the emergency lighting system.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.3.4-3 Lighting Levels

The control room emergency illumination system should be designed to provide a minimum illumination level of 10 footcandles at all work stations in the primary operating area.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

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7.3.5 Auditory Environment

7.3.5-1 General

The acoustic design of the control room should ensure that verbal communications between operators are not impaired; auditory signals are readily detected; and auditory distraction, irritation, and fatigue of operators are minimized.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.3.5-2 Background Noise

Background noise should not impair verbal communication between any two points in the primary operating area.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.3.5-3 Background Noise Level

Background noise levels should not exceed 65 dB(A).

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.3.5-4 Further Reductions

Where communications between the primary operating area and other control room locations are necessary, and voice transmission systems are not provided, further reductions in background noise should be implemented.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.3.5-5 Noise Distractions

Noise distractions generated either inside or outside the control room should be minimized.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

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7.3.5-6 Reverberation Time and Sound Absorption

The acoustical treatment of the control room should limit reverberation time to 1 second or less.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return	Reason:

7.3.6 Personal Storage

7.3.6-1 Storage Locations

There should be a suitable, out-of-the-way, but secure place in which control room personnel may keep their coats and other personal belongings.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.3.6-2 Storage Suitability

If lockers are provided, they should be large enough to hold the items that might reasonably be expected to require storage.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

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7.3.7 Ambience and Comfort

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7.3.7-1 Decor

Decor should create a pleasant working environment for control room operators.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.3.7-2 Restroom and Eating Facilities

A restroom and kitchen or eating area should be provided within (preferably) or near the control room isolation boundary.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.3.7-3 Rest Area/Lounge

Consideration should be given to providing a rest area (possibly in conjunction with the eating area) conducive to relaxation and revitalization, especially where shifts are long.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.4 Panel Layout

7.4.1 General Panel Layout

7.4.1-1 Grouping by Task Sequence

Controls and displays should be assigned to work stations based on the tasks the operator must carry out.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.4.1-2 Grouping by System Function

Within the constraints of grouping by task sequence, controls and displays should be assigned to panels in functional groups related to system structure.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.4.1-3 Grouping by Importance and Frequency of Use

Controls and displays should be assigned to panels depending on their importance and frequency of use, within the constraints of grouping by task sequence and system function.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.4.1-4 Secondary Controls/Displays

Controls or displays which are neither important to plant safety nor frequently used should be installed in secondary panel locations.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.4.1-5 Spacing

Spacing between groups should be at least the width of a typical control or display in the group.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.4 Panel Layout

7.4.1 General Panel Layout

7.4.1-6 Color Shading

When color shading is used, colors should provide adequate contrast and should be consistent with other color coding in the control room.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.4.1-7 Emergency Controls

Distinctive enhancement techniques should be used for emergency controls.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.4 Panel Layout

7.4.2 Layout Arrangement Factors

7.4.2-1 Sequence

Controls and displays should be grouped together when they are observed/operated in a specified sequence.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.4.2-2 Frequency of Use

Frequently used controls and displays should be near the center of the preferred visual and manual areas.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.4.2-3 Functional Considerations

Functionally related controls and displays should be grouped together when they are used together to perform tasks related to a specific function or are identical in purpose.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.4.2-4 Order and Labeling

Components should be arranged left-to-right and/or top-to-bottom and identified in alphabetic or numeric sequence.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.4.2-5 Other Expectations

Components should be arranged to match other operator expectations when these can be identified.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.4 Panel Layout

7.4.2 Layout Arrangement Factors

7.4.2-6 Inter- and Intra-Panel Consistency

The location of arrangement of recurring functional groups and individual components of those groups should be similar from panel to panel or within a panel.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.4.2-7 Repeated Functions

The layout of identical control or display sets should be consistent at all locations.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.4.2-8 Mirror-Imaging

Layouts of repeated functions should not be mirror-imaged.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.4.2-9 Panel-to-Panel

Standardization should be maintained where similar functions or panels are located at several work stations or units and must be used by the same personnel.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.4.2-10 Simulator to Control Room Standardization

Standardization should be maintained where simulator or procedures trainers are used that simulate the actual operational equipment.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.4 Panel Layout

7.4.3 Specific Panel Layout Design

7.4.3-1 Access

Control access should not be impeded by any position of an adjacent control. Recommended minimum separation distances for controls are shown in Table 7.6 and Figure 7.11.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.4.3-2 Inadvertent Actuation

Control actuation should not result in inadvertent actuation of an adjacent control.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.4.3-3 Simultaneous Actuation

It should be possible to simultaneously actuate adjacent controls (where required).

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.4.3-4 Orientation

Horizontal rows of displays should be used rather than vertical columns.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.4.3-5 String Length

Strings of similar small displays should not exceed 20 inches on the control board.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

Table 7.6 Minimum separation distances for controls (see Figure 7.11)

Minimum Separation (inches)											
Controls	Key-Operated Controls	Pushbuttons (not in an array)	Push-button Arrays	Legend Switches, Legend Switch Array	Slide Switches, Rocker Switches	Toggle Switches	Thumb-wheels, Thumb-wheel Arrays	Rotary Selector Switches	Continuous Rotary Controls	J-Handles (large)	J-Handles (small)
Key-Operated Controls	1.0	0.5	1.5	1.0	0.75	0.75	0.5	.75	.75	5.0	2.0
Pushbuttons (not in an array)	0.5	0.5	2.0	2.0	0.5	0.5	0.5	0.5	0.5	6.0	3.0
Pushbutton Arrays ¹	1.5	2.0	2.0	2.0	1.5	1.5	1.5	2.0	2.0	6.0	3.0
Legend Switches, Switch Arrays ²	1.0	2.0	2.0	2.0	1.5	1.5	1.5	2.0	2.0	6.0	3.0
Slide Switches, Rocker Switches	0.75	0.5	1.5	1.5	0.5	0.75	0.5	0.5	0.5	5.0	2.0
Toggle Switches ³	0.75	0.5	1.5	1.5	0.75	0.75	0.5	0.75	0.75	6.0	3.0
Thumbwheels, Thumbwheel Arrays	0.50	0.5	1.5	1.5	0.5	0.5	0.5	0.75	0.75	5.0	2.0
Rotary Selector Switches	0.75	0.5	2.0	2.0	0.5	0.75	0.75	1.0	1.0	5.0	2.0
Continuous Rotary Controls	0.75	0.5	2.0	2.0	0.5	0.75	0.75	1.0	1.0	5.0	2.0
J-Handles (large)	5.0	6.0	6.0	6.0	5.0	6.0	5.0	5.0	5.0	3.0	5.0
J-Handles (small)	2.0	3.0	3.0	3.0	2.0	3.0	2.0	2.0	2.0	5.0	1.0

¹ Pushbuttons within an array, 0.75 inches center-to-center.

² Legend switches within an array, no minimum distance, but should be separated by a barrier. Barrier should be at least 0.125 inches wide, 0.183 inches high, with rounded edges. Legend switches manufactured as elements of a module or modular array may be mounted as closely as engineering considerations permit.

³ Toggle switches arrayed in a horizontal line, 0.75 inches center-to-center.

Figure 7.11 Measurement of minimum separation between controls
(distances d shown in Table 7.6)

7.4.3 Specific Panel Layout Design

7.4.3-6 Number of Components

No more than 5 similar components should be laid out in an unbroken row or column.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.4.3-7 Coordinate Axes for Matrices

Large matrices of similar components should have the coordinate axes labeled for identification of any single component within the grid.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.4.3-8 Labeling Large Matrices

The left and top sides of large matrices should be used for labeling.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.4.3-9 Demarcation of Large Matrices

Large matrices should be subdivided by appropriate demarcation.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.5 Panel Labeling

7.5.1 Labeling Principles

7.5.1-1 Need for Labeling

Controls, displays, and other equipment items that must be located, identified, or manipulated should be appropriately and clearly labeled to permit rapid and accurate human performance.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.5.1-2 Hierarchical Scheme

A hierarchical labeling scheme should be used to reduce confusion, operator search time, and redundancy.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.5.1-3 Content of Hierarchical Labels

Major labels should be used to identify major systems or operator work stations, subordinate labels should be used to identify subsystems or functional groups, and component labels should be used to identify each discrete panel or console element.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.5.1-4 Letter Size in Hierarchical Labels

Labels should be graduated in letter size such that system/work station labels are about 25 percent larger than subsystem/functional group labels, subsystem/functional group labels are about 25 percent larger than component labels, and component labels are about 25 percent larger than control position labels.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.5 Panel Labeling

7.5.2 Label Location

7.5.2-1 Normal Placement

Labels should be placed above the panel element(s) they describe.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.5.2-2 Panel Labeling

The placement of labels on control panels should conform to the guidance according to the principles in Section 7.5.1.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.5.2-3 Visibility Enhancement

Labels for elements located above eye level should be positioned to ensure label visibility:

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.5.2-4 Proximity

Labels should be placed close to the panel element.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.5.2-5 Labels on Controls

Labels should not appear on the control itself when an adjustment or manipulation is required that causes the operator's hand to obscure the label for an extended time period.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.5 Panel Labeling

7.5.2 Label Location

7.5.2-6 Adjacent Labels

Adjacent labels should be separated by sufficient space so that they are not read as one continuous label.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.5.2-7 Integrity

Labels should be mounted in such a way as to preclude accidental removal.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.5.2-8 Surface

Labels should be mounted on a flat surface.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.5.2-9 Horizontal Orientation

Labels should be oriented horizontally so that they may be read quickly and easily from left to right.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.5.2-10 Curved Patterns

Curved patterns of labeling should be avoided.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.5 Panel Labeling

7.5.2 Label Location

7.5.2-11 Other Information Sources

Labels should not cover any other information source or detract from or obscure figures or scales which must be read by the operator.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

7.5.2-12 Concealment

Labels should not be covered or obscured by other units in the equipment assembly.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

7.5.2-13 Controls

Labels should be visible to the operator during control actuation.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

7.5.2-14 Cleaning

Administrative procedures should be in place for the periodic cleaning of labels.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

7.5 Panel Labeling

7.5.3 Label Content

7.5.3-1 Primary Function

Labels should describe the function of equipment items.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.5.3-2 Wording of Instruction Labels

The label should briefly and simply express the intended action.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.5.3-3 Commonly Used Terms and Symbols

Terms, abbreviations, and symbols used on panel labels should have commonly accepted meanings for all intended users.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.5.3-4 Distinguishability

Symbols should be unique and distinguishable from each other.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.5.3-5 Consistency

Labels should be consistent within and across panels in their use of words, acronyms, abbreviations, and part/system numbers.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.5.3 Label Content

7.5.3-6 Agreement with Procedures

There should be no mismatch between nomenclature used in procedures and that printed on the labels.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.5.3-7 Administrative Control

A list of standard names, acronyms, abbreviations, and part/system numbers should be in place and administratively controlled.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.5.3-8 Label Similarity

Words and abbreviations of similar appearance should be avoided where an error in interpretation could result.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.5.3-9 Functional Relationship

Labels should be used to identify functionally grouped controls or displays.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.5.3-10 Label Location

Labels should be located above the functional groups they identify.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.5 Panel Labeling

7.5.3 Label Content

7.5.3-11 Control Position Labels

All discrete functional control positions should be identified.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.5.3-12 Direction

Direction of motion (increase, decrease) should be identified for continuous motion rotary controls.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.5.3-13 Visibility

Control position information should be visible to the operator during operation of the control.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.5.3-14 Access Opening Labeling

Each access opening used by control room operators should be labeled to identify the function of items accessible through it.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.5.3-15 Danger, Warning, and Safety Instruction Labels

All danger, warning, and safety instruction labels should be in accordance with appropriate safety standards.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.5 Panel Labeling

7.5.4 Use and Control of Temporary Labels

7.5.4-1 Necessity

Temporary labels should be used only when necessary.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.5.4-2 Visibility

Temporary labels should not obscure prior permanent labels unless the old label is to be replaced.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.5.4-3 Identification

Tag-out labels should clearly identify out-of-service components and equipment.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.5.4-4 Mounting

Tag-outs should be securely affixed.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.5.4-5 Obscuration

Tag-outs should not obscure the label associated with the non-operable device.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

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7.5 Panel Labeling

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7.5.4 Use and Control of Temporary Labels

7.5.4-6 Activation

Tag-outs should be designed to physically prevent actuation of a control.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.5.4-7 Adjacent Devices

Tag-outs should not obscure any adjacent devices or their associated labels.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.5.4-8 Administrative Procedures

The use of temporary labels should be administratively controlled.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.5.4-9 Review Procedures

The use and control of temporary labels should be periodically reviewed.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.5 Panel Labeling

7.5.5 Location Aids

7.5.5-1 Use

Lines of demarcation can be used to: (1) enclose functionally related controls and displays, and group related controls and displays.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.5.5-2 Contrast

Lines of demarcation should be visually distinctive from the panel background.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.5.5-3 Permanence

Lines of demarcation should be permanently attached.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.5.5-4 Consistency

The color coding scheme should be used consistently throughout the control room.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.5.5-5 User Expectations

Color should be dedicated to specific functions or conditions throughout the control room in order for the code to elicit the expected operator response.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.5 Panel Labeling

7.5.6 Label Lettering

7.5.6-1 Character Height

Character height should subtend a visual angle of 15 minutes (the viewing distance multiplied by .004) as a minimum; a visual angle of 20 minutes (the viewing distance multiplied by .006) is preferred.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.5.6-2 Contrast

Colors should be chosen for maximum contrast against the label background.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.5.6-3 Character Selection

Labels should be prepared in capital letters with letters and numerals without flourishes or serifs.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.5.6-4 Character Width

Letter width-to-height ratio should be between 1:1 and 3:5. Numeral width-to-height ratio should be 3:5 except for the numeral "4," which should be one stroke width wider, and the numeral "1," which should be one stroke in width.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.5.6-5 Stroke Width

Stroke width-to-character height ratio should be between 1:6 and 1:8.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

7.5.6 Label Lettering

7.5.6-6 Spacing

The minimum space between characters should be one stroke width. The minimum space between words should be one character width. The minimum space between lines should be one-half of the character height.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

8.1 Labeling

8.1.1 Placement of Labels

8.1.1-1 Labeling of Equipment

Labels should appear on all components and systems with which operators may interact.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

8.1.1-2 Replacement of Labels

When labels are affixed, earlier markings (such as labels applied during construction or acceptance, or informal labels) should be removed.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

8.1.1-3 Viewing Direction

When equipment may be approached from more than one direction, labels should be placed on surfaces so that they are visible from each direction.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

8.1.1-4 Label Visibility

Identifying labels should be placed so that they are readily visible at typical viewing distances and orientations.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

8.1.1-5 Locator Labels

Readily visible markings should be placed nearby to indicate the location and identity of components that are partially blocked from view.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

8.1 Labeling

8.1.1 Placement of Labels

8.1.1-6 Label Orientation

Labels should be designed and mounted so that text is oriented horizontally for ease of reading.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

8.1.1-7 Label Positioning

Labels should be attached or positioned so as to unambiguously indicate the item being identified.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

8.1.1-8 Redundant Labels

When labels are placed on the doors of equipment cabinets, redundant labels should be placed inside so that they are visible when the door is open.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

8.1.1-9 Label Placement Conventions

Specific conventions for label placement should be employed for each type of equipment (e.g., valves, motors).

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

8.1.1-10 Label Mounting

Tags should be attached to components so as not to cause damage or interfere with operation.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

8.1 Labeling

8.1.1 Placement of Labels

8.1.1-11 Label Replacement after Maintenance

Maintenance procedures should require personnel to check that labels are in place after components are reassembled or replaced.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

8.1.1-12 Means of Label Attachment

Labels and tags should be securely attached in a manner appropriate to the equipment and environmental conditions.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

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8.1 Labeling

Page 8-4

8.1.2 Label Design

8.1.2-1 Label Material

The material from which labels and tags are made should be appropriate to the equipment and environmental conditions.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

8.1.2-2 Label Contrast

Lettering and background colors should provide high contrast and high legibility.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

8.1.2-3 Character Height

Characters used on labels should be sized to take into account viewing distances and illumination conditions.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

8.1.2-4 Stenciled Labels

Stenciled labels should not be used.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

8.1.2-5 Label Reflectance

Surfaces of labels should have a non-reflective (i.e., matte) finish.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

8.1 Labeling

8.1.3 Label Content

8.1.3-1 Label Information

Labels should contain concise, descriptive noun names along with alphanumeric system and component identification codes.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

8.1.3-2 Labeling Conventions

Labeling conventions should be employed to ensure consistency of plant labeling with drawings and procedures.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

8.1.3-3 Standard Label Format

The format of presentation (e.g., order, position) of information should be consistent on all labels.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

8.1.3-4 Abbreviations

Abbreviations used on labels should be standardized and easily recognized.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

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8.2 Indication

Page 8-6

8.2.1 Gauges/Meters

8.2.1-1 Design

The design of gauges and meters should conform to the relevant portions of Section 1.5.5.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

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8.2 Indication

Page 8-7

8.2.2 CRT Displays

8.2.2-1 Design

If CRT displays are employed, they should conform to the relevant portions of Section 1.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

8.2 Indication

8.2.3 Valve Position Indication

8.2.3-1 Alignment Marks

Alignment marks should be used to indicate open and closed status of important manual valves.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

8.2.3-2 Visibility of Position Indication

The location and size of the alignment marks should reflect the normal viewing distance, location, and ambient lighting.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

8.2.3-3 Indication of Full Open/Closed Positions

Alignment marks should show both the valve's fully open and fully closed positions.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

8.2.3-4 Design of Position Indication

Alignment marks should be located to minimize parallax error.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

8.2.3-5 Indication of Direction of Rotation

The direction of rotation for opening and closing of a valve control wheel should be indicated in cases where the direction is not obvious.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

8.2 Indication

8.2.3 Valve Position Indication

8.2.3-6 Precision of Indication

Alignment marks should be precise enough that the observers can tell when a valve is fully opened or closed.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

8.2.3-7 Alternate Means of Local Position Indication

Indicators that are activated by valve limit controls should be used for those valves when alignment marks would not be appropriate.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

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8.3 Control

Page 8-10

8.3.1 General

8.3.1-1 Design of Controls

The design and operation of controls should conform to the guidance in Section 3.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

8.3.1-2 Inadvertent Activation

Controls should be protected against inadvertent actuation.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

8.3.1-3 Suitability for Operator Use

The operation of controls should be compatible with the use of protective clothing, if it may be required.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

8.3 Control

8.3.2 Manual Valves

8.3.2-1 Operating Labels

Handwheels should be provided with double-ended arrows showing the direction of operations and labeled at each end to indicate the functional result (i.e., open and close).

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

8.3.2-2 Turning Aids

Knurling, indentation, high-friction covering, or a combination of these should be built into the handwheel to allow the application of maximum torque.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

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8.4 Communication

Page 8-12

8.4.1 Loudspeakers

8.4.1-1 Range of Coverage of Loudspeakers

Loudspeaker coverage should be such that members of the work force can be alerted under all plant conditions.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

8.4.1-2 Coverage Areas of Loudspeakers

Loudspeaker coverage should be provided in all areas where the work force may be.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

8.4.1-3 Locations and Amplitudes of Loudspeakers

Speakers should be placed within a space so that their number, location, and volume provide an intelligible signal to all workers therein.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

8.4.1-4 Echoes

Loudspeaker systems should not echo.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

8.4 Communication

8.4.2 Public Address/Pager Stations

8.4.2-1 Locations of Page Stations

Page stations should be located so that time required for access by personnel does not exceed 30 seconds.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

8.4.2-2 Shielding of Page Stations

Sound shielding should be provided where ambient noise levels exceed 90 dB(A).

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

8.4.2-3 Control of Page System

Design features or administrative controls should limit unauthorized or excessive paging.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

8.4.2-4 Variable Amplitude Speakers

A means of varying speaker amplitude should be provided when ambient noise levels may vary by more than 20dB.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

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8.4 Communication

Page 8-14

8.4.3 High Noise Areas

8.4.3-1 High Noise Environments

Communications equipment should conform to guidance in Section 6.2.1 relevant to high noise environments (i.e, Guidelines 6.2.1-5, 6.2.1-7, 6.2.1-9).

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

8.4.3-2 Portable Alerting Devices

Personal page devices should be provided and should be suitable for high-noise or remote areas.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

8.4.4 Two-Way Communication Systems Design Guidance

8.4.4-1 Capacity Requirements

A minimum of five communications channels should be provided to avoid excessive waiting for a free channel.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

8.4.4-2 Dedicated Emergency Circuits

Dedicated lines should be provided for frequent or emergency communications.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

8.4.4-3 Signal Characteristics

The signal transmission characteristics of the system should support good intelligibility.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

8.4.4-4 System Access Locations

System stations should be located so that time and effort required for access by personnel is not excessive and so that stations are in areas of relative quiet.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

8.4.4-5 Portable Communication Devices

Portable systems should be available to supplement installed systems.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

8.4.4 Two-Way Communication Systems Design Guidance

8.4.4-6 Radio Coverage

Surveys should be conducted to identify areas in which radio communication is not possible, e.g., "dead spots" or areas near sensitive equipment.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

8.4.4-7 Radio Repeaters

Radio repeaters should be installed to eliminate "dead spots" if radio communication with operators is relied upon.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

8.4.4-8 Use with Special Garments

Communication capability should be provided for personnel wearing protective clothing.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

8.4 Communication

8.4.5 Administrative Considerations

8.4.5-1 Training in Communications Practices

Communications training should be provided as a cost effective method of improving efficiency and reliability of communications.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return	Reason:

8.4.5-2 Periodic Surveillance Programs

Administrative programs should provide for periodic system surveillance.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return	Reason:

8.4.5-3 Intelligibility Tests

Determinations of speech intelligibility should be conducted for activities involving critical communications.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return	Reason:

8.4.5-4 Page System Capacity Upgrading

Multiplexing should be added where needed to expand the number of page-party channels.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return	Reason:

8.5 Environment

8.5.1 Temperature/Humidity

8.5.1-1 Outdoor Equipment

Equipment located outdoors should be sheltered from the elements as much as possible.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

8.5.1-2 Heat Stress

The level of physical activity and required protective clothing, as well as temperature and humidity, should be considered when assessing the danger of heat exposure posed to operators.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

8.5.1-3 Engineering Controls

Engineering controls should be applied where heat may impair the effectiveness or threaten the well-being of operators.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

8.5.1-4 Work Practices

Work practices should be adopted to minimize risk due to heat exposure which cannot be eliminated by engineering controls.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

8.5.1-5 Water Replacement

Water should be readily available in areas where the potential for heat stress exists.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

8.5.2 Noise

8.5.2-1 Hearing Protection

Ear protection devices should be available and required to be worn in areas where noise levels are 85 dB or more.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

8.5.2-2 Sound Attenuating Enclosures

When operators may be required to remain in high noise areas for extended periods of time, appropriate sound attenuating enclosures should be provided.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

8.5.2-3 Auditory Capabilities of Users

The hearing sensitivity of the work force should be monitored.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

8.5.2-4 Communications and Hearing Protection

Communication equipment in high noise areas should be compatible with ear protection devices.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

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8.5 Environment

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8.5.3 Lighting

8.5.3-1 Portable Lighting

Easily used, portable lighting devices should be readily available nearby when permanent lighting (normal or emergency) may be inadequate.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➤	Reason:

8.5 Environment

8.5.4 Accessibility

8.5.4-1 Permanent Means of Access

Permanent means of access to equipment requiring recurrent or emergency operation should be provided when it is beyond the normal standing reach of operators.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

8.5.4-2 Temporary Means of Access

Temporary or movable access platforms to equipment should be available when the equipment is located beyond the normal standing reach of operators and permanent access provision is not feasible.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

8.5.4-3 Formal Means of Access

Catwalks, ladders, and other formal means should be provided for operators to reach equipment.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

8.5.4-4 Sufficient Clearance

Sufficient clearance should be provided in the vicinity of equipment in contaminated or high temperature areas to allow operators easy access despite the use of protective garments and associated gear.

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

8.5.4-5 Impediments to Access

Access to equipment to be operated should not be impeded by structural elements.[AI]

☐	OK	Comment:
☐	Discrepancy	
☐	N/A	
☐	Return ➡	Reason:

GLOSSARY

Abbreviation: A shortened form of a word or phrase used for brevity.

Acknowledged alarm: An alarm is considered to be acknowledged when the operator has made some type of input to the alarm system (such as pressing a button) to indicate receipt of the alert or message provided by the alarm system. The act of acknowledging an alarm typically causes the attention-getting characteristics of its display to cease or decrease (e.g., the sound stops and the flashing display changes to a steady illumination).

Acknowledgment: Providing feedback to the sender that a message has been received.

Acronym: A word formed from the initial letter(s) of each of the successive or major parts of a compound term.

Activated alarm: The condition in which a monitored parameter exceeds a specified limit (setpoint), the deviation is evaluated by the processing portion of the alarm system, and a message is conveyed to the operator via the display portion of the alarm system (e.g., annunciators).

Active window: The window in which user is currently interacting with the system. Typically, this means that an active window (a) is currently receiving input from the user, (b) has last received input from the user, or (c) has been readied for input through the user's explicit action. The user is generally said to be "working in" the active window (such as processing a document, controlling a system, entering data). (See also inactive and closed windows).

Additive color process: Presentation of color images by the simultaneous selective projection of red, green, and blue light on a screen.

Addressing messages: Preparing header information to specify the destination for transmitting data.

Advanced alarm system: A primarily digital alarm system employing alarm processing logic and advanced control (e.g., on-screen controls) and display (e.g., VDU) technology. (This is in contrast to conventional alarm systems, which are largely based on analog instrument and control technologies.)

Advanced control room (ACR): A control room that is primarily based on digital technology. ACRs typically allow the primary operator to interact with the plant via computer-based interfaces, such as video display units. This is in contrast to "conventional" control rooms, which provide interaction via analog interfaces, such as gauges.

Alarm: The term alarm is used in the broad sense, i.e., a plant parameter, component, system, or function that is in a state requiring the attention of plant personnel. The alarm may be the result of exceeding a setpoint or value, or may result from the alarm processing system as in the case of alarm generation. As used here alarms contrast with annunciators in that they require the operator's attention. In a narrow sense, the term alarm is used to mean an attention-eliciting message given to plant personnel about an unspecified or potentially adverse deviation of a plant parameter, component, system, or function from its expected value or performance.

Alarm availability: The display processing method by which the results of alarm processing are made available to the operating crew. This relates to *which* alarms are made available to the operator rather than *how* they are

presented (which is referred to as alarm display). Three techniques are identified: filtering, suppression, prioritization.

Alarm display: The method(s) by which alarm coding and messages are presented to plant personnel.

Alarm generation processing: A class of alarm processing which includes techniques that analyze the existing alarms and, then based upon this, generate alarm messages which (1) give the operator higher level or combined information, (2) notify the operator when "unexpected" alarms occur, or (3) notify the operator when "expected" alarms do not occur.

Alarm message: Information presented to the operator by the auditory, visual, and other display devices of the alarm system in response to an alarm condition.

Alarm processing techniques: The rules or algorithms that are used to analyze plant sensor data to determine their importance, validity, and relevance, and determine whether an alarm message should be presented to the operator.

Alarm signal processing: The process by which signals from plant sensors are automatically evaluated. This process, which includes signal validation and other techniques, determines whether an alarm condition exists.

Alarm system: An automated system consisting of processing and display hardware and software, which processes or analyzes signals from plant sensors and alerts the operator via visual and/or auditory displays when monitored parameters deviate from specified limits (setpoints).

Alphabetic: Pertaining to a character set that contains letters and other symbols, excluding numbers.

Alphanumeric code: A set of letters and/or numbers used to identify a group of data (e.g., in a table).

Alphanumeric: Pertaining to a character set that contains letters, digits, and usually other symbols, such as punctuation marks.

Annunciator: An indicator of the status of a plant parameter, component, system, or function that does not necessarily require the attention of plant personnel. When such attention is required, an alarm condition exists. In conventional plants, the term annunciator is used to refer to the spatially dedicated display portion of an alarm system.

Applicant: An organization, such as a nuclear plant vendor or utility, that is applying to the U.S. Nuclear Regulatory Commission for design certification or plant licensing.

Audio: Pertaining to acoustic, mechanical, or electrical frequencies corresponding to normally audible sound waves.

Auditory: Pertaining to the sense of hearing.

Automatic mode: A mode in which processing proceeds without human intervention (as contrasted with interactive and manual modes).

Bar chart: A graphic figure in which numeric quantities are represented by the linear extent of parallel lines (or bars). Bar graphs are useful for showing a comparative measure for separate entities or for a variable sampled at intervals. A graphic means of comparing numbers by rectangles with lengths proportional to the numbers represented.

Binary: (1) Pertaining to a characteristic or property involving a selection, choice, or condition in which there are two possibilities. (2) Pertaining to the number representation system with two values.

Blackboard (also called darkboard): An alarm display in which the medium is dark (not illuminated) if all monitored plant parameters are in the normal range. Thus, an illuminated alarm-display device indicates a deviation from normal plant conditions. This is in contrast to many conventional alarm systems which employ display devices to indicate both normal and abnormal changes in plant condition.

Blank: Containing no data; a non-printing graphic character used to separate data; a space for the entry of data.

Buffer: A file or device that temporarily stores data.

Button: A type of hardware control device or a defined control region on the display screen which, when selected, causes some action.

Cancel: A capability that regenerates (or re-initializes) the current display without processing or retaining any changes made by the user.

Category: A grouping of data values along a dimension defined for operational purposes.

Cathode ray tube: An electronic vacuum tube, such as a television picture tube, that can be used to display textual information and/or graphics. Typically abbreviated "CRT."

Caution signal: A signal which alerts the operator to an impending condition requiring attention, but not necessarily immediate action (See warning signal).

Character set: A set of unique representations called characters; e.g., the 26 letters of the English alphabet, and the 128 characters of the ASCII alphabet.

Character width: The horizontal distance between a character's origin (a point on the base line used as a reference location) and the next character's origin.

Character: A letter, digit, or other symbol that is used as part of the organization, control, or representation of data.

CIE distance: Difference between colors expressed as a distance in a three-dimensional color space which is based on the response of the human eye to light of different wavelengths.

Clear: A system function which removes the current selection but does not put it into the temporary buffer. A copy is retained, accessible immediately by the Undo command. To place one or more storage locations into a prescribed state, usually press zero or the space character.

Cleared alarm: An alarmed parameter that has returned from an alarmed state to its normal range. Some alarm systems generate alarm messages when the parameter enters the normal range. The operator may be required to acknowledge the alarm in order to "clear" it.

Click: An input device "button-down" action (e.g., depressing and releasing the button on a mouse or trackball) for the actual entry (enabling, activation) at a designated position. This action is distinct from cursor positioning. Also, the auditory feedback from keyboard entry.

Closed window: A window which is not visible and which requires some action by the user to gain perceptual and functional access. For example, a user may select and open an icon that represents a window or, in contrast, might input a command to open a specific window. (See also active and inactive windows).

Coding: Use of a system of symbols, shapes, colors or other variable sensory stimuli to represent specific information. Coding may be used (a) for highlighting (i.e., to attract a user's attention to part of a display), (b) as a perceptual indicator of a data group, or (c) to symbolize a state or attribute of an object (e.g., to show a temperature level or for warning purposes).

Cognitive error: A human error that results from the characteristics of human information processing such as errors in diagnosis due to information overload.

Color: The aspect of objects or light sources which may be described in terms of hue, lightness (or brightness), and saturation.

Column: A vertical arrangement of items.

Command: The act of instructing the computer or system to perform an action.

Command language: A type of dialogue in which a user composes entries, possibly with minimal prompting by the computer.

Component: An individual piece of equipment such as a pump, valve, or vessel; usually part of a plant system.

Concatenation: (1) The process of linking data together. (2) A set of logically related items which are treated as a whole.

Context definition: Displaying an indication of previous user actions or computer processing that will affect the results of current actions, to help a user predict how the system will respond.

Continuous: Marked by uninterrupted extension in space, time, or sequence.

Contrast: Diversity of adjacent parts in color and intensity.

Contrast ratio: The measured luminance at one point divided by the measured luminance at another, equal to L_t/L_b , $(L_s-L_b)/L_b$, or $(1+L_s)/L_b$, where:

L_t = total luminance, or luminance of the image in the presence of background;

L_s = luminance of the symbol without background (luminance emitted by CRT in the case of CRT displays);

Lb = luminance of background.

Contrast ratio, rather than contrast, is often specified by display manufacturers because it is numerically larger (by one) than contrast.

Control: A mechanism used to regulate, and/or guide the operation of a component, equipment, subsystem, or system.

Control Entry: User input for sequence control, such as function key activation, menu selection, command entry.

Controlling transmission: The process of ensuring that data which are sent are saved until they can be delivered or returned to the sender.

Conventional alarm system: A primarily analog-based alarm system employing little or no alarm display processing logic and using conventional control (e.g., pushbutton) and display (e.g., annunciator tiles) technology. (This is in contrast to advanced alarm systems).

Copy: A system function that puts a duplicate of the selection into the temporary editing buffer without disrupting the original data.

Critical tasks: Tasks that must be accomplished in order for personnel to perform their functions. In the context of probabilistic risk assessment, critical tasks are those that are determined to be significant contributors to plant risk.

CRT: A cathode ray tube, i.e., an electronic vacuum tube, such as a television picture tube that can be used to display textual information and/or graphics.

Cursor: A display graphic that is used to indicate the position of the user's operation on the display (such as an arrow or flashing bar).

Cut: A system function that removes the current selection from the screen and puts it into the temporary editing buffer, replacing the buffer's previous contents. Cut may be used to either delete or to move a selection.

Darkboard (also called blackboard): An alarm display in which the medium is dark (not illuminated) if all monitored plant parameters are in the normal range. Thus, an illuminated alarm-display device indicates a deviation from normal plant conditions. This is in contrast to many conventional alarm systems which employ display devices to indicate both normal and abnormal changes in the plant's condition.

Data: The raw materials from which a user extracts information. (A user can be a human or another component of the system, such as an expert system.) Data may include numbers, words, and/or pictures.

Data display: Output of data from a computer to its users. Generally, this phrase denotes visual output, but it may be qualified to indicate a different modality, such as an "auditory display".

Data entry: User input of data for storage in, and/or processing by, the system.

Data item: A set of characters of fixed or variable length that forms a single unit of data. Sometimes a data item might contain only a single character. Data items may be entered by a user or may be displayed by the system.

Data protection: Functional capabilities that guard against unauthorized access to and tampering with data, and data loss due to user errors or computer failure.

Data transmission: Computer-mediated communication among system users, and also with other systems.

Data validation: Functional capabilities that check data entry items for correct content or format, as defined by software logic.

Database: A structured set of data, manipulated using a data management system.

De-emphasis: The inverse of pre-emphasis, employed for the purposes of restoring original vowel-consonant amplitude relationships in pre-emphasis speech; primarily useful in maintaining the "natural" sound quality.

Decibel (dBA): Sound level in decibels, measured using A-weighting. The use of A-weighting causes the frequency response of the sound level meter to mimic that of the human ear, i.e., response is maximum at about 2kHz, less at very low or very high frequencies. A-weighted measurements correlate well with measures of speech interference and judgements of loudness.

Default: A value or setting that is used if no alternative is specified. Assumed unless specifically overridden. Defaults represent predetermined, frequently used, values for data or control entries intended to reduce entry actions required from the user.

Demarcation: The technique of circumscribing functional or selected groups of controls and displays with a contrasting line to emphasize their relatedness.

Density: (Screen Density) The amount of the display screen that contains information; often expressed as a percentage of the total area.

Diagram: A special form of a picture in which details are only shown if they are necessary to perform a task. For example, an electrical wiring diagram for a facility would show wiring but not necessarily furniture or plumbing.

Dialogue: A structured series of interchanges between a user and a computer. A dialogue can be initiated by a computer (e.g., question and answer) or by a user (e.g., command language).

Digitizing tablet: (Graphics Tablet) Device used to convert an image into digital code drawing or tracing with a pen-like or puck-like instrument. The instrument is moved across the tablet and a series of X-Y coordinates is generated.

Dimension: A scale or categorization along which data may vary, taking different values at different times.

Direct manipulation: The user manipulates symbols in the display by directly interacting with the symbol. The direct manipulation is generally performed by using a display structure, such as a pointer, and a cursor control device, such as a mouse.

Direct manipulation control: Defined by the close temporal and physical relations between the movement of the control device and the cursor, or other screen-based follower (e.g., an icon or a window). Direct manipulation

control devices include the mouse, the trackball, and pointer. In general, such devices permit the user to move it and to use the cursor to select a display structure (e.g., by clicking on a button on the device).

Direction: (1) Explicit instruction. (2) Guidance or supervision of action or conduct. (3) The line or course on which something is moving, aimed, pointing, or facing.

Discrete: Consisting of distinct or unconnected elements.

Display: A specific integrated, organized set of information. A display can be an integration of several display formats (such as a system mimic which includes barcharts, trend graphs, and data fields).

Display control: Procedures by which a user can specify what and/or how data are shown.

Display device: The hardware used to provide the display to users. Examples include video display units and speakers for system messages.

Display elements: The individual components of a display, including labels, abbreviations, acronyms, icons, symbols, numbers, color, graph lines, coding, and highlighting.

Display format: Methods of data presentations, such as trend plots, bar charts, graphs, and tables.

Display selection: Refers to the specification of data outputs, either by a user or automatically.

Display structure: Functional or information-presenting aspects of a display that are consistent in appearance and use across applications, e.g., providing reference to the user's location in an information system and display of control options available.

Display tailoring: Designing displays to meet the specific task needs of a user, rather than providing a general display which can be used for many purposes.

Dot matrix: A rectangular array of dots or lights from which characters are built.

Drag: The act of moving a follower (such as a cursor) or selected icon through parts of a display (typically using a direct manipulation device such as a mouse).

Dynamic: Marked by continuous activity or change.

Dynamic display: Contains screen structures which change one or more feature(s), e.g., numerical value, color, shape, or spatial location, in real time or near real-time.

Enter: An explicit user action that affects computer processing of user entries. For example, after typing a series of numbers, a user might press an ENTER key that will add them to a database, subject to data validation.

Enter key: Key used to indicate completion of data entry for current field or record.

Entry: (1) The act of inputting information to the system. (2) Something which has been entered.

Excerpt file: A file which allows the user to move data from one location to another; it differs from a temporary editing buffer in that the excerpt file can be saved. Data can be appended to or interleaved into the existing contents of the excerpt file.

Existing alarm (also called steadied): An acknowledged alarm which has not yet cleared.

Extinguished alarm (also called reset alarm): An alarm that has returned to an inactive state (e.g., the plant parameter has returned to the normal range and all associated alarm messages have been acknowledged by the operator).

Feedback: System or component response (e.g., visual or aural) which indicates the extent to which the user's desired effect was accomplished. Feedback can be either intrinsic or extrinsic. Intrinsic feedback is that which the individual senses directly from the operation of the control devices (e.g., clicks, resistance, control displacement). Extrinsic feedback is that which is sensed from an external source that indicates the consequences of the control action (e.g., indicator lights, display changes, aural tones).

Field: An area of the display screen reserved for the display of data or for user entry of a data item. In a database, a specified area used for a particular category of data, for example, equipment operational status.

Field label: A displayed word or phrase that identifies the data display or entry field.

File: A collection of data which is treated as a single unit, e.g., such as that stored in the computer.

Filtering: An alarm display processing technique which may eliminate alarm messages that are irrelevant, less important, or otherwise unnecessary. These alarm messages are not available to the operators. (This is in contrast to suppression which does not make the alarm messages immediately available but does allow the operator to retrieve them.)

First-out alarm: An alarm message which indicates the initial change in parameter responsible for reactor and/or turbine trips.

Fixed form: Pertaining to a mode of input in which the user is presented with a set of blanks to be filled in.

Fixed format: An unchanging description of specification of information content in a particular area.

Fixed function key: Key which has a function that cannot be changed by the user or system and that remains constant between applications.

Flowchart: A diagram that illustrates sequential relations among elements or events. Flowcharts are often shown as boxes connected by arrows.

Follower: The on-screen symbol (such as a cursor and arrow pointer) that responds to the movement of computer input devices (such as a cursor key, mouse, trackball, and lightpen).

Form: A dialogue technique which presents category labels and requires the user to fill in the blanks. A formatted output to the user with blank spaces for inserting required or requested information.

Format: The arrangement of data.

Formatting: The process or act of arranging data.

Frequency modulation: Sinusoidal variation of the frequency of a tone around a center frequency.

Frequency: Rate of signal oscillation in cycles per second (Hz or Hertz).

Function: (1) A software supported capability provided to a user to aid in performing a task. (2) An action that is required to achieve a desired goal. Safety functions are those functions that ensure higher-level objectives and are often defined in terms of a boundary or entity that is important to maintaining plant integrity and preventing the release of radioactive materials. A typical safety function is "reactivity control." A high-level objective, such as preventing the release of radioactive material to the environment, is one that designers strive to achieve through the design of the plant and that operators strive to achieve through its proper operation. The function is often described without reference to specific plant systems and components or the level of human and machine intervention that is required to carry out this action. Functions are often accomplished through some combination of lower-level functions, such as "reactor trip." The process of manipulating lower-level functions to satisfy a higher-level function is defined here as a control function. In allocating function the control function is assigned to human and machine elements.

Function allocation: The distribution of functions among the human and automated constituents of a system.

Function analysis: The examination of system goals to determine what functions they require. Also, examination of the required functions with respect to available workers, technology, and other resources, to determine how the functions may be allocated and executed. In NUREG-0700, primarily the identification of established functions and examination of how they are allocated and executed.

Function areas: Specific screen or panel locations that are reserved for specific purposes.

Function key: A key whose activation will affect a control entry. Detection of the signal usually causes the system to perform some predefined function for the user.

Gloss: The extent to which light incident on a surface at angle x is reflected from that surface at angle $-x$ (minus x) relative to a line perpendicular to the surface. A mirror has maximum gloss.

Gloss instrument: A device that measures reflected light as a function of illumination and angle of view. The angle for which gloss is measured is typically 60 degrees.

Graph: A display that represents the variation of a variable in comparison with that of one or more other variables.

Graphic element: A component part of a graphic display, such as a line, a circle, or a scale.

Graphic interaction: A dialogue in which the user selects displayed control elements by pointing or by other direct manipulation.

Graphical display: A display which provides a pictorial representation of an object or a set of data. Graphical displays include line, solid object, and perspective drawings; bar, pie, and line charts and graphs; scatterplots; displayed meters; flowcharts and schematic diagrams.

Graphics: Data specially formatted to show spatial, temporal, or other relations among data sets.

Graphics tablet: (Digitizing Tablet) Device used to convert an image into digital code by drawing or tracing with a pen-like or puck-like instrument. The instrument is moved across the tablet and a series of X-Y coordinates is generated.

Grid: A network of uniformly spaced horizontal and vertical lines for locating points by means of coordinates.

Group: A set of items.

Grouping: (1) Locating alarm messages that are related to a common function or system in one area of a display.
(2) The act or process of combining in groups.

Hardcopy: A printed copy of computer output in a readable form; for example, printed process displays an alarm listing.

Help: Information provided to guide the user in operating the system or displayed at the user's request for on-line guidance.

Hierarchical branching: A method of structuring menu items that are hierarchically related which allows selection among alternatives without requiring the opening and closing of a series of menus; the entire hierarchy is contained in one menu.

Hierarchy: The designated order or rank of items; a series of items which are classified by rank or order.

Highlight: A means of directing the user's attention to a feature of the display. Highlighting methods include image reversal (reverse video), brightness/boldness contrast, color, underlining, blinking, flashing arrows, and changes in font. Emphasizing displayed data or format features in some way, e.g., by using underlining, bold, or inverse video.

Histogram: A type of bar chart used to depict the frequency distribution for a continuous variable. The variable may be grouped into classes.

Human-centered design goals: Goals of human-factors engineering design that address the cognitive and physical support of personnel performance.

Human engineering discrepancy (HED): A departure from some benchmark of system design suitability for the roles and capabilities of the human operator. This may include a deviation from a standard or convention of human engineering practice, an operator preference or need, or an instrument/equipment characteristic that is implicitly or explicitly required for an operator's task but is not provided to the operator.

Human factors engineering (HFE): The application of knowledge about human capabilities and limitations to the design of a plant, system, and equipment. HFE ensures that such designs, human tasks, and work

environment are compatible with the sensory, perceptual, cognitive, and physical attributes of the personnel who operate, maintain, and support it (See human factors).

Human factors: A body of scientific facts about human characteristics. The term covers all biomedical, psychological, and psychosocial considerations; it includes, but is not limited to, principles and applications in the areas of human factors engineering, personnel selection, training, job performance aids, and human performance evaluation (See human factors engineering).

Human-system interface (HSI): The means through which personnel interact with the plant, including the alarms, displays, controls, and job-performance aids. Generically, this also includes maintenance, test, and inspection interfaces.

Icon: Pictorial, pictographic, or other nonverbal representation of objects or actions.

Identification: A code number or code name which uniquely identifies a record, block, tile, or other unit of information.

Identifier: A symbol whose purpose is to identify, indicate or name a body of data.

Inactive window: Windows perceptually and functionally available to the user (the user may be able to see and obtain information from them) but not immediately available in the sense that the user must activate an inactive window before working in it. (See also active and closed windows).

Index: To prepare an ordered reference list. An ordered reference list of the contents of a file or document, together with keys or reference notations to identify or locate those contents.

Information: Organized data that users need to successfully perform their tasks. Information can include (a) a representation of facts, concepts, or instructions in a formalized manner suitable for communication, interpretation, or processing by humans or automatic means; and (b) any representations, such as characters or analog quantities, to which meaning is, or might be, assigned.

Initiating transmission: The process of actually sending a command, message, or data file. Transmission can either be initiated by the computer, or by a system user.

Input: (1) Information entered into a system for processing. (2) The process of entering information. (3) Pertaining to the devices that enter information.

Input/output: (1) Pertaining to either input or output, or both. (2) A general term for the equipment used to communicate with a computer, commonly called I/O. (3) The data involved in such communication. (4) The media carrying the data for input/output.

Insert mode: A data entry mode which allows the user to insert new information within existing information. If the cursor is placed within existing information, old characters are moved forward to allow insertion of the new characters.

Interactive graphics: A mode of input in which the user is graphically (e.g., by plot, histogram) presented data from which to choose. Once an input has been so selected, the user may interact with the system to correct or refine the data.

Interactive mode: A processing mode in which the user is assumed to be available to the system for inputs or decision making. The user submits one input at a time to the system and each input is processed by the system as soon as possible (as contrasted with manual and automatic modes).

Interface: A shared boundary. The point at which a user and the system interact. An interface might be a hardware component to link two devices or it might be a portion of storage or registers accessed by two or more computer programs.

Interrupt: Stopping an ongoing transaction to redirect the course of the processing. Examples of interrupt options are BACKUP, REVIEW, CANCEL, RESTART.

Joystick: A stick-type control device that can provide continuous cursor control in any direction on a display screen.

Justification: The act of adjusting, arranging, or shifting digits to the left, right, or center to fit a prescribed pattern.

Keystroke: The act of striking a key.

Keystroke command: A single or limited number of keystrokes that define a command. The keystrokes are often initiated by simultaneously pressing a key that signals a keystroke command and the first letter of a one word command. Another version of the keystroke command is the function key.

Keyword: A word exemplifying the meaning or value of the data: (a) one of the significant, informative words in a title or document that describes the content of that document; (b) a symbol that identifies a parameter; or (c) a part of a command operand that consists of a specific character string.

Label: Descriptor that is distinguishable from, and helps to, identify displayed screen structures or components.

Large-screen display: A large display which can be viewed from multiple workstations and locations in a control room. It typically contains important information which should be commonly available to control room crew members.

Layered windows: Layered windows (in contrast to tiled windows) refer to the on-screen positioning of multiple windows so that windows can overlap and may obscure the contents of the covered windows

Left justified: The left-hand digit or character (or its sign) occupies the left-hand position of the space allotted for that data.

Legend: (1) The textual content of a continuously present, spatially dedicated alarm display. (2) An explanatory list of symbols or highlighting used on a graph, chart, diagram, or map.

Legibility: The quality of a display that allows groups of characters and symbols to be easily discriminated and recognized.

Lightpen: A pencil- or pen-like control device which interacts with the computer system through the display device screen either by emitting or sensing light.

Local control station (LCS): An operator interface related to nuclear power plant (NPP) process control that is not located in the main control room. This includes multifunction panels, as well as single-function LCSs, such as controls (e.g., valves, switches, and breakers) and displays (e.g., meters) that are operated or consulted during normal, abnormal, or emergency operations.

Location: A position or site occupied or available for occupancy.

Macro-command: A group of a series of commands redefined as a single command.

Main menu: A top level menu displayed upon entry into the system.

Manual mode: A processing mode in which the user is assumed to provide all inputs (as contrasted with interactive and automatic modes).

Matte: A surface that scatters incident light nearly equally in all directions; a surface that lacks gloss.

Medium: The material, or configuration thereof, on which data are recorded, for example, paper tape, cards, magnetic tape.

Menu: A type of dialogue in which a user selects one item out of a list of displayed alternatives. Selection may be made by actions such as pointing and clicking and by depressing an adjacent function key.

Menu bar: A specialized function area that displays categories of alternatives of user responses.

Menu selection: A type of dialogue in which a user selects one item out of a list of displayed alternatives, whether the selection is by pointing, by entry of an associated option code, or by activating an adjacent function key.

Message: (1) Alarm information displayed in text. (2) Data that are transmitted from another user or from the system.

Message area: A specialized function area for communication from another user or from the system.

Mimic: A display format combining graphics and alphanumerics used to integrate system components into functionally oriented diagrams that reflect component relationships.

Mockup: A static representation of an HSI (See simulator and prototype).

Mode: A state of operation in which the system operates in specific, unique ways or has specific, unique characteristics.

Mode editor: A text editing system in which the interpretation of the same user input varies depending whether the system is in entry mode or edit mode. Specifically, in a mode text editor the user must enter special commands to cause subsequent inputs to be entered either as text or as editing commands.

Modeless editor: A text editing system in which the interpretation of the same user input does not vary; ordinary characters are entered as text, and commands are invoked using special keys.

Monitor: The physical device housing the electronics, display, and display controls for an interactive computer system (See also video display unit).

Mouse: A control device whose movements across a flat surface are converted into analogous movements of the cursor across the screen.

Multitasking: The parallel performance of two or more tasks.

N-key rollover: A feature of a keyboard input system that stores keystrokes and generates the corresponding characters in the correct sequence despite more than one key being depressed at the same time (as in very rapid typing).

Natural language: A type of dialogue in which users compose control entries in a restricted subset of their natural language, e.g., English.

New alarm: An unacknowledged (unsilenced) alarm.

Non-disruptive: An action that does not interfere with the ongoing activities of the system or user.

Nuisance alarm processing: A class of alarm display processing which includes techniques that essentially eliminate alarm messages which have no operational significance to current plant conditions. For example, mode dependent processing eliminates alarms that are irrelevant to the current mode of the plant, e.g., a low temperature or pressure signal which is an alarm condition in normal operation mode but is expected and normal during startup or cold shutdown.

Numeric: Pertaining to numerals or to representation by means of numerals.

Objects: Distinct information whose representation can be displayed and/or manipulated as a single entity. Objects are normally represented by graphic icons and/or names.

Open window: Windows which are both perceptually and functionally available to the user. Two types of open windows exist: active and inactive. (See also window)

Open/closed: When a window is opened it appears on the screen. Windows may be closed (removed from the screen) and reopened.

Operand: That which is operated upon. Information entered with a request to define the data in which the processor is to operate and control the execution of the processor.

Operation: (1) A defined action, namely, the act of obtaining a result from one or more operands in accordance with a rule that completely specifies the result for any permissible combination of operands. (2) The set of such acts specified by such a rule, or the rule by itself.

Operator: Any individual in a facility who manipulates a control or directs another to manipulate a control.

Optical reader: A device that reads handwritten or machine printed symbols into a computing system.

Output: The data which are the product of an information handling operation or series of operations; the data emitted from a storage device; the data being transferred from primary storage (core, drum) to secondary storage (cards, tape); electrical pulses; reports produced by a printer or typewriter unit; a general term for output media such as cards and tape. Contrasts with Input.

Page: (1) The data appearing at one time on a single display screen. (2) A fixed-length block of data, especially that which fits into a printed record or screen. (3) To summon a particular page or the next logical page.

Paging: A method of viewing and moving through data in which a user conceives data as being grouped into display-sized pages and moves through it by discrete steps. Also, to summon by calling out by name.

Panel: The front face of an assembly, normally used for mounting controls and displays.

Parallax: The apparent change in the relative position of objects at different distances from the observer as the observer's position changes.

Parameter: (1) A power-conversion process variable or quantity that can assume any of a given set of physically feasible values. Plant parameters are typically measures of the performance of systems and processes of the plant, e.g., the parameter T_{hot} is a measure of the temperature of reactor coolant that has passed through the reactor core. (2) A variable that is measured.

Paste: A system function that puts the contents of the temporary editing buffer (a selection previously cut or copied) at the insertion point of the current interactive window. The buffer contents are not altered by this operation.

Peak-clipping: A technique for controlling amplitude relationships in speech by limiting the instantaneous peak-amplitudes to improve its intelligibility, usually followed by amplification of the signal to increase the amplitude of the clipped peaks to their original level, with a proportional increase of the weaker speech sounds.

Performance-shaping factors (PSFs): Factors that influence human reliability through their effects on performance. PSFs include factors such as environmental conditions, HSI design, procedures, training, and supervision.

Personal safety: Relates to the prevention of individual accidents and injuries of the type regulated by the Occupational Safety and Health Administration.

Pictographic: Pertaining to a picture-like representation of an object.

Pie charts: A circle divided into sections (as pieces of a pie) to represent graphically the relative proportions of different parts of a whole. A circular chart cut by radii into segments illustrating magnitudes or frequencies.

Plant: The operating unit of a nuclear power station including the nuclear steam-supply system, the turbine, electrical generator, and all associated systems and components. In the case of a multi-unit plant, the term plant refers to all systems and processes associated with the unit's ability to produce electrical power, even though some systems or portions of systems may be shared with the other units.

Plant safety: Also called "safe operation of the plant." A general term used herein to denote the technical safety objective as articulated by the International Nuclear Safety Advisory Group of the International Atomic Energy Agency (IAEA) in the "Basic Safety Principles for Nuclear Power Plants" (IAEA, 1988): "To prevent with high confidence accidents in nuclear plants; to ensure that, for all accidents taken into account in the design of the plant, even those of very low probability, radiological consequences, if any, would be minor; and to ensure that the likelihood of severe accidents with serious radiological consequences is extremely small." See Section 1.4 for additional discussion.

Pop-up Menu: A menu whose items are normally "hidden" from the user's view until they are activated or brought into full view by a complete selection action. Pop-up menus remain visible until the user takes another action to hide the menu or make a selection.

Position: In a string, each location that may be occupied by a character or binary digit, and may be identified by a serial number.

Position designation: User selection and entry of a position on a display, or of a displayed item. (See also cursor).

Pre-emphasis: Systematic distortion of the speech spectrum to improve intelligibility of the sound by attenuating the low-frequency components of vowels (relatively unimportant for intelligibility) and proportionately increasing the amplitude of high-frequency vowel components and consonants (highly important for intelligible speech transmission).

Precision: The degree of discrimination with which a quantity is stated. For example, a three-digit numeral discriminates among 1000 possibilities.

Preparing messages: Includes specification of contents, format, and header information.

Print queue: An area of computer memory that temporarily stores a file to be printed so that the user can continue interacting with the system while the file prints.

Printer: A device that writes output data from a system on paper or other media.

Prioritization: A class of alarm-display processing that presents alarm messages to the operator according to an evaluation of importance, often using 2 to 4 categories of priority. The intent of this approach is to help the operators focus attention on the most important alarm conditions when there are multiple alarm conditions.

Processing: The execution of a systematic sequence of operations.

Programmable function keys: User programmable keys whose function may vary between applications or between users within an application.

Prompting: The process or act of assisting by suggestion.

Prototype: A dynamic representation of an HSI that is not linked to a process model or simulator (See simulator and mockup). A model of an interface which includes the functions and capabilities expected in the final system, though not in a finished form.

Pull-down menu: A menu whose items are normally hidden from the users view and accessed by the user holding the selection button down over the desired menu-bar label.

Question and answer: A type of dialogue in which a computer displays questions, one at a time, for a user to answer.

Queue: A waiting line or list formed by items in a system waiting for service; for example, tasks to be performed or messages to be transmitted in message switching system.

Record: A group of related data fields that are operated on as a single entity in a database.

Redundant alarm processing: A class of alarm-display processing which includes techniques that evaluate active alarm conditions to identify those that are true/valid but are redundant with other active alarm conditions. This processing filters, suppresses, or reduces the priority of alarm messages that have been determined to be of less importance because they provide information that is redundant with other existing alarm conditions and theoretically provide no new/unique information to the operator. For example, in causal-relationship processing, alarm messages associated with "causes" are displayed prominently, while alarm messages associated with "consequences" are eliminated or lowered in priority.

Reflash: A method of alarm presentation that can be implemented any time an alarm condition is based on input from more than one plant parameter. Reflash causes an alarm display to re-enter the new alarm state when an associated plant parameter reaches its setpoint. The alarm display cannot return to normal until all related parameters return to their normal ranges.

Rejection level: The minimum level of certainty (represented by a number) required by a speech recognition system for a spoken command to be executed.

Remote: Acting on or controlling indirectly from a distance.

Request: A user input specifying the operation(s) to be performed.

Response time: The time between the submission of an item of work to a computing system and the return of results.

Retrace: A capability that returns a user to the last previous display in a defined transaction sequence (also called "backup").

Retrieval: The act, method, or procedure for recovering stored data.

Review: A capability that returns a user to the first display in a defined transaction sequence, while retaining any entries made by the user.

Right justified: To adjust the printing positions of characters on a page so that the right margin of the page is regular. To shift the contents of a register so that the least significant digit is at some specified position of the register.

Ringback: An alarm display feature that provides a distinct cue such as a slow flash or audible tone to indicate that an alarm condition has cleared, i.e., the monitored parameter(s) has returned to its normal range.

Row: A horizontal arrangement of characters or other expressions.

Safety evaluation: The NRC process of reviewing an aspect of an NPP to ensure that it meets requirements and that it will perform as needed to reliably ensure plant safety.

Safety function: A process or activity that must occur to achieve a safety goal such as preventing the release of radioactive material into the environment. Safety functions are often defined in terms of a boundary or entity that is important to plant safety, such as • reactivity control." The safety function is often described without reference to specific plant systems and components or the level of human and machine intervention that is required to carry out the function such as • provide core cooling."

Safety goal: A high-level objective such as, • Preventing the release of radioactive material to the environment" which designers strive to achieve through the design of the plant, and which plant operators strive to achieve through its safe operation.

Safety issue: An item identified during plant design, operation, or review that has the potential to affect the safe operation of the plant.

Safety-related: A term applied to those NPP structures, systems, and components (SSCs) that prevent or mitigate the consequences of postulated accidents that could cause undue risk to the health and safety of the public (see Appendix B to Part 50 of Title 10 of the *U.S. Code of Federal Regulations*). These are the SSCs on which the design-basis analyses of the safety analysis report are performed. They also must be part of a full quality assurance program in accordance with Appendix B.

Scale: A graduated series or scheme of rank or order.

Scaling: The positioning of displayed data elements with respect to a defined measurement standard.

Scatterplot: A scaled graph which shows relations among individual data points in a two- dimensional array.

Screen: The software-controlled visual interface of a monitor, e.g., the display surface of a CRT.

Screen dump: An action, usually performed with a keystroke sequence, that causes the exact contents of the current screen display to be captured for printing or storage in a file.

Screen structure: A generic display element, such as a menu bar or title.

Scroll: To move data being viewed in a line-by-line manner; to roll upward or downward.

Scrolling: An orientation for display framing in which a user conceives of data as moving behind a fixed display frame. The opposite of panning.

Selecting: A user's action of identifying display elements to the computer to ready them for use in some way (e.g., to open a valve by an input device click on a graphic representation of a valve).

Sequence: An arrangement of items according to a specified set of rules.

Sequence control: Logic and means by which user's actions and computer responses are linked to become coherent transactions.

Setpoint: The value of a monitored parameter which defines the boundary between the parameter's normal range and an alarm condition. An alarm condition exists when the parameter exceeds the normal range that is defined by the upper and/or lower limit setpoints. Graded alarms may have multiple setpoints outside the normal range that produce alarms that indicate increasing levels of severity of the abnormal condition, such as Low Level, or Low-Low Level.

Shared alarm: An alarm condition that is defined by the activation of one or more of a set of different process deviations. An example of a shared alarm is a "reactor coolant system trouble" message which may be displayed when any one of the reactor coolant pumps malfunctions. An individual alarm message associated with the particular malfunctioning reactor coolant pump may also be displayed in addition to the former message.

Should and may: The word "should" is used to denote a recommendation; the word "may" is used to denote permission, neither a requirement nor a recommendation.

Signal validation: A set of alarm processing techniques by which signals from redundant or functionally related sensors are compared and analyzed to determine whether a true alarm condition exists. The purpose of these techniques is to prevent false alarms being presented to the operator due to malfunctioning plant instrumentation, such as a failed sensor.

Significance processing: A class of alarm display processing which includes techniques that evaluate active alarm conditions to identify those that are true/valid but are of less operational significance than other active alarm conditions. This processing filters, suppresses, or reduces the priority of alarm messages that have been determined to be of less importance. For example, in an anticipated transient without scram event, alarms associated with minor disturbances on the secondary side of the plant are eliminated or lowered in priority.

Simulator: A facility that physically represents the HSI configuration and that dynamically represents the operating characteristics and responses of the plant in real time (See prototype and mockup).

Situation awareness: The relationship between the operator's understanding of the plant's condition and its actual condition at any given time.

Spacing: The distance between any two objects.

Spatially focused, variable location, serial display: A display where alarms are presented in no fixed location and according to some logic, such as time or priority. Usually, the same display device can be used to present many different alarms (in contrast with SDCV display where a given location presents only one alarm). A scrolling message list is an example of this type of display.

Spatially-dedicated, continuously visible (SDCV) alarm display: An alarm display which is in a spatially dedicated position and is always visible whether in an alarmed or cleared state. Conventional alarm tiles are an example of an SDCV alarm display.

Specular reflectance: The light incident on a surface at angle x that is reflected at angle $-x$ (minus x).

Speech display: Speech messages (either computer-generated or a recorded human voice) conveyed to the operating crew through audio devices, such as speakers and headsets.

Speech recognition: Permits a user to provide spoken input which a computer interprets as data or commands.

State-of-the-art human factors principles: Those principles currently accepted by human factors practitioners. "Current" is defined with reference to the time at which a program management or implementation plan is prepared. "Accepted" is defined as a practice, method, or guide that (1) is documented in the human factors literature within a standard or guidance document that has undergone a peer-review process or (2) can be justified through scientific research and/or industry practices.

Status information: Information pertaining to system status which is displayed to a user either automatically or by user's request.

Steadied: An alarm which has been acknowledged.

Storage: Any device on which data can be entered, held, and retrieved. The act of storing data on such a device.

String: A linear sequence of entities such as characters or physical elements.

Stroke width: The width of a line comprising a character.

Stylus: Pen-shaped instrument used to "draw" images or point to icons or menu selections.

Subtractive color process: The presentation of color images by selective absorption of projected light.

Suppression: A class of alarm display processing by which alarms determined by processing techniques to be less important, irrelevant, or otherwise unnecessary are not presented to the operators, but can be accessed by operators upon request. This approach is intended to help the operators focus attention on the most important alarm conditions when multiple alarm conditions exist.

Symbol: A representation of something by reason of relationship, association, or convention.

Syntax: The way in which words are put together to form phrases, clauses, or sentences.

System: An integrated collection of plant components and control elements that operate together and possibly in conjunction with other systems to perform a function.

System response time: The elapsed time between the initiation of a command and the notification to the user that the command has been completed.

Table: A rows and columns structure consisting of functional areas which contain data which may or may not require any input. Tables may be used to present a variety of types of information. A collection of data in a form suitable for ready reference.

Task analysis: A method of detailing the components of a task in terms of the demands placed upon the human operator, the information required by the operator, the extent to which the task requires reliance on or coordination with other personnel, and the relation of the task to other tasks.

Task: A series of transactions that comprises part of a user's defined job. A group of activities that have a common purpose, often occurring in temporal proximity, and that utilize the same displays and controls

Terminal: An input/output device used to enter and display data. Data are usually entered via a keyboard, and are usually displayed via a video screen (soft copy) or a printer (hard copy). A device, usually equipped with a keyboard and some kind of display, which can send and receive information over a communication channel.

Terminology: The technical or special terms of expressions used; nomenclature.

Text: The primary display for word processing, consists of alphanumeric character strings in linear arrays, making up words, sentences, and paragraphs. The main body of printed or written matter on a page or in a message.

Text entry: Initial entry and subsequent editing of textual data.

Tile: A type of spatially dedicated, continuously visible alarm-display consisting of an element of a conventional NPP alarm panel.

Tiled windows: Tiled windows (in contrast to layered windows) refers to the on-screen positioning of multiple windows side-by-side so that no window overlays information on another.

Tiling: A means of manipulating windows by which multiple windows on the same display abut, but do not overlap. As the number of windows increases in the tiled window environment, the size of each window decreases.

Top-down design: A review approach starting at the "top" with high-level plant-mission goals that are broken down into functions that are allocated to human and system resources, and then into tasks required to accomplish function assignments. Tasks are arranged into meaningful jobs and the HSI is designed to best support job performance. The detailed design is the "bottom" of the top-down process.

Touch screen: A control device that allows the user to communicate with the computer by touching a screen.

Touch zone: An area of a display that a user can activate to perform a predefined operation (e.g., displaying a pop-up window).

Trackball: A control device with which the user can control cursor movement in any direction by rotating a ball.

Transaction: An action by a user followed by a response from the computer. Transaction is used here to represent the smallest functional unit of user-system interaction.

Transilluminated display: A display having light passed through, rather than reflected off, an element to be viewed, e.g., illumination used on traditional annunciator tile panels or indicators using edge or back lighting techniques on clear, translucent, fluorescent, or sandwich-type plastic materials (in contrast to video display units).

Turnaround time: (1) The elapsed time between submission of a job to a computing center and the return of results. (2) In communications, the actual time required to reverse the direction of transmission from send to receive when using a half-duplex circuit.

Undo: A capability that reverses the effect of the previous operation.

Update: Regeneration of changing data to show current status, by user request or automatically by the computer.

User response time: The speed with which a user can enter commands and control a system regardless of the computer's ability to quickly process the commands.

Validation: (1) The process of determining whether the design of machine elements and the organizational design of human elements of a human-machine system is adequate to support effective integrated performance of established functions. (2) The capability of a system to check information entry items for correct content of format as defined by software logic.

Value: Specified data for a particular parameter or variable.

Variable: A quantity that can assume any of the given set of values.

Variable function key: A dedicated key which invokes functions of the system; the specific function invoked varies depending, e.g., on the mode of operation selected by the user.

Verification: The process of determining whether instrumentation, controls, and other equipment meet the specific requirements of the tasks performed by operators.

VDU: A video display unit.

Video display unit: An electronic device for the display of visual information in the form of text and/or graphics. Typically abbreviated VDU.

Vigilance: The degree to which personnel are attentive to their current task.

Visual angle: A measure, in degrees, of the size of the retinal image subtended by a viewed object. It represents the apparent size of an object based on the relationship between an object's distance from the viewer and its size (perpendicular to the viewer's line of sight). An object of constant size will subtend a smaller visual angle as it is moved farther from the viewer. Visual angle is typically defined in terms of minutes of visual arc.

Warning signal: A signal which alerts the operator to a condition requiring immediate action (see Caution Signal).

Window: A geometric area on a computer screen within which the system displays information or receives input from the user.

Window overlay: A portion of a display that is temporarily used to show added features such as requested data, menus, or user guidance, which may obscure previously displayed data.

Word: A character string or a bit string considered as an entity.

Word wrap: Occurs when words displaced from one line are moved to the next line so as to maintain the continuity of the text.

Workload: The physical and cognitive demands placed on plant personnel.

Workstation: The physical console at which a user works.

BIBLIOGRAPHIC DATA SHEET

(See instructions on the reverse)

1. REPORT NUMBER
(Assigned by NRC. Add Vol., Supp., Rev.,
and Addendum Numbers, if any.)

NUREG-0700

Rev. 1

Vol. 2

2. TITLE AND SUBTITLE

Human-System Interface Design Review Guidelines
Reviewer's Checklist

Final Report

3. DATE REPORT PUBLISHED

MONTH YEAR

June

1996

4. FIN OR GRANT NUMBER

L1317

5. AUTHOR(S)

6. TYPE OF REPORT

7. PERIOD COVERED (Inclusive Dates)

January 1995 - June 1996

8. PERFORMING ORGANIZATION - NAME AND ADDRESS (If NRC, provide Division, Office or Region, U.S. Nuclear Regulatory Commission, and mailing address; if contractor, provide name and mailing address.)

9. SPONSORING ORGANIZATION - NAME AND ADDRESS (If NRC, type "Same as above"; if contractor, provide NRC Division, Office or Region, U.S. Nuclear Regulatory Commission, and mailing address.)

Division of Systems Technology
Office of Nuclear Regulatory Research
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

10. SUPPLEMENTARY NOTES

11. ABSTRACT (200 words or less)

NUREG-0700, Rev. 1, provides human factors engineering (HFE) guidance to the U.S. Nuclear Regulatory Commission staff for its: (1) review of the human system interface (HSI) design submittals prepared by licensees or applicants for a license or design certification of commercial nuclear power plants, and (2) performance of HSI reviews that could be undertaken as part of an inspection or other type of regulatory review involving HSI design or incidents involving human performance. The guidance consists of a review process and HFE guidelines. The document describes those aspects of the HSI design review process that are important to the identification and resolution of human engineering discrepancies that could adversely affect plant safety. Guidance is provided that could be used by the staff to review an applicant's HSI design review process or to guide the development of an HSI design review plan, e.g., as part of an inspection activity. The document also provides detailed HFE guidelines for the assessment of HSI design implementations. NUREG-0700, Revision 1, consists of three stand-alone volumes. Volume 1, Human System Interface Design Review Guideline: Process and Guidelines, is the principal technical document and provides a detailed discussion of both the review procedures and HFE guidelines. Volume 2, Human System Interface Design Review Guideline: Reviewer's Checklist, provides the HFE guidelines in a checklist format. Volume 3, Human System Interface Design Review Guideline: Review Software and User's Guide, contains an interactive software application to support design reviews.

12. KEY WORDS/DESCRIPTORS (List words or phrases that will assist researchers in locating the report.)

control rooms, human factors engineering, man-machine systems,
nuclear power plant design, reactor safety, decision making,
functional models, inspection, interfaces, reactor instrumentation,
reactor operators, standardization

13. AVAILABILITY STATEMENT
unlimited

14. SECURITY CLASSIFICATION

(This Page)

unclassified

(This Report)

unclassified

15. NUMBER OF PAGES

16. PRICE