

SEMI E95-1101

SPECIFICATION FOR HUMAN INTERFACE FOR SEMICONDUCTOR MANUFACTURING EQUIPMENT

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1 Purpose

1.1 This standard addresses the area of processing content with the direct intention of developing common software standards, so that problems involving operator training, operation specifications, and efficient development can be resolved more easily.

1.2 This standard is written to be “tool-neutral” without reference to, or reliance on, specific capabilities of platforms or operating systems. Neither is it intended that choices of software tools or detailed implementation strategies be dictated.

1.3 Note that all figures in this standard are schematic, are not drawn to scale, and unless otherwise specified, are not intended to provide implementation details about number of buttons, button sizes, panel sizes, etc.

2 Scope

2.1 This standard specification applies to manufacturing equipment used in the production of semiconductors.

2.2 This standard may be applicable to other areas such as the manufacture of flat panel displays, but specific application to these areas is outside the scope of this document.

2.3 This standard does not purport to address safety issues, if any, associated with its use. It is the responsibility of the users of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

3 Referenced Standards

None.

4 Terminology

4.1 *condition* — a property of a displayed object or value (textual or numeric) that visually indicates, if applicable, whether the current state of an object or the current value violates the defined bounds of normal operational states or parameters, whether that violation is categorized as a minor exception (a caution) or a severe exception (an alarm), and provides no visual indication if no exception has occurred.

4.2 *display objects* — user interface elements displayed on the screen, such as function selection buttons, keyboard input buttons, graphics representing the equipment, etc.

4.3 *functional area* — a grouping of one or more views presenting information and control capabilities to the user.

4.4 *icon* — an icon (diagrammatic image) is a bitmap or other image used in GUI environments such as windowing systems to show different types of objects, improve operability, and help the user better understand the functionality underlying buttons.

4.5 *navigation model* — the navigation model determines how a user interacts with a system to access functionality and information.

4.6 *salience* — a salience is a solid (or textured), colored border shown around a display object to indicate an alarm, caution, or other condition, or to draw the user’s attention to the display object.

5 Requirements

5.1 Each of the following sections is designated with one of the following labels:

5.1.1 Sections designated:

Description provide background information and set the context for subsequent specifications;

Mandatory provide a specification of a requirement which shall both be present and implemented as specified;

Conditional provide a specification of a requirement which shall be implemented as specified if such a feature is implemented on the tool;

Recommended provide a recommended capability and implementation of that capability, but neither their presence nor their implementation is required.

5.2 Basic Display Objects

Description

5.2.1 This section specifies the general appearance and behavior of basic display objects used throughout the interface, including buttons, saliences, and dialog boxes. It is intended that the use of other types of display objects (choose lists, data display and data entry fields, scroll-bars, etc.) is specifically allowed, and their use is at the discretion of the implementers.

5.2.1.1 There are two types of display objects; selectable and non-selectable. Some are selectable by the user to initiate or execute an action. Non-selectable graphics and user interface elements (such as pipes and text field labels, respectively) are read only, and no action is initiated or executed.

5.2.2 Buttons

5.2.2.1 Button Size

Mandatory

5.2.2.1.1 When a touchscreen device is used, button sizes must be large enough to ensure selection on the targeted display.

5.2.2.2 Button Dimensions

Recommended

5.2.2.2.1 It is recommended that buttons shall have a minimum dimension of approximately 1.5 cm on the shortest side. If a smaller size is used, the space between buttons must be increased to avoid selection errors. For installations where a keyboard and a mouse, light pen or other pointing device is available, button sizes in the navigation panel and the command panel may be made somewhat smaller (approximately 1–1.25 cm), and the size of the information panel increased proportionally.

5.2.2.3 Button Behavior

Mandatory

5.2.2.3.1 One type of button behavior is momentary; that is, user selection of a button causes a brief display of the down (selected) state of the button, followed immediately by a display of the up (unselected) state. The other button behavior is two-state; the button remains in the down state after user selection. User re-selection of the button, and/or selection of another button, and/or selection of another display object restores the display of the up state. In some cases, the software will control the display of the down state or restore the up state, without direct user interaction.

5.2.2.3.2 For 2-D buttons, the down state shall be indicated by hatching, cross-hatching, or otherwise texturing the button in such a manner that does not obscure the button label.

5.2.2.4 Button Text

Mandatory

5.2.2.4.1 Text for all button labels shall have the first letter of words capitalized unless it is an article or pre-

position not occurring at the beginning or end of the label, or unless the word's conventional usage is not capitalized. Button labels that are all capital letters are harder to read than mixed case labels. Additionally, text in all capitals appears larger, and the user may attach more importance to the button than necessary simply because the label is visually distracting.

5.2.3 Saliences

Conditional

5.2.3.1 Saliences, colored, textured, or both shall be displayed around buttons and other display objects to indicate their condition, which may include caution, alarm, user attention required or requested, processing, unfinished task notification, and other conditions.

5.2.3.2 A salience is displayed to draw the user's attention to a display object when its condition is *not* normal or OK (in this case, the absence of a displayed salience shall indicate a normal or OK condition), or when the salience provides information that benefits the user in the performance of tasks or the monitoring of equipment functions and operations.

5.2.3.3 A salience shall not hide the display object it surrounds. Saliences shall not be used to indicate the state (open, closed, on, off, etc.) of display objects.

5.2.3.4 On color displays, alarm saliencies shall appear bright red, caution saliencies shall appear bright yellow, and processing and unfinished task saliencies shall appear medium blue. User attention required or requested saliencies, (for example, "Ready to Load," or "Ready to Unload") shall appear medium green.

5.2.4 Dialog Boxes

Description

5.2.4.1 Dialog boxes are secondary windows used to display supplemental information, solicit information from the user, or report errors.

5.2.4.2 Dialog boxes are used to provide additional information to the user; to display detailed information not shown on the information panel for controlling the system, and to display detailed information for monitoring system operation.

5.2.5 Dialog Boxes

Mandatory

5.2.5.1 Dialog boxes (which are always temporary) are displayed in response to some action initiated by the user. When displayed, a dialog box shall overlay a portion of the information panel, and shall not obscure the title panel. If invoked by user selection of a display object on the information or command panels, all the display objects on those two panels shall be disabled until the dialog box is dismissed. The title and navigation panels remain enabled. At the explicit request of the user, the dialog box is dismissed, and the underlying information is refreshed.

5.2.5.2 Dialog boxes contain a title bar at the top, a display (free use) area, and one or more dialog box window control buttons arranged horizontally at the bottom. The title bar text reflects the command or the nature of the event that invoked the dialog box. Dialog box window control buttons are centered on the width of the dialog box, with any other buttons (Apply, Log-out, etc.) right-aligned and visually separated from the window control buttons. If the underlying operating system will not allow this alignment, then it is allowed that other alignments may be used, but only if the alignment is consistent across all dialog boxes.

5.2.5.2.1 User selection of a dialog box control button controls the dismissal of the dialog box and, when applicable, controls whether the user accepts or rejects information or choices displayed, or desires no action be performed.

5.2.5.2.1.1 An “OK” dialog box control button, when selected by the user, indicates acceptance of any choices or user inputs made, if any, and causes the dismissal of the dialog box. If no choices or user inputs were made, selecting this button indicates acceptance of any default values displayed. If user choices or inputs are required, this button shall be disabled until the choices or inputs are made.

5.2.5.2.1.2 A “Cancel” dialog box control button, when selected by the user, indicates no action should be taken, causes the dismissal of the dialog box, and returns the user to the state that existed prior to the invocation of the dialog box.

5.2.5.2.1.3 A “Yes” dialog box control button is displayed when the dialog box message is in the form of a question. User selection indicates a positive response to the question asked and causes the dismissal of the dialog box.

5.2.5.2.1.4 A “No” dialog box control button is displayed when the dialog box message is in the form of a question. User selection indicates no action should be taken, causes the dismissal of the dialog box, and returns the user to the state that existed prior to the invocation of the dialog box.

5.2.5.2.1.5 A “Close” dialog box control button is displayed (often as the only dialog box control button) when the dialog box message contains only information and does not require the user to make or accept choices, and shall be used instead of an “OK” dialog box control button in this case. The “Close” dialog box control button shall also be used instead of a “Cancel” dialog box control button when the user cannot be returned to the state that existed prior to the invocation of the dialog box. User selection indicates no action should be taken and causes the dismissal of the dialog box.

5.2.5.2.1.6 An “Apply” dialog box control button, when selected by the user, indicates acceptance of any choices or user inputs made, if any, but does not dismiss the dialog box. This button shall be disabled until one or more user choices or inputs are made. After user selection of this button, it shall be disabled until additional choices or user inputs are made, if any.

5.2.5.3 Dialog boxes may not be resized or moved, but may display a button equivalent to the Cancel button in the title bar.

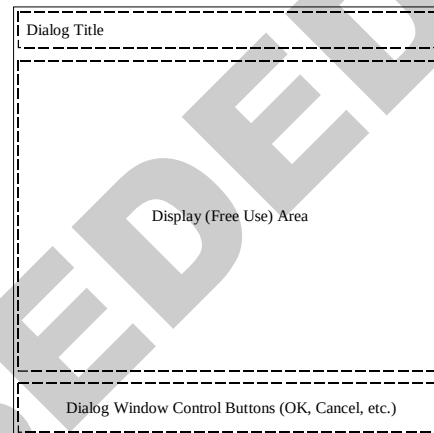


Figure 1
Dialog Box

5.2.5.4 Dialog boxes are classified into the following three types:

- Information dialog box
- Data input/selection dialog box
- Message dialog box

5.2.5.5 To be compliant with this specification, at least one of these dialog box types shall be supported.

5.2.6 Information Dialog Box

Conditional

5.2.6.1 This dialog box type is used to provide additional information to the user about some display object or topic addressed by the information panel. User selection of a display object on the information panel invokes an information dialog box, if appropriate for the display object selected. The window control button to dismiss the dialog box shall be the Close button. Use of an OK button in this case is not allowed.

5.2.6.2 Implementation of this dialog box type shall be conditional on the equipment having the capability of providing the required information.

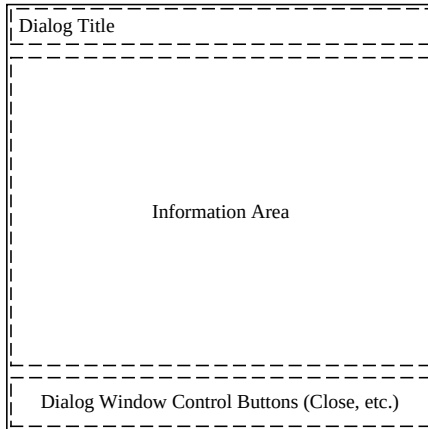


Figure 2
Information Dialog Box

5.2.7 *Input/Selection Dialog Box*

Conditional

5.2.7.1 This dialog box type is used to request data input or selection from the user. If no keyboard or keypad is available, and the user must input characters, an on-screen representation (“mimic”) of one or both shall be displayed as part of the dialog box. The window control buttons are the OK and Cancel buttons.

5.2.7.2 Implementation of this dialog box type shall be conditional on the presence of display objects that allow user input or selection.

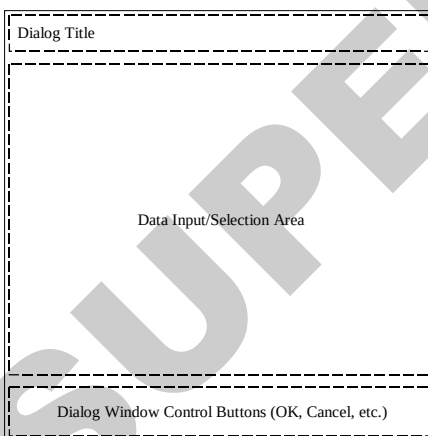


Figure 3
Data Input/Selection Dialog Box

5.2.8 *Message Dialog Box*

Conditional

5.2.8.1 This dialog box type is used to provide a message to the user (including the reporting of errors) or to request confirmation of a user initiated action. The

message text is located to the right of the icon. It is recommended that icons from the underlying operating system be used to represent the message type as follows:

- Information in the form of a simple message
- Progress, informing the user of an ongoing process
- Attention, alerting the user of possible danger, or inability to execute a command, or requesting confirmation (either as a statement or as a question)
- Error, informing the user of danger or inability to execute a command (if effect is severe)

5.2.8.2 Note that most style guides no longer recommend the use of a question mark icon when the message is phrased as a question, as its meaning could be ambiguous in some cases. The attention icon should be used instead.

5.2.8.3 The first two message types use the Close window control button. The second two use OK and Cancel, or Yes and No (and sometimes Cancel) if the message is phrased as a question. It is recommended that buttons or other display objects that would cause an error message be disabled in those circumstances.

5.2.8.4 Implementation of this dialog box type shall be conditional on the equipment having the capability of providing the required information.

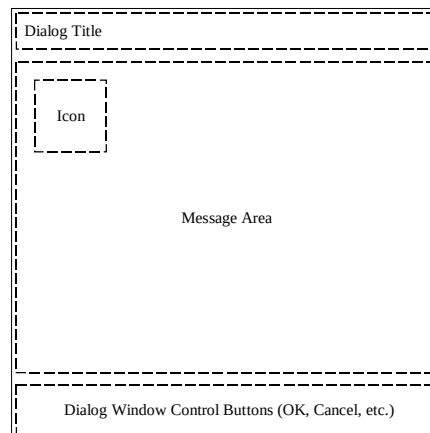


Figure 4
Message Dialog Box

5.3 Basic Network Navigation Model

Mandatory

5.3.1 This standard specifies a simple navigation model designed specifically to minimize the number of actions and the amount of time required of the user.

5.3.2 The basic network navigation model is capable of displaying a number of views within a single level of hierarchy. The user does not have to traverse up and down menu or view “trees” when exercising control and monitoring tasks. As shown in the figure below, the basic navigation model is a network, supporting horizontal (lateral) transfer, at any time, between any of the functional areas in the interface. The basic network navigation model does not support more than one view in any functional area. Expansion of detail for views is typically implemented using dialog boxes.

5.3.3 Note that the diagram is schematic; it shows that user selection of a functional area shall display its associated information panel. Only one information panel shall be displayed at any time.

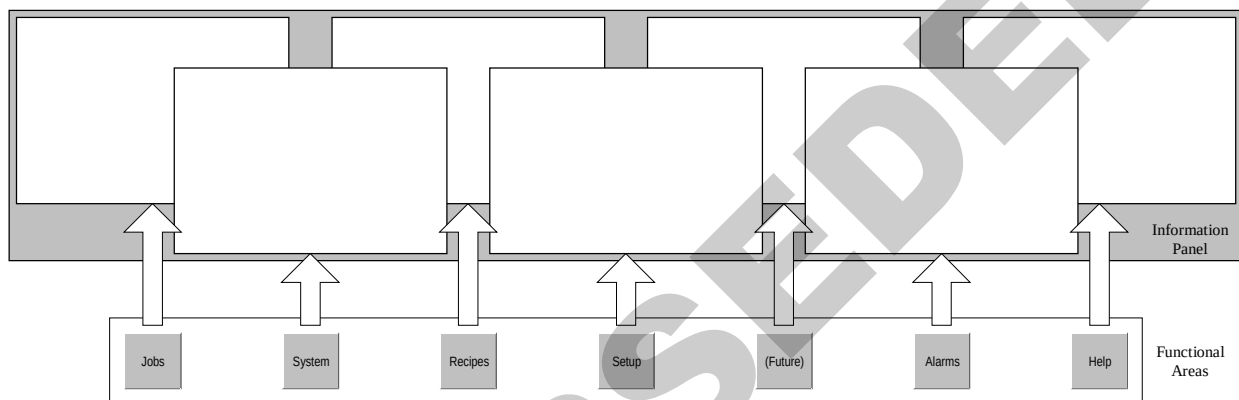


Figure 5
Basic Network Navigational Model

5.3.4 Network Navigation Model with Sub-navigation

Conditional

5.3.4.1 While maintaining the same basic structure, this navigation model supports multiple views within functional areas on the network. If any functional area has more than one view, all functional areas in the interface shall consistently use one of the two view sub-navigation methods described below. Lateral transfer between any of the views within a functional area is supported either by providing a single row of tabs which may be selected to change views (Figure 6), or by providing view sub-navigation buttons (Figure 7) in a separate screen area dedicated solely to sub-navigation. Expansion of detail for each of these views is typically implemented using dialog boxes.

5.3.4.2 The grouping of tasks within functional areas reflects the natural flow of information, events, and tasks in a way that is familiar to the user and that directly supports the attainment of successful process and equipment performance goals. Functional areas are user task oriented, collecting together logically related monitoring and control functions, reducing the need to navigate between views.

5.3.4.3 Note that the diagrams are schematic; they show that user selection of a functional area shall display its associated information panel. Only one information panel shall be displayed at any time. Similarly, user selection of a tab or sub-navigation button displays only one of the views available at any time.