

GP 15-07-03	Alarm Systems	July 2003
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Alarm Systems

GP 15-07-03

Scope

[I] This Global Practice (GP) covers the design, installation, and operation of process alarm/annunciation systems for control rooms and for local panels such as for compressors, furnaces, and boilers.

[I] An asterisk (*) indicates that a decision by the Owner's Engineer is required, that additional information is to be furnished by the Owner's Engineer, or that information for Owner's Engineer approval shall be supplied by Vendor or Contractor.

This GP is appropriate for attachment to an Inquiry or Purchase Document.

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GP 15-07-03	Alarm Systems	July 2003
-------------	---------------	-----------

Table of Contents

1. Required References.....	3
1.1. Global Practices–ExxonMobil Engineering Practices	3
1.2. ISA–Instrumentation, Systems, and Automation Society.....	3
2. Revision to Industry Standard.....	3
Modifications to ISA Standard 18.1.....	3
3. Design Considerations.....	7
3.1. General	7
3.2. Priority and Display	8
3.3. Visibility/Audibility.....	10
4. Priority 1 Alarm Systems	10
4.1. General	10
4.2. Annunciator Systems	11
4.3. VDU Systems.....	11
5. Alarm Loop and Power Considerations	12
6. Operating Environment.....	13
7. Alarm Window Design/Color-Coding.....	13
8. Alarm Suppression.....	15
9. Alarm System Operational Sequences.....	15
10. Alarm Contacts/Field Wiring.....	16
11. Power Supply	16
12. Acceptance Tests	16
13. Equipment Identification.....	16
Record of Change.....	17
Attachment: Purpose Codes Definitions.....	18

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Page 2 of 18	©ExxonMobil Development Company	



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GP 15-07-03	Alarm Systems	July 2003
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1. Required References

[I] This Section lists Practices and Standards that are generically referenced and assumed to be a part of this document. Unless otherwise specified herein, use the latest edition.

1.1. Global Practices–ExxonMobil Engineering Practices

GP 15-06-02	Environmental Protection for Instrumentation
GP 15-07-01	Electric Power Branch Circuit Design for Instrumentation
GP 15-07-02	Protective Systems
GP 15-10-01	Instrument Transmission Systems
GP 16-01-01	Area Classification and Related Electrical Design for Flammable Liquids, Gases or Vapors
GP 16-08-01	Instrument and Essential Services Power Supplies
GP 17-05-01	Human Factors in Plant Design
GP 20-01-01	Inspection of Equipment and Materials

RATIONALE: Additional references available for sites with an SRA are the following EMRE R&D Reports: EE.170E.98 Alarm Management Guidelines, EE.143E.99 Analyze Process Alarms to Improve System Performance, and EE.66E.2000 Online Alarm Management Tool: Alarm Configuration Manager. However, GP 15-7-3 shall remain the governing document. **ISA–Instrumentation, Systems, and Automation Society**

ISA 18.1	Annunciator Sequences and Specifications
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2. Revision to Industry Standard

[I] All provisions contained herein reflect additions, substitutions, modifications, and deletions. All provisions not modified or deleted remain in force.

Modifications to ISA Standard 18.1

Addition: Definitions

[I] Definitions shall be in accordance with ISA 18.1 except as modified and supplemented below.

Term	[I] Description	
Alarm	An alarm is a visual and/or audible indication of an abnormal event or	
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Term	[I] Description
	process condition which requires attention and/or corrective action from the operator. An alarm may be either remote in a control room or local on a panel close to the equipment generating the alarm condition (e.g., boiler or compressor alarm panel). An alarm shall not be used to indicate status only (i.e., information only messages such as "MOTOR ON").
Alarm system	An alarm system is a dedicated device or group of devices that call attention to abnormal changes in process conditions. The system can be an Annunciator system or a video display unit (VDU) system. Alarm systems may be local or remote (control room).
Alert	An alert is a signal to the operator that he or she should be aware of something unusual about the condition of the plant but that no intervention is immediately required. An alert should trigger a focused process monitoring action. (Also see Priority 3 alarm.)
Annunciator system	An annunciator system is a dedicated device or group of devices that call attention to abnormal changes in process conditions. An annunciator system usually includes sequence logic circuits, a light box, labeled windows, audible devices, and manually operated pushbuttons (such as Acknowledge, Reset, and Lamp Test). Annunciator systems are typically specified for displaying Priority 1 alarms.
Bypass alarm	A bypass alarm is an alarm that is activated whenever any protective system sensor, logic function or actuator is prevented from performing its designed protective action.
Common trouble or group alarm	A common trouble or group alarm is a single alarm that is activated whenever one or more local alarms associated with the same piece of equipment is activated (e.g., the vibration sensors on a specific compressor, diagnostic alarms for a PLC, etc.).
Control system	A system that responds to input signals from the equipment under control and/or from an operator and generates output signals, causing the equipment under control to operate in the desired manner. The Control System can perform basic regulatory control, sequential control, batch control, or advanced control. Also referred to as a Basic Process Control System (BPCS), a Distributed Control System (DCS), or a Process Control System.
Pre-alarm	A pre-alarm is an alarm indicating that a process unit or equipment system has reached the point where one or more abnormal conditions exist. If corrective action is not taken, the abnormal condition(s) may lead to automatic protective action by a protective system and/or subsequent alarms. Pre-alarms are not the last line of defense and should not be classified SHE-critical. Pre-alarms should be assigned a priority based on risk (See the matrix in Section 3.2).

Term	[I] Description
Priority 1 alarm (sometimes called Priority 'E' or Emergency alarms)	Priority 1 alarms include all SHE-critical alarms and a limited number of other high-priority alarms that do not meet the definition of SHE-critical alarms but which nonetheless require immediate action or attention by the console operator. Priority 1 alarms shall remain operable even when the control system interface fails. RATIONALE: A guideline of less than 10% of Priority 1 alarms should be Non-SHE-Critical alarms. A guideline of less than 10-15% of all alarms in a process unit should be Priority 1. Percentage guidelines aid sites in alarm management by limiting the number of Priority 1 alarms during process upsets and magnifying the importance of Priority 1 and SHE-critical alarms. Guidelines are consistent with Human Factors GP 17-5-1 and EE.170E.98 Alarm Management Guidelines.
Priority 2 alarm (sometimes called Priority 'H' or High alarms)	A Priority 2 alarm indicates the existence of an abnormal condition that may lead to a serious process upset. Prompt operator action or attention is required; however, the alarm point should be set to allow for sufficient time to determine the correct course of action and respond effectively. A Priority 2 alarm is typically less critical and need not remain operable when the control system fails. RATIONALE: A guideline of less than 35-40% of all alarms in a process unit should be Priority 2. Percentage guidelines aid sites in alarm management by limiting the number of Priority 1 alarms during process upsets and magnifying the importance of Priority 1 and SHE-critical alarms. Guidelines are consistent with Human Factors GP 17-5-1 and EE.170E.98 Alarm Management Guidelines.

Term	[I] Description
Priority 3 alarm (sometimes called Priority 'L' or Alerts)	A Priority 3 alarm indicates the existence of an abnormal condition that requires operator attention, but does not present an immediate threat to continued operation and/or plant safety. Some examples of a Priority 3 alarm include computer control application-generated alarms or operator messages. A Priority 3 alarm is less critical and need not remain operable when the control system fails. RATIONALE: A guideline of greater than 45% of all alarms in a process unit should be Priority 3. Percentage guidelines aid sites in alarm management by limiting the number of Priority 1 alarms during process upsets and magnifying the importance of Priority 1 and SHE-critical alarms. Guidelines are consistent with Human Factors GP 17-5-1 and EE.170E.98 Alarm Management Guidelines.
Protective system "activated" alarm	A protective system "activated alarm" is a single, local and/or remote alarm which occurs when the protective system logic has activated its final elements to place the process in its safe state.
Protective system initiator alarm	A protective system initiator alarm is a local and/or remote alarm activated when a process condition or measurement exceeds a specified safe limit. This alarm indicated that there is a demand on the protective system logic to place the process in its safe state. This alarm may be initiated when the protective system is manually actuated.
Safety, Health, & Environmental-Critical alarms (SHE-critical alarms)	Safety, Health, & Environmental-critical alarms are those that indicate the existence of abnormal situations and trigger immediate operator action as a last line of defense to prevent or mitigate one or more of the following: (1) an uncontrolled major breach of containment, (2) severe personal injuries or death, (3) a release of materials that would cause a serious environmental and/or health impact. Operator action is required to bring the process to a safe state, and there must be a written SHE-critical procedure describing the operator action for each SHE-critical alarm. SHE-critical alarms are dominant majority of Priority 1 alarms and must remain operable when the control system fails. RATIONALE: Revised SHE-critical definition from EMRE and Chemicals SHE organizations. Aids in alarm management by tightening definition. The Operator plays a crucial role and should have a written procedure to guide him/her.