

GENERAL SPECIFICATION

FIELD OPERATIONS

GS EP EXP 139

Alarm Management

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1. Scope

This document defines the minimum requirements for the alarm management development of a new and/or upgraded ICSS system.

The basis of design is to build an alarm system that will alert the operator about plant upsets in a reliable and coherent manner in order that he can understand and respond to the situation, in any and all anticipated normal and abnormal operational scenarios.

2. Reference documents

The reference documents listed below form an integral part of this General Specification.

External Documents

Unless otherwise stipulated, the applicable version of these documents, including relevant appendices and supplements, is the latest revision published at the effective date of this document.

Reference	Title
EEMUA PUB NO 191	Alarm systems : a guide to design, management and procurement
ISA 18.2	Management of alarms systems for the process industries

Total General Specifications

Unless otherwise stipulated, the applicable version of these documents, including relevant appendices and supplements, is the latest revision published in the applicable yearly collection.

Reference	Title
GS EP EXP 157	Operator Training Simulator
GS EP INS 103	Instrument Database Management
GS EP INS 110	Instrumentation for package units
GS EP INS 131	Standard Functions and Functional Analysis Development Requirements
GS EP INS 134	Design and supply of integrated control and safety system
GS EP INS 150	Design method for system configuration - Standard functions
GS EP INS 196	Input and Output Standard Functions
GS EP INS 197	Process Standard Functions
GS EP INS 198	Safety and Fire & Gas Standard Functions

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3. Application

This document has to be considered with related general specifications dealing with alarm design [GS EP INS 103](#), [GS EP INS 110](#), [GS EP INS 134](#), [GS EP INS 150](#), [GS EP INS 196](#), [GS EP INS 197](#) and [GS EP INS 198](#).

Alarm management philosophy is based on industry best practice [EEMUA PUB NO 191](#) and [ISA 18.02](#).

{Rule 1

This specification shall apply to the ICSS, including alarms coming from packages and subsea control systems.}

As far as the FGS is concerned, any masking shall be done on an exception basis under Company approval except in the case of inhibitions where the masking principle is applicable.

4. Definitions & Glossary

Alarm	An audible or visible means of indicating to the operator an equipment or process malfunction or abnormal situation
Alarm management	The processes and practices for determining, documenting, designing, monitoring and maintaining alarm systems
Alarm priority	The ranking of alarms by severity and response time
Alarm rationalization	A process whereby a multi-function team determines what alarm configuration (priority and settings) is required for individual parameters in the control system
Alarm system	Refers to the complete system for generating and handling alarms including field equipment, signal conditioning and transmission, alarm processing and alarm display
Basic Engineer (BE)	Party responsible for the Basic Engineering or FEED
CAD	Chronological Alarm Display
Chattering Alarm	Alarm that goes in and out in a very short amount of time (i.e. 3 times per minute)
Contractor	Party responsible for the detailed design / construction / installation /commissioning of a work package or of the whole plant and directly contracted by Company
EEMUA	Engineering Equipment and Material User's Association
ESD	Emergency Shut Down
Event	A change in plant or equipment condition including operator commands
FAT	Factory Acceptance Test
FEED	Front End Engineering and Design

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FGS	Fire and Gas System
Grouped alarm	A single grouped alarm may be used to display a number of different initiating events from a plant system
ICSS	Integrated Control and Safety System
Masking	Method to prevent the alarm being annunciated and displayed on the CAD
Nuisance alarm	Alarms which do not generate a specific action or response from the operator
Operator response time	The time between the annunciation of the alarm and when action is required to prevent the consequences of the alarm related event
OWS	Operator Work Station
P3 package	P3 type package as defined in GS EP INS 110
PCS	Process Control System
P&ID	Piping and Instrument Diagram
PSS	Process Safety System
SAT	Site Acceptance Test
Shelving	Shelving is a facility where the operator is able to temporarily prevent an alarm from being displayed to him when it is causing nuisance. A shelved alarm will be removed from the list and will not re-annunciate until un-shelved
Standing alarm	Any alarm active for a predefined period of time (i.e. full operational shift or longer)
Suppress	An alarm is suppressed when logical criteria are applied to determine that the alarm should not occur, even though the base alarm condition (e.g. alarm setting exceeded) is present

5. Alarm management engineering and deliverables

5.1 Principles

{Rule 2

A performance level 4 (Robust) according to EEMUA PUB NO 191 alarm management system shall be provided.}

The main drivers for alarm management are the following:

- Alarms are properly designed and implemented.
- Alarms are relevant, clear and easy to understand.
- Alarms are configured consistently.

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- Alarms are presented at a rate that the operator can effectively handle.
- Operators can rapidly assess the importance of alarms.
- Operators understand the required response to be carried out following receipt of an alarm.
- Operators have adequate time to respond with the required defined response.
- Alarms system is properly controlled, monitored and maintained.
- Every alarm shall require to have a defined operator response.

5.2 Objectives

The goal of the Alarm management engineering is to ensure that the operator is alerted to plant upsets in a clear manner without being overloaded during normal operation, downgraded operation and even plant upset.

[EEMUA PUB NO 191](#) is recognised as industry best practice for alarm management. Best practice involves the alarm management design during project phase for a new and/or upgraded ICSS as well as alarm management strategy for continuous improvement during field operations.

This General Specification only addresses design requirements during project phase. Requirements associated to field operations, such as organisation, responsibilities, continuous improvement and modifications strategies, operating rules, etc will be developed in another EXP document.

The system performance shall target a performance level 4 (Robust) according to [EEMUA PUB NO 191](#). Such performance level implies the following characteristics:

- Alarm system is reliable during all plant modes, including plant upset.
- Operators have a high degree of confidence in the alarm system and have time to read, understand and react correctly to all alarms.
- The alarm system adjusts automatically according to plant operating mode, displaying only the alarms that are relevant under the current conditions.

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Table 1: Typical KPIs during operations

Average Alarm Rate /10 minutes	< 10 but >1
Max alarms rate / 10 minutes	< 100 but >10
% hour when there were more than 30 alarms	<5% but >1%
Standing Alarms based on hourly sampling ¹	< 1% of total alarms configured
Target maximum occurrence rates during operations	
Critical alarms	Very infrequently
High Priority Alarms	Less than 5 per shift
Medium priority Alarms	Less than 2 per hour
Low priority Alarms	Less than 10 per hour

Table 2: Alarm Priority Distribution configured during system design

Critical	Max 20 Critical
High	~ 5% High
Medium	~ 15% medium
Low	~ 80% Low

5.3 Alarm and Event recording

All alarms and events presented to the operator are logged.

{Rule 3

The alarm and event logging function shall provide long term storage of alarms and events. These events shall, as a minimum, include the following:

- Controller mode changes MAN/AUTO/CASCADE.
- Operator applied inhibits ON/OFF.
- Operator applied masking ON/OFF.
- Alarms.
- Pump/Compressor START/STOP.
- Valve OPEN and CLOSE command from the operators.
- Valve OPEN and CLOSE command from the system.}

¹ Excluding maintenance shelved alarms i.e. alarms indicative of a problem that cannot be resolved in the short term (for example waiting for annual overhaul).