

Stay Live Industry

Guide to alarm management

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Table of Contents

1. Background	3
2. Purpose	4
3. Ownership.....	5
4. Alarm Definition	5
5. Understanding the KPI's.....	6
6. Other types of alerts / notifications.....	7



Revision A

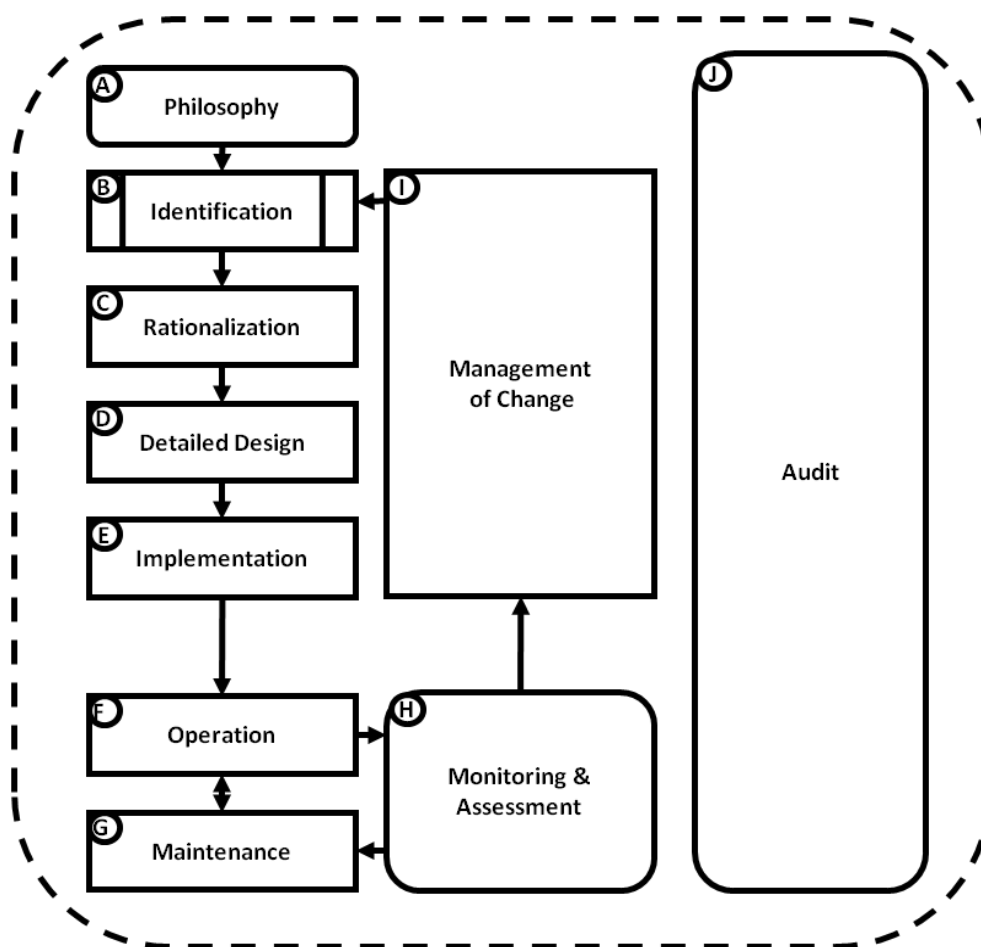


1. Background

Alarm management provides an important process safety barrier. Having a well-engineered, well-maintained and well-operated alarm system is critical to process safety. To achieve a stable alarm system the following international standards are used.

- IEC 62682
- ISA 18.2
- EEMUA 191

Below is a table from ISA 18.2 which gives a strategy to obtain effective alarm management.



2. Purpose

The purpose of an alarm management standard is to ensure that the Process Control alarm system acts as an effective tool to help the operator take the correct action at the correct time.

This will be achieved if;

- Alarms are properly chosen and implemented,
- Alarms are relevant, clear and easy to understand,
- Alarms are configured consistently in accordance with industry best practice guidelines,
- Alarms are presented at a rate the operator can effectively handle,
- Operators can rapidly access the location and relative importance of all process alarms,
- Operators can process alarm information during high frequency alarm actuation events, and
- Alarm systems are properly controlled, monitored and maintained.

The Standard provides a consistent and optimum basis for

- Alarm Selection
- Priority Determination
- Alarm Configuration
- Alarm Handling Methods
- Alarm System Performance Monitoring
- Nuisance Alarm Resolution
- Alarm Detection, Presentation and Annunciation
- Operator Interface for Alarms
- Operator Response to Alarms
- Maintenance and testing of Alarms
- Alarm System Management of Change

The Standard is based on several key assumptions;

- No amount of alarm management will replace the constant surveillance of a qualified operator.
- Operators are trained on the alarm management strategy.
- Alarm management enhances the operator's ability to make a judgment based on their existing experience and skill.
- Operators will respond to all alarms, regardless of priority. (Therefore the system shall not produce more alarms than the operator can respond to.)
- Alarm priorities define the order of the operator's response
- The alarm system is routinely maintained and kept up to date.
- Alarm management includes all categories of alarms coming to an operator, including system alarms.
- Systems will be designed (or retroactively modified) so the operator is capable of effectively responding to all alarms in all anticipated scenarios. Operators (and all associated personnel) will be trained on the relevant parts of the alarm system for the plants they operate.
- It will be subject to periodic review and revision as part of an audit process.
- This philosophy will be kept evergreen to reflect best corporate & industry practice as well as all appropriate national & international regulations.

3. Ownership

Having effective alarm management relies on close coordination between operations, maintenance and project groups in an organisation.

The organisation owner for alarm management needs to be operations as they are the group that is directly affected by poor alarm management.

4. Alarm Definition

Alarms will meet the definition and specific criteria defined as follows:

1) An alarm is an audible and/or visible means of indicating - There must be an indication of the alarm. An alarm limit can be configured to generate control actions or log data but if this limit is not audibly or visually indicated it should not be considered an alarm.

2) to the operator - The indication must be targeted to the operator to be an alarm, not to provide information to an engineer, maintenance technician, or manager.

3) an equipment malfunction, process deviation, or abnormal condition - The alarm must indicate a problem, not a normal process condition or normal operational event (e.g., pump stopped, valve closed). The automation system should be configured to determine if any events have occurred unexpectedly (i.e., are “abnormal”). If an unexpected or abnormal event has occurred and operator action is required, this notification should be classified as an alarm.

4) requiring a response. - There must be a defined operator response to correct the condition and bring the process back to a desired (safe and/or productive) state. If the operator does not need to respond, then the condition should not be an alarm. A notification that has no associated operator action should be defined as an alert or message. Acknowledging the alarm or logging a measurement is not considered an operator response (does not correct the abnormal situation). Typical operator responses to alarm include:

- *Request field operator to close a valve.*
- *Change the setpoint or output of a controller.*
- *Start a backup pump.*
- *Raise a corrective action work order.*

5. Understanding the KPI's

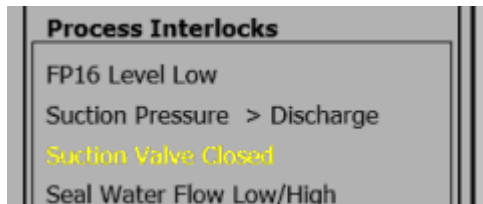
	Metric	Target	Action limit	What are the KPI's most likely to be indicating.
1	Average Alarm Rate (alarms per hour per operator)	<6	>12	<ol style="list-style-type: none"> Poor design and over alarming of equipment. Alarms not properly controlled during maintenance or operational testing activities
2	Quantity of Chattering and Fleeting Alarms (occur repeatedly over a short period of time (i.e. 3 times per minute) or immediately return to normal without operator response)	0		<ol style="list-style-type: none"> Poor alarm setup and configuration. Alarms not properly controlled during maintenance or operational testing activities
3	Percent of time the alarm system is in flood (alarm rate exceeds 10 or more alarms occurring in 10 minutes, and ending when the rate drops below 5 alarms in 10 minutes)	<1%	>5%	Indicating the frequency of a dangerous condition where the operator is likely to miss key alarms and put plant or people at risk.
4	Stale Alarms (number of alarms in the alarm list that have been there greater than 24 hours)	<5	>5	<ol style="list-style-type: none"> Poor design and over alarming of equipment. Insufficient maintenance of equipment. Operating plant outside of design boundary. Poor management of change where field equipment is removed but logic still in the control system.
5	Annunciated Priority Distribution (Level 4 Low Priority)	~80%	<50%	Rationalisation not completed effectively and alarms are providing poor assistance to the operator.
6	Annunciated Priority Distribution (Level 3 Medium Priority)	~15%	>25%	Rationalisation not completed effectively and alarms are providing poor assistance to the operator.
7	Annunciated Priority Distribution (Level 2 High Priority)	~5%	>10%	Rationalisation not completed effectively and alarms are providing poor assistance to the operator.
8	Annunciated Priority Distribution (Level 1 Critical Priority)	~1%	>3%	Rationalisation not completed effectively and alarms are providing poor assistance to the operator.
9	Top 10 most Frequent (Bad Actors)	<5	>20	This KPI indicates an even spread of alarm activations across the system. I.e. not the same alarm which would indicate a defect or poor plant stability.

The KPI's should be prioritised as per the table above. Immediate action should be taken on the first 3 KPI's to ensure alarms are presented to the operator are a rate that can be effectively dealt with. Stale alarms can take more time and effort to work through and often a large proportion of these alarms are not required and do not meet the definition of an alarm.

6. Other types of alerts / notifications

There are a number of other types of alerts and notifications that can be presented to the operator or other interested parties when the information does not meet the alarm definition. Some examples are;

Process interlocks – These can be displayed by using a different colour on the process graphic.



CMMS notifications – work order creation can be triggered directly from the control system without the need to send an alarm to the operator and then manually create a notification.

Text message / Email – Where a person other than the panel operator needs to be advised of an event or plant status. The use of text or email is a way of getting the correct information to the correct person. Rather than relying on an operator to relay alarm information.

Dispatch notifications – these are not alarms and should be handled as operator alerts.

7. Revision Table

Revision	Comment	Date	By	Reviewed	Approved
1	Initial draft – issued for comment	23.6.2017	MS	MH,GF,MW	
1.1	Updated to reflect initial Contact Energy comments	30.6.2017	MS	MH,GF,MW	
1.2	Updated to reflect Meridian comments	1.7.2017	MH	MH,GF,MW	
1.3	Section 6 added	1.8.2017	MS	MH,GF,MW	
A	Issued for use	7.9.2017	MS	MH,GF,MW	MH,GF,MW