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OPC unified architecture -
Part 9: Alarms and Conditions

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CONTENTS

FOREWORD 10
1 Scope 13
2 Normative references 13
3 Terms, definitions, abbreviated terms and used data types 14
3.1 Terms and definitions 14
3.2 Abbreviated terms and symbols 17
3.3 Used data types 17
4 Concepts 17
4.1 General 17
4.2 Conditions 18
4.3 Acknowledgeable Conditions 19
4.4 Previous states of Conditions 20
4.5 Condition state synchronization 21
4.6 Severity, quality, and comment 22
4.7 Dialogs 22
4.8 Alarms 22
4.9 Multiple active states 24
4.10 Condition instances in the AddressSpace 25
4.11 Alarm and Condition auditing 26
4.12 Alarms in a system 26
5 Model 26
5.1 General 26
5.2 Two-state state machines 28
5.3 ConditionVariable 30
5.4 ReferenceTypes 31
5.4.1 General 31
5.4.2 HasTrueSubState ReferenceType 31
5.4.3 HasFalseSubState ReferenceType 32
5.4.4 HasAlarmSuppressionGroup ReferenceType 32
5.4.5 AlarmGroupMember ReferenceType 33
5.4.6 AlarmSuppressionGroupMember ReferenceType 33
5.5 Condition Model 34
5.5.1 General 34
5.5.2 ConditionType 35
5.5.3 Condition and branch instances 40
5.5.4 Disable Method 40
5.5.5 Enable Method 41
5.5.6 AddComment Method 42
5.5.7 ConditionRefresh Method 43
5.5.8 ConditionRefresh2 Method 45
5.6 Dialog Model 47
5.6.1 General 47
5.6.2 DialogConditionType 47
5.6.3 Respond Method 49
5.6.4 Respond2 Method 50
5.7 Acknowledgeable Condition Model 51
5.7.1 General 51

5.7.2 AcknowledgeableConditionType 51
5.7.3 Acknowledge Method 53
5.7.4 Confirm Method 54
5.8 Alarm model 56
5.8.1 General 56
5.8.2 AlarmConditionType 57
5.8.3 AlarmGroupType 64
5.8.4 AlarmSuppressionGroupType 64
5.8.5 Reset Method 65
5.8.6 Reset2 Method 66
5.8.7 Silence Method 67
5.8.8 Suppress Method 68
5.8.9 Suppress2 Method 69
5.8.10 Unsuppress Method 70
5.8.11 Unsuppress2 Method 71
5.8.12 RemoveFromService Method 71
5.8.13 RemoveFromService2 Method 72
5.8.14 PlaceInService Method 73
5.8.15 PlaceInService2 Method 74
5.8.16 GetGroupMemberships Method 75
5.8.17 ShelvedStateMachineType 76
5.8.18 LimitAlarmType 88
5.8.19 Exclusive Limit Types 91
5.8.20 NonExclusiveLimitAlarmType 97
5.8.21 Level Alarm 100
5.8.22 Deviation Alarm 101
5.8.23 Rate of change Alarms 103
5.8.24 Discrete Alarms 104
5.8.25 DiscrepancyAlarmType 108
5.9 ConditionClasses 109
5.9.1 Overview 109
5.9.2 BaseConditionClassType 110
5.9.3 ProcessConditionClassType 111
5.9.4 MaintenanceConditionClassType 111
5.9.5 SystemConditionClassType 112
5.9.6 SafetyConditionClassType 112
5.9.7 HighlyManagedAlarmConditionClassType 112
5.9.8 TrainingConditionClassType 113
5.9.9 StatisticalConditionClassType 113
5.9.10 ~~TestingConditionSubClassType~~TestingConditionClassType 114
5.10 Audit Events 114
5.10.1 Overview 114
5.10.2 AuditConditionEventType 116
5.10.3 AuditConditionEnableEventType 117
5.10.4 AuditConditionCommentEventType 117
5.10.5 AuditConditionRespondEventType 118
5.10.6 AuditConditionAcknowledgeEventType 118
5.10.7 AuditConditionConfirmEventType 118
5.10.8 AuditConditionShelvingEventType 119

5.10.9 AuditConditionSuppressionEventType 119
5.10.10 AuditConditionSilenceEventType 120
5.10.11 AuditConditionResetEventType 120
5.10.12 AuditConditionOutOfServiceEventType 121
5.11 Condition Refresh related Events 121
5.11.1 Overview 121
5.11.2 RefreshStartEventType 122
5.11.3 RefreshEndEventType 123
5.11.4 RefreshRequiredEventType 123
5.12 HasCondition Reference type 123
5.13 Alarm & Condition status codes 124
5.14 Expected A & C server behaviours 125
5.14.1 General 125
5.14.2 Communication problems 125
5.14.3 Redundant A & C servers 125
6 AddressSpace organisation 126
6.1 General 126
6.2 EventNotifier and source hierarchy 126
6.3 Adding Conditions to the hierarchy 127
6.4 Conditions in InstanceDeclarations 128
6.5 Conditions in a VariableType 129
7 System State & Alarms 129
7.1 Overview 129
7.2 HasEffectDisable 129
7.3 HasEffectEnable 130
7.4 ~~HasEffectSuppress~~HasEffectSuppressed 130
7.5 HasEffectUnsuppressed 131
8 Alarm Summary and Objects 132
8.1 Overview 132
8.2 AlarmState Variable 133
8.3 AlarmMask 134
9 Alarm Metrics 135
9.1 Overview 135
9.2 AlarmMetricsType 135
9.3 AlarmRateVariableType 137
9.4 Reset Method 137
Annex A (informative) Recommended localized names 139
A.1 Recommended state names for TwoState Variables 139
A.1.1 LocaleId "en" 139
A.1.2 LocaleId "de" 139
A.1.3 LocaleId "fr" 140
A.2 Recommended dialog response options 141
Annex B (informative) Examples 142
B.1 Examples for Event sequences from Condition instances 142
B.1.1 Overview 142
B.1.2 Server maintains current state only 142
B.1.3 Server maintains previous states 143
B.1.4 Server current-State Model with Suppression 144

B.1.5 Example for On-Delay, Off Delay and ReAlarmTime 146
B.2 AddressSpace examples 146
~~Annex C (informative) Mapping to EEMUA ..... ~~
Annex C (informative) Mapping from OPC A&E to OPC UA A & C 150
C.1 Overview 150
C.2 Alarms and Events COM UA wrapper 150
C.2.1 Event areas 150
C.2.2 Event sources 151
C.2.3 Event categories 151
C.2.4 Event attributes 152
C.2.5 Event subscriptions 152
C.2.6 Condition instances 155
C.2.7 Condition Refresh 155
C.3 Alarms and Events COM UA proxy 155
C.3.1 General 155
C.3.2 Server status mapping 155
C.3.3 Event Type mapping 156
C.3.4 Event category mapping 156
C.3.5 Event Category attribute mapping 157
C.3.6 Event Condition mapping 160
C.3.7 Browse mapping 160
C.3.8 Qualified names 161
C.3.9 Subscription filters 162
Annex D (informative) IEC 62682 Mapping 164
D.1 Overview 164
D.2 Terms 164
D.3 Alarm records & State indications 170
Annex E (Informative) System state 171
E.1 Overview 171
E.2 SystemStateStateMachineType 172
Bibliography 177

Figure 1 – Base Condition state model 18
Figure 2 – AcknowledgeableConditions state model 19
Figure 3 – Acknowledge State Model 20
Figure 4 – Confirm~~ed~~ acknowledge State model 20
Figure 5 – Alarm state machine model 23
Figure 6 – Typical Alarm Timeline example 24
Figure 7 – Multiple active states example 25
Figure 8 – ConditionType hierarchy 28
Figure 9 – TwoStateVariable Illustration 30
Figure 10 – Condition model 35
Figure 11 – SupportsFilteredRetain process 38
Figure 12 – DialogConditionType Overview 47
Figure 13 – AcknowledgeableConditionType overview 51
Figure 14 – AlarmConditionType Hierarchy Model 56

Figure 15 – Alarm Model 59
Figure 16 – Shelve state transitions 77
Figure 17 – ShelvedStateMachineType model 78
Figure 18 – LimitAlarmType 89
Figure 19 – ExclusiveLimitStateMachineType 92
Figure 20 – ExclusiveLimitAlarmType 96
Figure 21 – NonExclusiveLimitAlarmType 99
Figure 22 – DiscreteAlarmType Hierarchy 105
Figure 23 – ConditionClass type hierarchy 110
Figure 24 – AuditEvent hierarchy 116
Figure 25 – Refresh Related Event Hierarchy 122
Figure 26 – Typical HasNotifier Hierarchy 127
Figure 27 – Use of HasCondition in a HasNotifier hierarchy 128
Figure 28 – Use of HasCondition in an InstanceDeclaration 128
Figure 29 – Use of HasCondition in a VariableType 129
Figure 30 – AlarmSummary equipment example 132
Figure 31 – AlarmSummary Equipment Object Example 133
Figure B.1 – Single state example 142
Figure B.2 – Previous state example 143
Figure B.3 – SuppressedState and OutOfServiceState example 145
Figure B.4 – Alarm example – On Delay, Off Delay, ReAlarmTime 146
Figure B.5 – HasCondition used with Condition instances 147
Figure B.6 – HasCondition reference to a Condition type 148
Figure B.7 – HasCondition used with an instance declaration 148
Figure C.1 – The type model of a wrapped COM AE server 152
Figure C.2 – Mapping UA Event Types to COM A&E Event Types 156
Figure C.3 – Example mapping of UA Event Types to COM A&E categories 157
Figure C.4 – Example mapping of UA Event Types to A&E categories with attributes 160
Figure E.1 – SystemState transitions 171
Figure E.2 – SystemStateStateMachineType model 172

Table 1 – Parameter types defined in IEC 62541-3 17
Table 2 – Parameter types defined in IEC 62541-4 17
Table 3 – TwoStateVariableType definition 29
Table 4 – ConditionVariableType definition 31
Table 5 – HasTrueSubState ReferenceType 32
Table 6 – HasFalseSubState ReferenceType 32
Table 7 – HasAlarmSuppressionGroup ReferenceType 33
Table 8 – AlarmGroupMember ReferenceType 33
Table 9 – AlarmSuppressionGroupMember ReferenceType 34
Table 10 – ConditionType definition 36
Table 11 – ConditionType Additional Subcomponents 36
Table 12 – ConditionId SimpleAttributeOperand Illustration 40

Table 13 – Disable result codes 40
Table 14 – Disable Method AddressSpace definition 41
Table 15 – Enable result codes 41
Table 16 – Enable Method AddressSpace definition 41
Table 17 – AddComment arguments 42
Table 18 – AddComment result codes 42
Table 19 – AddComment Method AddressSpace definition 43
Table 20 – ConditionRefresh parameters 43
Table 21 – ConditionRefresh result codes 43
Table 22 – ConditionRefresh Method AddressSpace definition 45
Table 23 – ConditionRefresh2 parameters 45
Table 24 – ConditionRefresh2 result codes 46
Table 25 – ConditionRefresh2 Method AddressSpace definition 47
Table 26 – DialogConditionType definition 48
Table 27 – DialogConditionType Additional Subcomponents 48
Table 28 – Respond parameters 49
Table 29 – Respond Result Codes 49
Table 30 – Respond Method AddressSpace definition 50
Table 31 – Respond2 parameters 50
Table 32 – Respond2 Result Codes 50
Table 33 – Respond2 Method AddressSpace definition 51
Table 34 – AcknowledgeableConditionType definition 52
Table 35 – AcknowledgeableConditionType Additional Subcomponents 52
Table 36 – Acknowledge parameters 53
Table 37 – Acknowledge result codes 53
Table 38 – Acknowledge Method AddressSpace definition 54
Table 39 – Confirm Method parameters 54
Table 40 – Confirm result codes 55
Table 41 – Confirm Method AddressSpace definition 55
Table 42 – AlarmConditionType definition 60
Table 43 – AlarmConditionType Additional Subcomponents 61
Table 44 – AlarmGroupType definition 64
Table 45 – AlarmSuppressionGroupType definition 65
Table 46 – ~~Silence~~ Reset result codes 65
Table 47 – Reset Method AddressSpace definition 66
Table 48 – Reset2 Method parameters 66
Table 49 – Reset2 result codes 66
Table 50 – Reset2 Method AddressSpace definition 67
Table 51 – Silence result codes 67
Table 52 – Silence Method AddressSpace definition 68
Table 53 – Suppress result codes 68
Table 54 – Suppress Method AddressSpace definition 69
Table 55 – Suppress2 Method parameters 69

Table 56 – Suppress2 Method AddressSpace definition 69
Table 57 – Unsuppress result codes 70
Table 58 – Unsuppress Method AddressSpace definition 70
Table 59 – Unsuppress2 Method parameters 71
Table 60 – Unsuppress2 Method AddressSpace definition 71
Table 61 – RemoveFromService result codes 72
Table 62 – RemoveFromService Method AddressSpace definition 72
Table 63 – RemoveFromService2 Method parameters 73
Table 64 – RemoveFromService2 result codes 73
Table 65 – RemoveFromService2 Method AddressSpace definition 73
Table 66 – PlaceInService result codes 74
Table 67 – PlaceInService Method AddressSpace definition 74
Table 68 – PlaceInService2 Method parameters 75
Table 69 – PlaceInService2 result codes 75
Table 70 – PlaceInService2 Method AddressSpace definition 75
Table 71 – GetGroupMemberships result codes 76
Table 72 – GetGroupMemberships Method AddressSpace definition 76
Table 73 – ShelvedStateMachineType definition 79
~~Table 50 – ShelvedStateMachineType transitions ..... ~~
Table 74 – ShelvedStateMachineType Additional References 81
Table 75 – ShelvedStateMachineType Attribute values for child Nodes 82
Table 76 – Unshelve result codes 82
Table 77 – Unshelve Method AddressSpace definition 83
Table 78 – Unshelve2 Method parameters 83
Table 79 – Unshelve2 result codes 83
Table 80 – Unshelve2 Method AddressSpace definition 84
Table 81 – TimedShelve parameters 84
Table 82 – TimedShelve result codes 84
Table 83 – TimedShelve Method AddressSpace definition 85
Table 84 – TimedShelve2 parameters 85
Table 85 – TimedShelve2 result codes 86
Table 86 – TimedShelve2 Method AddressSpace definition 86
Table 87 – OneShotShelve result codes 87
Table 88 – OneShotShelve Method AddressSpace definition 87
Table 89 – OneShotShelve2 Method parameters 87
Table 90 – OneShotShelve2 result codes 87
Table 91 – OneShotShelve2 Method AddressSpace definition 88
Table 92 – LimitAlarmType definition 90
Table 93 – ExclusiveLimitStateMachineType definition 92
~~Table 60 – ExclusiveLimitStateMachineType transitions ..... ~~
Table 94 – ExclusiveLimitStateMachineType Additional References 93
Table 95 – ExclusiveLimitStateMachineType Attribute values for child Nodes 94
Table 96 – ExclusiveLimitAlarmType definition 96

Table 97 – NonExclusiveLimitAlarmType definition 100
Table 98 – NonExclusiveLimitAlarmType Additional Subcomponents 100
Table 99 – NonExclusiveLevelAlarmType definition 101
Table 100 – ExclusiveLevelAlarmType definition 101
Table 101 – NonExclusiveDeviationAlarmType definition 102
Table 102 – ExclusiveDeviationAlarmType definition 103
Table 103 – NonExclusiveRateOfChangeAlarmType definition 104
Table 104 – ExclusiveRateOfChangeAlarmType definition 104
Table 105 – DiscreteAlarmType definition 105
Table 106 – OffNormalAlarmType definition 106
Table 107 – SystemOffNormalAlarmType definition 106
Table 108 – TripAlarmType definition 107
Table 109 – InstrumentDiagnosticAlarmType definition 107
Table 110 – SystemDiagnosticAlarmType definition 107
Table 111 – CertificateExpirationAlarmType definition 108
Table 112 – DiscrepancyAlarmType definition 109
Table 113 – BaseConditionClassType definition 111
Table 114 – ProcessConditionClassType definition 111
Table 115 – MaintenanceConditionClassType definition 111
Table 116 – SystemConditionClassType definition 112
Table 117 – SafetyConditionClassType definition 112
Table 118 – HighlyManagedAlarmConditionClassType definition 113
Table 119 – TrainingConditionClassType definition 113
Table 120 – StatisticalConditionClassType definition 113
Table 121 – ~~TestingConditionSubClassType~~ TestingConditionClassType definition 114
Table 122 – AuditConditionEventType definition 116
Table 123 – AuditConditionEnableEventType definition 117
Table 124 – AuditConditionCommentEventType definition 117
Table 125 – AuditConditionRespondEventType definition 118
Table 126 – AuditConditionAcknowledgeEventType definition 118
Table 127 – AuditConditionConfirmEventType definition 119
Table 128 – AuditConditionShelvingEventType definition 119
Table 129 – AuditConditionSuppressionEventType definition 120
Table 130 – AuditConditionSilenceEventType definition 120
Table 131 – AuditConditionResetEventType definition 120
Table 132 – AuditConditionOutOfServiceEventType definition 121
Table 133 – RefreshStartEventType definition 122
Table 134 – RefreshEndEventType definition 123
Table 135 – RefreshRequiredEventType definition 123
Table 136 – HasCondition *ReferenceType* Definition 124
Table 137 – Alarm & Condition result codes 124
Table 138 – HasEffectDisable ReferenceType 130
Table 139 – HasEffectEnable ReferenceType 130

Table 140 – ~~HasEffectSuppress~~ HasEffectSuppressed ReferenceType 131
Table 141 – ~~HasEffectUnsuppress~~ HasEffectUnsuppressed ReferenceType 132
Table 142 – AlarmStateVariableType definition 134
Table 143 – AlarmMask values 134
Table 144 – AlarmMask definition 135
Table 145 – AlarmMetricsType Definition 136
Table 146 – AlarmRateVariableType Definition 137
Table 147 – Suppress result codes 137
Table 148 – Reset Method AddressSpace Definition 138
Table A.1 – Recommended state names for LocaleId "en" 139
Table A.2 – Recommended DisplayNames for LocaleId "en" 139
Table A.3 – Recommended state names for LocaleId "de" 140
Table A.4 – Recommended DisplayNames for LocaleId "de" 140
Table A.5 – Recommended state names for LocaleId "fr" 141
Table A.6 – Recommended DisplayNames for LocaleId "fr" 141
Table A.7 – Recommended dialog response options 141
Table B.1 – Example of a Condition that only keeps the latest state 142
Table B.2 – Example of a *Condition* that maintains previous states via branches 144
Table B.3 – Example of a Condition that is Suppressed / OutOfService 145
~~Table C.1 – EEMUA Terms .....~~
Table C.1 – Mapping from standard Event categories to OPC UA Event types 151
Table C.2 – Mapping from ONEVENTSTRUCT fields to UA BaseEventType Variables 153
Table C.3 – Mapping from ONEVENTSTRUCT fields to UA AuditEventType Variables 153
Table C.4 – Mapping from ONEVENTSTRUCT fields to UA AlarmType Variables 154
Table C.5 – Event category attribute mapping table 157
Table D.1 – IEC 62682 mapping table 164
Table E.1 – SystemStateStateMachineType definition 172
Table E.2 – SystemStateStateMachineType additional references 175
Table E.3 – SystemStateStateMachineType Attribute values for child Nodes 176
~~Table F.2 – SystemStateStateMachineType transitions .....~~

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OPC unified architecture - Part 9: Alarms and Conditions

FOREWORD

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IEC 62541-9 has been prepared by subcommittee 65E: Devices and integration in enterprise systems, of IEC technical committee 65: Industrial-process measurement, control and automation. It is an International Standard.

This fourth edition cancels and replaces the third edition published in 2020. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

a) addition of "Comment" parameter to Alarm shelving methods;
b) addition of method that allows a client to get the members of a group, since it is possible that the AddressSpace does not expose instances of alarms;
c) addition of deadband properties for all limits in the limit AlarmType (from which all other types described in this issue are derived);
d) addition of text explaining the disabling of alarms is no longer supported in ISA 18.2 and that it is maintained in this document for backward compatibility, but that it is recommended that Alarm not be disabled;
e) addition of optional severities for limit alarms;
f) addition of new AlarmState variable type that can be used to collect alarm information for displays on graphics;
g) addition of SupportsFilterRetain property to improve Client filtering;
h) removal of ConditionSubClassId and ConditionSubClassNames from the conditiontype definition since they are now defined in BaseEventType.

The text of this International Standard is based on the following documents:

Draft	Report on voting
65E/1056/CDV	65E/1109/RVC

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

Throughout this document and the other parts of the IEC 62541 series, certain document conventions are used:

Italics are used to denote a defined term or definition that appears in the "Terms and definitions" clause in one of the parts of the IEC 62541 series.

Italics are also used to denote the name of a service input or output parameter or the name of a structure or element of a structure that are usually defined in tables.

The *italicized terms* and *names* are, with a few exceptions, written in camel-case (the practice of writing compound words or phrases in which the elements are joined without spaces, with each element's initial letter capitalized within the compound). For example, the defined term is *AddressSpace* instead of Address Space. This makes it easier to understand that there is a single definition for *AddressSpace*, not separate definitions for Address and Space.

A list of all parts in the IEC 62541 series, published under the general title *OPC Unified Architecture*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

– reconfirmed,

– withdrawn, or

– revised.

1 Scope

This part of IEC 62541 specifies the representation of *Alarms* and *Conditions* in the OPC Unified Architecture. Included is the *Information Model* representation of *Alarms* and *Conditions* in the OPC UA address space. Other aspects of alarm systems like alarm philosophy, life cycle, alarm response times, alarm types and many other details are captured in standards such as IEC 62682 and ISA 18.2. The *Alarms* and *Conditions Information Model* in this document, is designed in accordance with IEC 62682 and ISA 18.2. Annex C specifies a recommended mapping between OPC Classic Alarm & Events (A&E) servers to the model described in this document.

Annex A describes recommended localized names for *Alarm* states.

Annex B describes examples (e.g. *Event* sequences, *Alarm* areas in *AddressSpace*).

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC ~~TR~~ 62541-1, *OPC Unified Architecture - Part 1: ~~Overview and~~ Concepts*

IEC 62541-3, *OPC Unified Architecture - Part 3: Address Space Model*

IEC 62541-4, *OPC Unified Architecture - Part 4: Services*

IEC 62541-5, *OPC Unified Architecture - Part 5: Information Model*

IEC 62541-6, *OPC Unified Architecture - Part 6: Mappings*

IEC 62541-7, *OPC Unified Architecture - Part 7: Profiles*

IEC 62541-8, *OPC Unified Architecture - Part 8: Data Access*

IEC 62541-11, *OPC Unified Architecture - Part 11: Historical Access*

IEC 62541-16, *OPC Unified Architecture - Part 16: State Machines*

IEC 62682, *Management of alarm systems for the process industries*

~~EEMUA: 2nd Edition EEMUA 191 – *Alarm System – A guide to design, management and procurement (Appendixes 6, 7, 8, 9)*, available at https://www.eemua.org/Products/Publications/Print/EEMUA-Publication-191.aspx~~

ISA 18.2, *Management of Alarm Systems for the Process Industries*

3 Terms, definitions, abbreviated terms and used data types

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 62541-1, IEC 62541-3, IEC 62541-4, and IEC 62541-5 as well as the following apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

– IEC Electropedia: available at https://www.electropedia.org/

– ISO Online browsing platform: available at https://www.iso.org/obp

3.1.1
Acknowledge
Operator action that indicates recognition of an *Alarm*

Note 1 to entry: ~~This definition is copied from EEMUA. The term "Accept" is another common term used to describe *Acknowledge*. They can be used interchangeably. this document uses *Acknowledge*.~~ In EEMUA Publication 191, "Accept" is another term to describe term *Acknowledge*. Both terms can be used interchangeably. In this document, term *Acknowledge* is used

[SOURCE: IEC 62682:2022, 3.1.2, modified – Note 1 to entry has been added.]

3.1.2
Active
~~state *for an Alarm* that indicates that the situation the *Alarm* is representing currently exists~~

alarm state in which the alarm condition is true

Note 1 to entry: ~~Other common terms defined by EEMUA are "Standing" for an *Active Alarm* and "Cleared" when the *Condition* has returned to normal and is no longer *Active*.~~ In EEMUA Publication 191, "Standing" is another term to describe an *Active Alarm* and "Cleared" is used to describe when the *Condition* has returned to normal and is no longer *Active*.

[SOURCE: IEC 62682:2022, 3.1.3, modified – Note 1 to entry has been replaced.]

3.1.3
AdaptiveAlarm
Alarm for which the setpoint or limits are changed by an algorithm.

Note 1 to entry: *AdaptiveAlarms* are alarms that are adjusted automatically by algorithms. These algorithms can detect conditions in a plant and change setpoints or limits to keep alarms from occurring. These changes occur, in many cases, without *Operator* interactions.

3.1.4
AlarmFlood
condition during which the alarm rate is greater than the *Operator* can effectively manage

Note 1 to entry: OPC UA does not define the conditions that would be considered alarm flooding, these conditions are defined in other standards such as IEC 62682 or ISA 18.2

3.1.5
AlarmManager
application that manages alarms in a system

Note 1 to entry: An *AlarmManager* usually includes higher level functionality like intelligent alarm suppression or dynamic adjustment of limits or other alarm management functionality. It will still act on the alarm model associated with the actual alarm source.