FACTORY ACCEPTANCE TEST (FAT)

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<th>Role/Title</th>
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<td>Reviewer</td>
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Note about document identification: The document properties (date, revision, state) as defined by the document header represents the planned FAT and should be approved using a workflow before any results is filled. After manual completion of the form a new revision will be created and after scanning it should be released using a new workflow. At this stage the document header will not be updated but only represent the planned state of the document.

NOTE: The authoring instruction box should be deleted from the document before it is finalised

Authoring instruction

Text in italic is to be adjusted/removed as applicable.

Text which is not in italic is to be seen as standard text (may be changed as applicable).

This document shall be adjusted as applicable of the Test and Verification Coordinator and then sent for review and approval. After approval, the document shall be printed to be filled in manually. After the test, the document shall be scanned in to the original document and then be sent for new approval as final. Tests shall conform to applicable standard.
**N/A** shall be filled in if tests are not applicable and a comment of reason shall be filled in under Comments referring to applicable clause. Reason may be that the actual test is performed of contractor and documented in contractor document.

**SYSTEM NAME** shall be filled in of **Test and Verification Coordinator** with FBS element name applicable to equipment for test.

**CONTACTS** shall be filled in of **Test and Verification Coordinator** responsible to equipment for test.

**ROLES & RESPONSIBILITIES** shall be filled in of **Test and Verification Coordinator** listing actual test team as applicable and their responsibilities. Listed **testers** shall sign and date their role.

**LIST OF EQUIPMENT FOR TEST** shall be filled in of **Test and Verification Coordinator** specifying equipment for test with sign and date.

**LIST OF REFERENCE DOCUMENTATION** shall be filled in of **Test and Verification Coordinator** specifying reference documentation with sign and date.

**TESTS TO BE PERFORMED** shall be filled in of **Test and Verification Coordinator**.

**SUMMARY FINDINGS** shall be filled in of **test leader** as applicable to detailed findings.

**VALIDATION APPROVAL** shall be filled in of **test leader**. Depending to if detailed findings are approved or rejected, **test leader** summarizes under summary findings and then either approve or reject under validation approval with sign and date. After validation the **test leader** shall hand over this document to **Test and Verification Coordinator** for information and filing or measure. After corrected remarks, **Test and Verification Coordinator** to communicate for a new test.

**DETAILED FINDINGS** shall be filled in of responsible tester with any remarks. After test, document of detailed findings shall be signed and dated of tester and handed over to **Test and Verification Coordinator**. The checkbox remark is to be filled in when remarks are found and a comment to remark shall be filled in under **FAT PUNCH LIST** with reference to clause.

The checkbox approved is to be filled in when remarks are approved of tester.
### VALIDATION DATA - FAT

| SYSTEM NAME: | <<input FBS element name>> |

### CONTACTS

**Test and Validation Coordinator:**

**Test Leader:**

### ROLES & RESPONSIBILITIES

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<td><strong>Tests to be performed</strong></td>
<td><strong>SIGNATURE</strong></td>
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<tr>
<td>Test team</td>
<td>clause</td>
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<td>1. Test and Validation Coordinator</td>
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<td>2. Test Leader</td>
<td>1, 2, 3, 4 &amp; 5</td>
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<td>LIST OF EQUIPMENT FOR TEST</td>
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1. *Electrical control cabinet (Cabinet ID)*

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<td>SIGN:</td>
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<tr>
<td>1. Circuit diagrams</td>
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<td>2. Cabinet lay-out</td>
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<td>3. Parts list</td>
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<td>4. Cable lists</td>
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<td>5. Functional specification</td>
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## VALIDATION APPROVAL

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<td>□ APPROVED</td>
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**SIGN:**

**DATE:**

## TESTS TO BE PERFORMED

*Tests to be performed may be adjusted as applicable*

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<tbody>
<tr>
<td>1. <strong>Check that the electrical equipment complies with the documentation for manufacturing. (according SS EN 60204-1)</strong></td>
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<tr>
<td>2. <strong>Check that conditions for protection against indirect contact by automatic disconnection are fulfilled. (according SS EN 60204-1)</strong></td>
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<tr>
<td>3. <strong>Check insulation resistance. (according SS EN 60204-1)</strong></td>
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<tr>
<td>4. <strong>Check for disruptive discharge occurrence by voltage tests. (according SS EN 60204-1)</strong></td>
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<tr>
<td>5. <strong>Check for residual voltages. (according SS EN 60204-1)</strong></td>
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<td>6. <strong>Check functions. (according SS EN 60204-1)</strong></td>
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## SUMMARY FINDINGS

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</table>
1. Check that the electrical equipment complies with the documentation for manufacturing

Tests to be performed may be adjusted as applicable

1.1 *Conductors* inside control cabinets (colour, type, end sleeves) mounted according to the documentation for manufacturing

☐ N/A  ☐ Remark  ☐ Approved

1.2 *Marking of components* shall be according to manufacturing documentation. The marking shall still be present even if the component is replaced, which means that the marking is to be located beside the component.

☐ N/A  ☐ Remark  ☐ Approved

1.3 *Function Markings* e.g. above the actuators, operator panel, instruments, etc. performed according to manufacturing documentation.

☐ N/A  ☐ Remark  ☐ Approved

1.4 *Components* selected according to the manufacturing documentation.

☐ N/A  ☐ Remark  ☐ Approved

1.5 *Placement of components* inside control cabinets made according to production documentation. Mounting layout shall be compared with the control cabinet. For approval the components shall be positioned so that no confusion of components can be made in comparison with the mounting layout.

☐ N/A  ☐ Remark  ☐ Approved

1.6 *Functional separation* inside control cabinets made according to production documentation. Mounting layout shall be compared with the control cabinet. For approval conductors shall be located in the designated conduit / cable path.

☐ N/A  ☐ Remark  ☐ Approved

1.7 *Marking of equipment* a nameplate shall be mounted adjacent to the incoming supply point (main switch or terminal), according ESS-0015433 Rules for electrical design, Clause regarding Marking of cabinets.

☐ N/A  ☐ Remark  ☐ Approved

1.8 *IP-class* shall comply with documentation for manufacturing

☐ N/A  ☐ Remark  ☐ Approved

1.9 *IP-class 21* (touch-proof) shall be fulfilled inside control cabinet.

☐ N/A  ☐ Remark  ☐ Approved
## DETAILED FINDINGS APPROVAL

1. Check that the electrical equipment complies with the documentation for manufacturing

### Functional bonding
Mounting plate shall be galvanized. Colour at connection points for functional bonding must be removed. Connection points for functional bonding shall be threaded and spring washer positioned adjacent to the screw head.

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### Cable Markings
Cable Markings shall comply with documentation for manufacturing.

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### Routing of installed cables
Routing of installed cables shall comply with documentation for manufacturing.

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### Cable types
Cable types shall comply with documentation for manufacturing.

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### Connections of installed cables
Connections of installed cables shall comply with documentation for manufacturing.

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### Additional Remarks

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<th>DETAILED FINDINGS APPROVAL</th>
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<tr>
<td>2. Check that conditions for protection against indirect contact by automatic disconnection are fulfilled.</td>
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- [ ] APPROVED
- [ ] REJECTED

| SIGN: | SIGN: |
| DATE: | DATE: |

2. Check that conditions for protection against indirect contact by automatic disconnection are fulfilled.

2.1 Check continuity of the protective bonding circuits

- [ ] N/A  [ ] Approved  [ ] Remark

2.2 Check conditions for fault loop impedance by checking that conductor length and area comply with calculation

- [ ] N/A  [ ] Approved  [ ] Remark

2.3 Check settings and characteristics of the associated overcurrent protective devices

- [ ] N/A  [ ] Approved  [ ] Remark

2.4 Check conditions for protection by reducing the touch voltage below 50V by checking that conductor length and area comply with calculation.

- [ ] N/A  [ ] Approved  [ ] Remark

**NOTE** – Equipotential protective bonding conductor area do not need to be larger than 25mm²Cu.

Additional Remarks

2.5 ……………………………………………………………………………………………………………… [ ] Approved
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### 3. Check insulation resistance.

3.1 Check insulation resistance

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Additional Remarks:

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### DETAILED FINDINGS APPROVAL

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### 4. Check for disruptive discharge occurrence by voltage tests.

#### 4.1 Check for disruptive discharge

☐ N/A  ☐ Approved  ☐ Remark

Additional Remarks

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5. Check for residual voltages.

5.1 Check for residual voltages
☐ N/A  ☐ Approved  ☐ Remark

Additional Remarks

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6. Check functions.

Tests to be performed may be adjusted as applicable

6.1 Test Supply disconnecting device by switching on and off. In off position, all electrical supply to the controlled equipment shall be isolated. Selected electrical points are measured and checked that no electrical voltage is present. In on position, all electrical components shall be electrically supplied, and CPU, OP, etc. shall automatically go into RUN mode. (Orange conductors are not covered by the test).

N/A  Approved  Remark

6.2 Emergency Stop Function shall disconnect electric supply to equipment according to risk assessment.

N/A  Approved  Remark

6.3 Active-unacknowledged, active-acknowledged, acknowledged inactive- alarm is indicated.

N/A  Approved  Remark

6.4 Equipment shall not restart automatically after power failure. Example, if a local disconnecting device to a motor is operated, etc.

N/A  Approved  Remark

Additional Remarks

6.5                                                                                                                                         Approved
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6.17                                                                            Approved
### 6. Check functions.

#### 6.18 PLC Test of digital inputs

N/A

The digital inputs are activated by simulating an activation via the terminals, push buttons, turn feedbacks on solenoids, pumps (contactors), etc. The activation of a digital input is controlled via the programming tool by checking its status and the applicable functions via the operator panel (e.g. alarms).

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<td>Remark</td>
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DETAILED FINDINGS APPROVAL

6. Check functions.

6.19 PLC Test of digital outputs  □ N/A

By forcing the digital outputs via the programming tool, the corresponding objects connected to the digital output are activated. If no object connected to the digital output, the output's activation is controlled by a multimeter connected to the last junction of the output.

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<td>Start Pump P01</td>
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</table>
6. Check functions.

6.20 PLC Test of analog inputs  □ N/A

Via a current generator, the analog input signals are simulated. (e.g. If a generated signal of 12mA is applied, the system (e.g. the operator panel) shall indicate 50% (50°C degrees shall be indicated at a temperature input range of 0-100°C). Maximum value, minimum value, and center value is to be simulated for each signal.

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<thead>
<tr>
<th>Physical address</th>
<th>Simulated value</th>
<th>Measured value</th>
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<th>Approval</th>
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<td>12mA</td>
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### DETAILED FINDINGS APPROVAL

#### 6. Check functions.

<table>
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<tr>
<th>Physical address</th>
<th>Simulated value</th>
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<tr>
<td>QW 288</td>
<td>50%</td>
<td>12mA</td>
<td>Control valve</td>
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6.21 Test of analog outputs  □ N/A

Via the programming tool, the analog outputs shall be forced and the output value shall be controlled by multimeter (e.g. output in the PLC of 50%, shall indicate a current of 12mA at a 4-20mA output). Maximum value, minimum value, and center value is to be simulated for each signal.
FAT PUNSCH LIST

Any incomplete work or nonconformities shall be recorded on the FAT punch list and categorized as follows:

a) To be cleared on the spot, FAT to be continue after rectification;
b) Ongoing rectification during FAT;
c) FAT to be repeated;
d) Modifications to be made after FAT, before the system/cabinet/controllers are shipped to site;
e) Remaining work to be rectified i.e. at site;

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