

---

---

## ESS Rules for documentation of electrical systems

---

---

	Name	Role/Title
<b>Owner</b>	Jonas Widing	Section Coordinator (EI and I&C) – Design & Engineering group
<b>Reviewer</b>	Jörgen Mattsson	Electrical Safety Engineer – ES&H
<b>Approver</b>	Peter Rådahl	Head of Division – EIS Division

## TABLE OF CONTENT

## PAGE

1.	DOCUMENTATION.....	3
1.1	Required documentation, descriptions and manuals .....	3
1.2	Preparation of documents for use in electrotechnology.....	4
1.3	Classification and naming of documents .....	4
1.4	Documentation formats .....	6
2.	SYMBOLS .....	6
3.	NAMING AND STRUCTURING.....	6
4.	PARTS DATABASE .....	7
5.	REVISIONING AND VERSIONING OF DOCUMENTS.....	7
6.	REFERENCES.....	8
	DOCUMENT REVISION HISTORY .....	8
	APPENDIX 1 – ESS PARTS LIST.....	9

### List of informal reviewers:

Ronny Sjöholm	Advisor – CF Baseline Team
Frithiof Jensen	WP-Leader – Accelerator Division
Thomas Gahl	Group Leader – Motion Control (NSS)
Benedetto Gallese	Control Engineer – ICS
Peter Asvany	Electrical Engineer – EIS-Division (Target)
Mattias Skafar	Head of Division – Quality Division
Henrik Carling	Head of Division – Integrated Control System

## 1. DOCUMENTATION

Documentation owned by ESS are protected in accordance to ISO16016 "Protection notices for restricting the use of documents and products".

### 1.1 Required documentation, descriptions and manuals

Technical documentation shall be delivered with all the equipment that is delivered to the ESS facility. The set of documentation delivered shall comply as applicable with the SS-EN 13460:2009 "Documentation – Documentation for Maintenance" Chapter 5 as well as other applicable directives and requirements stated in this document. Reason is that a certain level of documentation is needed for CE-marking but also for operation, service and maintenance of the equipment installed.

In addition documentation of an electrical part, assembly or system shall include drawings listed in Table 1 Electrical drawings and reports within the ESS" below.

Document type:	Information presented in document:
Arrangement drawings	Gives detailed information of where things are located at the facility. Also applicable for drawings of cable runways etc.
Front page	General information of the set of drawings.
Table of contents	Gives information of contents.
Fuse table	Gives information of protection devices installed.
Block diagram	Gives information of principal parts and functions within a system.
Single line diagram	Gives an overview of a system. Single line diagrams shall be performed for power distribution and for communication.
Circuit Diagram	Gives detailed information of electrical circuits and functions.
Cabinet lay-out	Gives detailed information the assembly.
Parts list	Gives information of parts included in the design.
Cable lists	Gives information of cable types and routing.
Terminal connection list	Gives detailed information of cables and cores connected.

**Table 1 Electrical drawings and reports within the ESS**

NOTE: Documentation of calculations, analyses and verifications performed shall be handed over in accordance to applicable standards e.g. AFS2008:3 & SS 436 40 00. All relevant certificates shall be handed over to the ESS.

Document Type	Rules
Document Number	ESS-0053443
Date	Mar 15, 2016
Revision	1 (5)
State	Review
Confidentiality Level	Internal

## 1.2 Preparation of documents for use in electrotechnology

Documentation delivered shall conform to SS-EN 61082 "Preparation of documents used in electrotechnology – Part 1: Rules".

## 1.3 Classification and naming of documents

### Naming of documents & files

Documents and files shall be named in accordance to the "Configuration management plan" [ESS-0003688](#).

### Naming of files

Drawing files shall be named in accordance to the "Configuration management plan" [ESS-0003688](#).

### Naming of sheets in electrical drawings

Sheets of electrical drawings shall be designated in accordance to SS-EN 61355-1 "Classification and designation of documents for plants, systems and equipment – Part 1 rules and classification tables" and SS-EN 61082 "Preparation of documents used in electrotechnology – Part 1: Rules".

This means that documents shall be designated with the tag.id of the object it belongs to followed by document code and page number:

FBS-Name	&	Document code	Page number
----------	---	---------------	-------------

As an example we can use motor M3 in transport system W1 and its reference documents:

Tag id of the object: =W1.M3

Datasheets has the document code DA and therefore datasheet of the electrical motor will be designated:

=W1.M3&DA1

Circuit diagrams have the document code FS and will therefore be designated:

=W1.M3&FS1

Service and maintenance descriptions have the document code EDC and will therefore be designated:

=W1.M3&EDC1

Document Type	Rules
Document Number	ESS-0053443
Date	Mar 15, 2016
Revision	1 (5)
State	Review
Confidentiality Level	Internal

Documents delivered to the ESS shall be designated in accordance to Table 2 Documents classes and naming of documents within the ESS" below. SS-EN 61082 – Tabel C.1 and SS-EN 61355 – Tabel A.2 gives further information regarding designation of documents if not covered in the table below.

<b>Designation:</b>	<b>Document type:</b>
AA	Front page
AB	Table of contents
DA	Datasheet
EDC	Service and maintenance description
FA	Overview diagram Single line diagrams Block diagrams
FS	Circuit diagram
FQ	Fuse tables
MA	Connection diagram Connection table Terminal connection diagram
MB	Cable diagram Cable lists
LD	General layout Arrangement drawings Drawings of cable routes
LU	Cabinet layout
PC	Parts list/BOM-list

**Table 2 Documents classes and naming of documents within the ESS**

Document Type	Rules
Document Number	ESS-0053443
Date	Mar 15, 2016
Revision	1 (5)
State	Review
Confidentiality Level	Internal

## 1.4 Documentation formats

The electrical drawings and associated reports shall be delivered in ePLAN .zw1 format. Drawings and reports shall also be delivered in intelligent PDF-format. Drawings must be with full functionality which means that all connections, parts and references etc. has been linked properly in the CAD-tool. Imported .dwg files in ePLAN doesn't give any intelligence. That means that the ability to automatically generate reports and connect data to objects is lost, which is not acceptable.

It is preferred that arrangement drawings and drawings of e.g. cable runways are based on CATIA V6.

Civil design models based on Revit shall be delivered in .rvt format with floor plans defined and with work sharing turned off. Drawings shall also be delivered as CATIA V6 compatible files as below.

General requirements on hand-over CAD-files:

- 2D drawings shall be delivered as a pdf file and a file format compatible with CATIA V6 (recommended dxf and/or dwg) and the native file.
- If 3D files are available they shall be delivered. In this case drawing files shall be delivered in a format compatible with CATIA V6 (preferrably sat, step or igs) plus the native file.

All office documents shall be delivered in MS Word and PDF format.

## 2. SYMBOLS

Symbols used in electrical documentation shall conform to the symbol standard IEC 60617.

## 3. NAMING AND STRUCTURING

Objects within the ESS shall be tagged in accordance with: [ESS-0036752](#), Decision summary for ESS naming, tagging and structuring of data.

For more information see:

[ESS-0048668](#) – “ESS Breakdown Structures Guideline”

[ESS-0015433](#) – “ESS rule for Electrical Design”

#### 4. PARTS DATABASE

Parts used in the design shall preferably be registered in the ESS parts database. Suppliers shall as far as possible strive to use the ESS parts database but if so is not reasonable supplier is responsible to provide a list of components for approval by the ESS. The list of components shall be equivalent to the ESS parts list as shown in appendix 1. The parts list in appendix 1 is an example of how an ESS parts list could look.

#### 5. REVISIONING AND VERSIONING OF DOCUMENTS

Revisions and versioning of drawings are of great importance for traceability in the design work. Within ESS revisions are indexed in accordance to Table 3 Index" below. The first digit in the index indicates the revision of the document and the second digit indicates the version of the revision. The revision of the document will be changed only when the document has reached the lifecycle released in the PLM-system CHESS. All lifecycle steps between released revisions will be indicated as versions of the revision.

Design phase:	Index (Examples):
Initial design	1.1 (First preliminary version of revision 1)
Detailed design	1.2 (Second preliminary version of revision 1)
Detailed documentation	1 (First released revision)

**Table 3 Indexes of revisions**

Example:

##### **Initial design**

A drawing was submitted for initial design review in revision 1, version 1 (Rev.1.1). The design proposal was rejected in the review and the drawing has to be updated. When the drawing is sent for review next time the revision will still be revision 1, but the version will change to version 2 (Rev.1.2). T

##### **Detailed design**

The same drawing has now been updated and submitted for detailed design review in revision 1, version 3 (Rev.1.3). The design proposal was rejected in the review and the drawing has to be updated. When the drawing is sent for review next time the revision will still be revision 1, but the version will change to version 4 (Rev.1.4).

##### **Detailed documentation**

Same drawing has now been approved in the detailed documentation review in revision 1, version 5 (Rev.1.5) which means that it has been released in the PLM-system. Once released in CHESS full revisions will be shown only, in this case Rev.1 will be present.

NOTE: Once released in CHESS full revisions will be shown only. There is no integration between ePLAN and CHESS which means that this information has to be added manually. To avoid confusion it is of great importance that the index stated in the drawing header corresponds to the index in CHESS.

## LIST OF TABLES

Table 1 Electrical drawings and reports within the ESS .....	3
Table 2 Documents classes and naming of documents within the ESS .....	5
Table 3 Indexes of revisions.....	7

## 6. REFERENCES

1. SS-EN 13460:2009 – Documentation – Documentation for maintenance.
2. SS-EN 61082 - Preparation of document used in electrotechnology.
3. SS-EN 61355 – Classification and designation of documents for plants, systems and equipment.
4. SS-EN 81346 - Industrial systems, installations and equipment and industrial products - Structuring principles and reference designations.
5. [ESS-0008797](#) – ESS Procedure for Management of Controlled Documents.

## DOCUMENT REVISION HISTORY

Revision	Reason for and description of change	Author	Date
1	First revision of the Rule for Documentation of Electrical Systems.	Jonas Widing	2016-04-12



