

INTERNATIONAL STANDARD

NORME INTERNATIONALE



Document kinds for electrical and instrumentation projects in the process industry

Types de documents pour les projets relatifs aux systèmes électriques et aux instruments de fonctionnement dans l'industrie de transformation



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INTERNATIONAL
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INTERNATIONAL ELECTROTECHNICAL COMMISSION

DOCUMENT KINDS FOR ELECTRICAL AND INSTRUMENTATION PROJECTS IN THE PROCESS INDUSTRY

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The text of this standard is based on the following documents:

FDIS	Report on voting
65/580/FDIS	65/583/RVD

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

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

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INTRODUCTION

The engineering in the process industry is driven by international cooperation. Due to economic reasons, special know-how, special licence, authorization or simply capacity utilisation the work is split between partners. They will arrange their cooperation for each individual project differently. This requires well defined split of work and responsibilities. Documents are the basis for these definitions since they are the result of any engineering work.

If there is only the name of a document without further description of form and content, it will be likely that each partner develops their own view of the result of their efforts. Therefore, for each project the definition of deliverable documents is a major issue. The name of a document is often used for similar but in detail different documents. This standard will take the most commonly used name from synonymous names as the document kind name, intending to make other alternatives obsolete.

The first aim of this standard is to avoid misunderstandings and erroneous elaboration of documents in order to reduce additional corrective works and expenses for clarification between partners.

The second aim is to provide the convenience of document handling by using the IEC 61355 database. This standard will provide document kind names, document kind classification codes specified by IEC 61355, and some templates.

To cover these aims, we specify individual document kind names, but do not specify which documents are mandatory or optional.

DOCUMENT KINDS FOR ELECTRICAL AND INSTRUMENTATION PROJECTS IN THE PROCESS INDUSTRY

1 Scope

This International Standard defines specific documents and their basic content required for electrical and instrumentation projects in the process industry.

This standard specifies the document kind name and the mandatory content of the document kind.

Documents used in the phases of a project from the concept phase to the mechanical completion are covered (see IEC 62337).

Documents for project management and quality assurance are included.

Documents for commercial project administration are excluded.

Examples of documents are provided for easy reference, understanding and usage.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60617, *Graphical symbols for diagrams*

IEC 60079-10-1, *Explosive atmospheres – Part 10-1: Classification of areas – Explosive gas atmospheres*

IEC 60079-11, *Explosive atmospheres – Part 11: Equipment protection by intrinsic safety "i"*

IEC 61082-1, *Preparation of documents used in electrotechnology – Part 1: Rules*

IEC 61131-3, *Programmable controllers – Part 3: Programming languages*

IEC 61355 (all parts), *Classification and designation of documents for plants, systems and equipment*

IEC 61355-1:2008, *Classification and designation of documents for plants, systems and equipment – Part 1: Rules and classification tables*

IEC 61511 (all parts), *Functional safety – Safety instrumented systems for the process industry sector*

IEC 61987-10, *Industrial-process measurement and control – Data structures and elements in process equipment catalogues – Part 10: Lists of properties (LOPs) for industrial-process measurement and control for electronic data exchange – Fundamentals*

IEC 62337, *Commissioning of electrical, instrumentation and control systems in the process industry – Specific phases and milestones*

IEC 62381, *Automation systems in the process industry – Factory acceptance test (FAT), site acceptance test (SAT), and site integration test (SIT)*

IEC 62424, *Representation of process control engineering – Requests in P&I diagrams and data exchange between P&ID tools and PCE-CAE tools*

IEC 82079-1, *Preparation of instructions for use – Structuring, content and presentation – Part 1: General principles and detailed requirements*

ISO 10006, *Quality management systems – Guidelines for quality management in projects*

ISO 10628, *Flow diagrams for process plants – General rules*

3 Terms, definitions, abbreviated terms and acronyms

3.1 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1.1

activity

smallest identified item of work in a project

[SOURCE: ISO 10006: 2003, 3.1]

3.1.2

document

fixed and structured amount of information intended for human perception that can be managed and interchanged as a unit between users and systems

[SOURCE: IEC 61355-1: 2008, 3.2, modified – notes removed for easy understanding.]

3.1.3

document kind

type of document defined with respect to its specified content of information and form of presentation

[SOURCE: IEC 61355-1: 2008, 3.6, modified – note removed for easy understanding.]

3.1.4

document request

document which requests to prepare or provide a set of documents

3.1.5

documentation

collection of documents related to a given subject

[SOURCE: IEC 61355-1: 2008, 3.5, modified – notes removed for easy understanding.]

3.1.6

export permission

authority permission to transport e.g. embargo goods from the country of origin to its intended country of destination

3.1.7**identifier**

attribute associated with an object to unambiguously distinguish it from other objects within a specified domain

[SOURCE: IEC/ISO 81346-1: 2009, 3.10]

3.1.8**process industry**

industry that uses chemical reactions, separations, or mixing techniques in order to create new products, modify existing products or treat waste and includes the following types of industries: chemical, petrochemical, waste treatment, paper, cement, etc. It does not include such industries as equipment/machine manufacturing or similar industries. Industries which are subject to special requirements and or validation, etc. are also not included

[SOURCE: IEC 62337: 2012, 3.13]

3.1.9**project**

sum of commercial, technical and other activities related to a specific object

[SOURCE: IEC 61355-1: 2008, 3.12 modified – definition adapted to comply with the ISO/IEC Directives, Part 2.]

3.1.10**work package**

subset of a project forming a group of activities having common characteristics such as purpose, theme, object, responsible, time frame, etc.

3.2 Abbreviated terms and acronyms

DCS	Distributed control system
DLOP	Device list of properties
E&I	Electrical and instrumentation
ESD	Emergency shutdown system
Ex-i	Intrinsic safety "i" according to IEC 60079-11
FAT	Factory acceptance test
I/O	Input/output
ID	Identifier
IT	Information technology
OLOP	Operating list of properties
P&ID	Piping and instrumentation diagram
PLC	Programmable logic controller
SAT	Site acceptance test
SIF	Safety instrumented function
SIL	Safety integrity level
SIS	Safety instrumented system
SIT	Site integration test
SRS	Safety requirement specification

4 Conformity

4.1 Document

Conformance of a document with this international standard may be declared if the following is fulfilled:

The document kind name shall be indicated on the respective document. If the document contains more than one page, the document kind name may be shown on the cover sheet only. The document kind name defined in this standard shall be used.

In addition, a reference to this international standard shall be made in close relation with the usage. A footnote or endnote may be used for this purpose.

Furthermore the final document shall contain all mandatory contents defined in this international standard as a minimum. If data is not or not completely available at the point of time the document is issued, the document may claim conformity with this standard if the missing information is clearly marked as to be given later. A general note declaring the document as being in progress may be used.

4.2 Document request

Conformance of a document request with this international standard may be declared if the following is fulfilled:

The document kind name defined in this standard shall be used.

In addition, a reference to this international standard shall be made in close relation with the usage. A footnote or endnote may be used for this purpose.

5 Document kinds

Table 1 lists document kinds with their properties listed below.

- "Document kind name" indicates the name of the document kind.
- "Description" is the short description of the kind of information to be provided by the document kind.
- "Mandatory content" indicates mandatory information included in the document kind.
- "DCC" indicates a document kind classification code of the document kinds according to IEC 61355-1. The document kind classification code shown is informative only since IEC 61355 may leave other classifications open to the user.
- "Identifier" is a number which together with the DCC is used within this standard to reference the items.
- "Example" shows where an example can be accessed.

Table 1 – Document kinds (1 of 12)

Document kind name	Description	Mandatory content	DCC (informative)	Identifier	Example
List of documents	Formal list of content of a document package or a documentation.	- Drawing / document number - Number of sheets - Revision index - Document designation code - Title of document	AB	001	Figure B.1
Punch list	List of all open tasks.	- Task ID - Task description - Task owner - Due date - Priority - Status	BB	001	Figure B.2
Work breakdown structure (WBS)	Structured list of major work packages. It has a tree structure which covers all works required to perform the projects scope and includes all deliverables. The use is described in ISO 10006.	See ISO 10006	BD	001	
Communication plan	Binding agreement regarding permitted ways of information and partners including rules for content and frequency. For further details see ISO 10006.	See ISO 10006	BD	002	
Project execution plan	Execution plan to confirm the project over all scope.	- Scope - Schedule - Documents lists - Organization - Communication plan	BD	003	
Manpower mobilization plan	Bar chart schedule with associated personnel resources and qualifications. For further details of resource planning see ISO 10006.	See ISO 10006 - Name of resource - Resources related to time	BE	001	Figure B.3
Time schedule	Representation of start and end dates of activities from work breakdown structure and main milestones according to IEC 62337.	- Defined activity - Division of activities into sub-activities, if required (e.g. preliminary studies, engineering, manufacturing, testing, dispatch, erection, commissioning, etc.) - Start and end dates for each activity	BE	002	
Equipment list with export restriction	List of equipment requiring export permission.	- Type of equipment - Reference to applicable export restriction	BF	001	

Table 1 (2 of 12)

Document kind name	Description	Mandatory content	DCC (informative)	Identifier	Example
Instrument data sheet	Data sheet with data for an instrument loop required for operation and maintenance. The document is typically used to transfer data between the different phases of the whole life-cycle.	- ID - Function - Description - Measuring range - Location - Process data - Instrument data	DA	001	Figure B.4
Identification system	Coding system for objects within a complex or plant.	- Scope of identification system - Coding rules	DB	001	
Test and maintenance recommendations	List of recommended test and maintenance activities.	- Description of recommended activities - Affected objects - Frequency	DC	001	Figure B.5
Operating manual	Manufacturer's instruction for the intended handling and using of a device or system according to IEC 82079-1.	See IEC 82079-1	DC	002	
Test and maintenance requirements	List of legally required or necessary test and maintenance works.	- Description of required activities - Affected objects - Frequency - Designation and title of applicable law or regulation	DZ	001	Figure B.6
General design requirements	Mandatory design rules adapted from project specific requirements as well as from relevant legal requirements and regulations.	- Scope - Description of rules - Designation and title of applicable law or regulation	EC	001	
Electrical consumer list	Tabulated list with all electrical consumers.	- Load ID - Load type (i.e. motor, etc.) - Description - Rated power - Rated current - Rated voltage	EC	002	Figure B.7
Lighting concept	Lighting design guide in compliance with applicable rules and standards paying attention to the safety concept. Typically the concept is further detailed than the general design requirements.	- Scope - Designation and title of applicable law or regulation - Design rules for lighting	EC	003	

Table 1 (3 of 12)

Document kind name	Description	Mandatory content	DCC (informative)	Identifier	Example
Concept for communication equipment	Design guide in compliance with applicable rules and standards for electrical systems such as: - warning system - fire alarm system - alarm and signaling system - general communication systems - IT systems - security systems - video surveillance systems etc. Typically the concept is further detailed than the general design requirements.	- Scope - Designation and title of applicable law or regulation - Design rules for communication equipment	EC	004	
Lightning protection, grounding and equipotential bonding concept	Design guide in compliance with applicable rules and standards for the design of lightning protection, grounding and equipotential bonding taking the local conditions into account. Typically the concept is further detailed than the general design requirements.	- Scope - Designation and title of applicable law or regulation - Design rules for lightning protection, grounding and equipotential bonding	EC	005	
Cathodic corrosion protection concept	Design guide in compliance with applicable rules and standards for the design of a cathodic corrosion protection system taking the local conditions into account. Typically the concept is further detailed than the general design requirements.	- Scope - Designation and title of applicable law or regulation - Design rules for cathodic corrosion protection	EC	006	
Electrical heat tracing concept	Design guide in compliance with applicable rules and standards for the design of an electrical heat tracing system taking the local conditions into account. Typically the concept is further detailed than the general design requirements.	- Scope - Designation and title of applicable law or regulation - Design rules for electrical heat tracing	EC	007	
Heating circuit list	List of all heating circuits.	- ID - Heated equipment - Heating cable type - Maintenance temperature - Starting point - Length - Power	EC	008	Figure B.8

Table 1 (4 of 12)

Document kind name	Description	Mandatory content	DCC (informative)	Identifier	Example
Requirement specification	This document includes the necessary requirements of E&I equipment describing the task, the operational conditions and additional information as for example using a subset of the operating list of properties (OLOP) according to IEC 61987-10. It is typically the user's technical input to the purchasing process.	See IEC 61987-10 - Base conditions - Process case - Operating conditions for device design - Process equipment - Location	EC	009	Figure B.9
Specification sheet	This data sheet includes data describing a particular implementation of the E&I equipment specified by the requirement specification, as for example using a subset of the device list of properties (DLOP) according to IEC 61987-10. It is typically the common basis of the user and manufacturer for the purchasing process and contains the manufacturer's technical input from the offer. The information out of the requirement specification can be indicated.	See IEC 61987-10 - ID - Application - Function and system design - Input - Output - Digital communication - Performance - Rated operating conditions - Mechanical and electrical construction - Operability - Power supply - Certificates and approval - Component part ID	EC	010	Figure B.10
Loop list	Tabulated list of all E&I IDs.	- ID - Function - P&ID reference	EC	011	Figure B.11
Technical specification	Complete description of all requirements for the realization (e.g. of an automation system).	- Scope - Requirements	EC	012	
Test specification	Definition of test purpose, extent and execution.	- Scope - Related documentation - Function to be tested - Test environment - Test result documentation - Test procedure	EC	013	
Construction bill of quantities	List of required works for complete erection of a system, plant or unit including expected quantity.	- Scope - Required works - Quantities	EC	014	Figure B.12

Table 1 (5 of 12)

Document kind name	Description	Mandatory content	DCC (informative)	Identifier	Example
Specification E&I process connections	Definition of nozzle design for various applications (pressure, temperature, level, etc.).	- Nozzle design	EC	015	Figure B.13
User requirement specification	Rough user specification in view of the customer, to be detailed by the technical specification.	- Scope - User requirements	EC	016	
Safety requirement specification (SRS)	Requirements for SIF design according to IEC 61511.	See IEC 61511	EC (alt. QB)	017	
Power supply system study	Impact analysis for the power distribution due to a short circuit. Additional studies could be supplemented (load flow, motor start, harmonics, selectivity, settings of protection devices, etc.).	- Scope - Short circuit location assumed - Impact	ED	001	
Cable sizing calculation	Cable sizing calculation of cables considering laying requirements, ambient conditions, and network topology for the specified operating conditions.	- Scope of calculation - Requirements - Topology - Ambient conditions assumed - Result of calculation	ED	002	
Illuminance calculation	Lighting system design calculation taking local conditions into account.	- Scope of calculation - Requirements - Local conditions assumed	ED	003	
Calculation of the cathodic corrosion protection system	Design calculation of the cathodic corrosion protection system taking the local conditions into account.	- Scope of calculation - Requirements - Ambient conditions assumed - Result of calculation	ED	004	
Calculation of the electrical heat tracing	Design calculation of the electrical heat tracing taking into account ambient conditions and the system topology.	- Scope of calculation - Requirements - Topology - Ambient conditions assumed - Result of calculation	ED	005	
Ex-i calculation sheet	Calculation verifying that within a circuit with type of protection Ex-i all apparatuses are operated within their certified values.	- Scope of calculation - Requirements - Topology - Ambient conditions assumed - Result of calculation	ED	006	Figure B.14

Table 1 (6 of 12)

Document kind name	Description	Mandatory content	DCC (informative)	Identifier	Example
Heat dissipation summary	Heat dissipation summary of electrical equipment in switch, rack and control room.	- Scope - Target system - Location - Grouping - Heat dissipation	ED	007	Figure B.15
Electrical single line diagram	Simplified schematic drawing of power distribution with graphic symbols and circuits – not showing any control wiring.	- Scope of drawing - Symbols and IDs of power source - Symbols and IDs of power consumer - Symbols and IDs of power circuits	FA	001	Figure B.16
Structure diagram DCS/PLC/SIS	Simplified schematic drawing of control systems and their network topology by graphical symbols – not showing any secondary wiring.	- Scope of drawing - Symbols and IDs of subsystem - Symbols and IDs of interconnection	FA	002	Figure B.17
Piping and instrumentation diagram (P&ID)	Diagram according to ISO 10628 including plant process equipment and connecting piping. E&I equipment shown according project specific requirements and IEC 62424.	See ISO 10628	FB	001	Figure B.18
Process flow diagram	Diagram according to ISO 10628 including plant process equipment and important connecting piping. Important E&I equipment shown according project specific requirements.	See ISO 10628	FB	002	
HMI specification	This specification contains detailed graphic standards and hierarchy of the human machine interface e.g. group-, trend-, alarm- and operator display.	- Scope of specification - ID of target HMI system - Designation and specifications of display screen - Hierarchy of display screens	FC	001	
Function description	Verbal description of task, function, operator interface and operation of closed control loop or open loop control like sequence, batch control and interlocks.	- Scope of description - Target - Functional descriptions	FE	001	Figure B.19

Table 1 (7 of 12)

Document kind name	Description	Mandatory content	DCC (informative)	Identifier	Example
Function block diagram	Graphical description of closed or open control loops following rules as e.g. given in IEC 61131-3 function block diagram with symbols according to IEC 60617.	- Graphical symbols for objects representing functions - Graphical symbols representing functional connections or interrelations - Interface terminals and designations - Signal designations	FF	001	Figure B.20
Cause and effect matrix	Actuators and sensors assigned to columns and rows according to their function, including their related switching and/or alarm function.	- Scope of document - Cause ID (inputs) - Effect ID (outputs) - Referenced documents - Description - Safety requirements - Relation between causes and effects	FF	002	Figure B.21
Signal list	List of all signals. See IEC 61082-1.	- ID - Description - Source - Target - Type	FP	001	Figure B.22
I/O list	Extract of all signals from or to an automation system out of the signal list.	- ID - Input or output designation	FP	002	Figure B.23
Trip point list	Tabulated list of all process values resulting in a switching function of E&I equipment.	- ID of process value - Condition to trip	FQ	001	Figure B.24
Configuration parameter list	Tabulated list of all variable parameter for E&I equipment.	- ID of equipment - ID of parameters - Value for parameter	FQ	002	Figure B.25

Table 1 (8 of 12)

Document kind name	Description	Mandatory content	DCC (informative)	Identifier	Example
Circuit diagram	Schematic drawing of current path without consideration of spatial and mechanical position of the electrical equipment. See IEC 61082-1.	- Graphical symbols representing the objects - Graphical symbols representing the connections among objects - Reference designations - Terminal designations - Signal level conventions (applicable to logic signals) - Information necessary to trace paths and circuits (signal designations, location) - Supplementary information necessary for the understanding of functions	FS	001	
Loop diagram	Representation of hardware and/or software functions of a control loop with graphical symbols according to IEC 60617. It shows equipment in its topological order and wiring including the terminals.	- ID of loop - Symbols according to IEC 60617	FS	002	Figure B.26
Bus layout drawing	Representation of all bus participants including their communication address and relation.	- ID of bus - ID of bus participant - Their address - Relation between participant	FS	003	Figure B.27
Main cable tray layout	Arrangement drawing showing the major cable trays in the plot plan.	- ID of cable tray - Location	LD (alt. LH)	001	
Cable route section	List of cables at a defined point along a cable route.	- Location - List of cable ID	LD (alt. LH)	002	
Plot plan E&I	Presentation of the locations of E&I equipment in the plot plan.	- ID of equipment - Location	LD (alt. LH)	003	Figure B.28
Instrument air supply plot plan	Layout of main instrument air pipes and equipment in the plot plan.	- ID of equipment - Location - Representation of air pipes	LD (alt. LH)	004	
Plot plan	Graphic representation of major equipment and structures in a given area in a top view drawing to scale. At least outlines of these equipments are shown. Other views may be added.	- ID and representation of equipment or structure - Outline of equipment and structure - Location	LD (alt. LH)	005	

Table 1 (9 of 12)

Document kind name	Description	Mandatory content	DCC (informative)	Identifier	Example
Arrangement drawing	Construction document for lighting, earthing, lightning protection, cathodic protection, heat tracing, cable trays, etc. The drawing contains the location of individual components or group of components and its designation with the required level of detail for the erection.	- Scope of drawing - ID and representation of component or group of components - Their representation - Location	LD (alt. LH)	006	Figure B.29
Allocation plan wall bushing	Survey of all cable bulkheads, which contains:	- Cable ID - Position	LH	001	
Cabinet layout drawing	Drawing to scale of equipment, terminal strips, cable trays, etc., in cabinets, consoles and similar equipment.	- ID of cabinet, console or similar equipment - ID and representation of components in the cabinet - Position of component	LU	001	Figure B.30
Allocation plan	Allocation of objects defining the usage of the object's resources with declaration of object resource and identification of resource consumer (e.g. signal allocation of an multichannel I/O card).	- ID of object - Object's resource - Declaration of object resource - Resource consumer	LU	002	
Terminal connection diagram	Schematic representation of terminal strips including designation of all connected wires, cables and jumper for each terminal.	- ID of the connected objects	MA	001	Figure B.31
Cross wiring diagram	Terminal diagram of incoming and outgoing terminals typically of a marshalling cabinet including their cross wiring connections.	- Scope of document - Incoming signal - Outgoing signal - Corresponding terminal ID	MA	002	
Conceptual wiring diagram	Conceptual wiring diagram of instruments, system components and their auxiliary power supplies. Drawing shows equipment, location of all terminals and type of connection between terminals for all type of signals.	- Graphical symbols according to IEC 60617 or defined project specific, representing E&I components - E&I component interconnections	MA	003	Figure B.32
Cable list	List of all electrical cables.	- Cable ID - Cable type - Cable cross section - Starting point - End point - Length	MB	001	Figure B.33

Table 1 (10 of 12)

Document kind name	Description	Mandatory content	DCC (informative)	Identifier	Example
Cable laying list	Tabulated list containing the starting point, the cable route sections and the end point in the course of a cable.	- Cable ID - Cable starting point - Cable route section - Cable end point	MB	002	Figure B.34
Material take off	Specification and quantity for bulk material.	- Name of material - Its specification - Its quantity	PA	001	Figure B.35
Spare parts list	List of recommended spare parts for a specific purpose or period with all required details for procurement.	- Item reference number - Quantity - ID of the spare part - Name of manufacturer or supplier of the spare part - Part name	PB	001	Figure B.36
Instrument index	Tabulated list of all instruments per ID.	- ID - Instrument type - Labelling	PB	002	Figure B.37
System log book	Detailed list of all hardware and software releases of a system.	- ID of hardware - Its revision of software	PD	001	Figure B.38
Quality plan	Description of basic processes within the projects phases securing the contractual requirements regarding product quality, health, safety and environment.	See ISO 9000:2005	QA	001	
Test plan	Overview of tests as provided in the contract.	- Scope of test - Purpose - Target - Related document	QA	002	
List of deficiencies	List of faulty characteristics or incomplete performed tests which are finally unremedied.	- Scope of document - Faulty characteristics or incomplete performed tests	QA	003	
Check list	List of all tests.	- Scope of document - List of all tests	QA	004	
Hazardous area classification drawing	Plan showing hazardous areas and the related equipment according to IEC 60079-10-1.	- Location - Classification of areas - Related equipment - Dimensions	QB	001	

Table 1 (11 of 12)

Document kind name	Description	Mandatory content	DCC (informative)	Identifier	Example
Safety concept for power supply	Definition of preventive measures for persons, electrical equipment and plant availability.	- ID of preventive measures - Purpose - Procedure	QB	002	
SIL classification	SIL classification according to IEC 61511.	- Scope of document - Loop ID - SIL classification	QB	003	
Material safety data sheet (MSDS)	Details of used chemical media including ID, name and main physical and chemical properties.	- ID of material - Name of material class - Properties - Location - Quantity	QB	004	
Certificate	Proof and certificate for type specific or individual properties of supplied devices or systems.	- Designation of target device, system, or project - Type of target - Designation and title of applicable law or regulation - Approval of issuer	QC	001	
Test report	Document verifying tested characteristics of a certain object.	- Date of testing - Signature of person responsible for test - Object ID (type, series number, etc.) - Measured values	QC	002	
Acceptance documentation	Certificate of FAT, SAT or SIT according to IEC 62381.	- Certificate according to IEC 62381	QC	003	
Test sheet for SIF	Specification of required tests and confirmation of correct completion.	- Scope of document - Designation of test plan document - Punch list	QC	004	
SIL verification	Verification that the required SIL classification is achieved.	- Scope of document - Loop ID - SIL classification - Information of verification	QC	005	

Table 1 (12 of 12)

Document kind name	Description	Mandatory content	DCC (informative)	Identifier	Example
Installation drawing (hook-up)	Schematic drawing and basic construction details for the installation of E&I equipment with all interconnections and required bill of materials.	- Scope of document - ID and symbol of E&I equipment - Representation of interconnection - Part list	TC	001	Figure B.39
Assembly drawing	Drawing with main dimensions and connecting details.	- Dimensions - Arrangement - Method of assembly	TC	002	Figure B.40

Annex A (informative)

Names of document kinds in different languages

Table A.1 and Table A.2 show the names of document kinds in different languages.

Table A.1 – Names of document kinds in English and French (1 of 4)

Document kind	Type de document	DCC	Identifiant
List of documents	Liste des documents	AB	001
Punch list	Liste des points résiduels	BB	001
Work breakdown structure (WBS)	Plan structurel des projets	BD	001
Communication plan	Plan de la communication	BD	002
Project execution plan	Plan d'exécution du projet	BD	003
Manpower mobilization plan	Planning du personnel	BE	001
Time schedule	Agenda	BE	002
Equipment list with export restriction	Liste de l'équipement avec les interdictions d'export	BF	001
Instrument data sheet	Feuille de postes PLT	DA	001
Identification system	Système d'étiquetage	DB	001
Test and maintenance recommendations	Instruction d'essai et d'entretien	DC	001
Operating manual	Manuel d'utilisation	DC	002
Test and maintenance requirements	Règlement d'essai et d'entretien	DZ	001
General design requirements	Spécification générale pour l'ingénierie	EC	001
Electrical consumer list	Liste des consommateurs électriques	EC	002
Lighting concept	Concept d'éclairage	EC	003
Concept for communication equipment	Concept de communication de l'équipement	EC	004
Lightning protection, grounding and equipotential bonding concept	Concept de protection contre la foudre, la mise à la terre et le câblage des équipotentiels	EC	005
Cathodic corrosion protection concept	Concept de protection anticorrosion cathodique	EC	006
Electrical heat tracing concept	Concept pour le chauffage électrique et la tuyauterie des appareils	EC	007
Heating circuit list	Liste des circuits de chauffage	EC	008

Table A.1 (2 of 4)

Document kind	Type de document	DCC	Identifiant
Requirement specification	Spécification des exigences	EC	009
Specification sheet	Spécification de l'équipement	EC	010
Loop list	Liste de postes PLT	EC	011
Technical specification	Cahier des charges	EC	012
Test specification	Spécification de contrôle	EC	013
Construction bill of quantities	Cahier des charges du montage	EC	014
Specification E&I process connections	Spécification des connexions des processus PLT	EC	015
User requirement specification	Cahier des charges	EC	016
Safety requirement specification (SRS)	Spécification des demandes de sécurité	EC	017
Power supply system study	Etude du réseau électrique	ED	001
Cable sizing calculation	Calcul de dimension des câbles	ED	002
Illuminance calculation	Calcul de l'éclairage	ED	003
Calculation of the cathodic corrosion protection system	Calcul de la protection anticorrosion cathodique	ED	004
Calculation of the electrical heat tracing	Calcul du chauffage électrique et de la tuyauterie des appareils	ED	005
Ex-i calculation sheet	Feuille de calcul Ex-i	ED	006
Heat dissipation summary	Inventaire des pertes de chaleur	ED	007
Electrical single line diagram	Schéma unifilaire de la distribution de l'énergie	FA	001
Structure diagram DCS/PLC/SIS	Schéma de structure SNCC, API	FA	002
Piping and instrumentation diagram (P&ID)	Schéma instruments de fonctionnement et des conduites (schéma de fonctionnement R&I)	FB	001
Process flow diagram	Schéma des procédés	FB	002
HMI specification	Spécification de l'interface utilisateur	FC	001
Function description	Description des fonctions	FE	001
Function block diagram	Diagramme fonctionnel	FF	001
Cause & effect matrix	Tableau cause-effet	FF	002
Signal list	Liste des signaux	FP	001
I/O list	Liste des E/S	FP	002
Trip point list	Liste des points de déclenchement	FQ	001

Table A.1 (3 of 4)

Document kind	Type de document	DCC	Identifier
Configuration parameter list	Liste des paramètres de configuration	FQ	002
Circuit diagram	Schéma électrique	FS	001
Loop diagram	Schéma des boucles	FS	002
Bus layout drawing	Plan des bus	FS	003
Main cable tray layout	Vue synoptique: cheminement des câbles	LD	001
Cable route section	Tracé du cheminement du câble	LD	002
Plot plan E&I	Plan local E&I	LD	003
Instrument air supply plot plan	Plan de l'alimentation en air des instruments	LD	004
Plot plan	Plan de mise sur pied	LD	005
Arrangement drawing	Plan d'installation	LD	006
Allocation plan wall bushing	Plan du passage des câbles	LH	001
Cabinet layout drawing	Schéma de l'armoire	LU	001
Allocation plan	Schéma des dispositions	LU	002
Terminal connection diagram	Schéma des bornes	MA	001
Cross wiring diagram	Schéma croisé du câblage	MA	002
Conceptual wiring diagram	Plan de conception du câblage	MA	003
Cable list	Liste des câbles	MB	001
Cable laying list	Schéma du tracé des câbles	MB	002
Material take off	Bordereau des matériaux	PA	001
Spare parts list	Liste des pièces détachées	PB	001
Instrument index	Liste d'appareils PLT	PB	002
System log book	Journal de bord du système	PD	001
Quality plan	Plan qualité	QA	001
Test plan	Plan d'essai	QA	002
List of deficiencies	Liste des manquants	QA	003
Check list	Liste d'essai	QA	004
Hazardous area classification drawing	Plan de classification des zones dangereuses	QB	001
Safety concept for power supply	Concept des protections de l'alimentation	QB	002
SIL classification	Classification SIL	QB	003
Material safety data sheet (MSDS)	Fiche technique de sécurité	QB	004
Certificate	Certificat	QC	001
Test report	Procès-verbal d'essai	QC	002

Table A.1 (4 of 4)

Document kind	Type de document	DCC	Identifïer
Acceptance documentation	Documentation de réception	QC	003
Test sheet for SIF	Feuille d'essai pour appareillages de protection	QC	004
SIL verification	Contrôle SIL	QC	005
Installation drawing (hook-up)	Schéma du montage	TC	001
Assembly drawing	Dessin de montage	TC	002

Table A.2 – Names of document kinds in Chinese and German (1 of 3)

文件种类	Dokumentenart	DCC	Identifïer
文件列表	Dokumentenliste	AB	001
剩余工作清单	Restpunktliste	BB	001
工作分解结构	Projektstrukturplan	BD	001
沟通计划	Kommunikationsplan	BD	002
项目实施计划	Projektabwicklungsplan	BD	003
人力动员计划	Personaleinsatzplan	BE	001
时间表	Terminplan	BE	002
限制出口设备清单	Liste ausfuhrkritischer Ausrüstungen	BF	001
仪表数据表	PLT-Stellenblatt	DA	001
标识系统 标识制	Kennzeichnungssystem	DB	001
测试与维护建议	Prüf- und Wartungsanleitung	DC	001
使用说明书	Betriebsanleitung	DC	002
测试与维护要求	Prüf- und Wartungsvorschrift	DZ	001
总体设计要求	Allgemeine Engineeringspezifikation	EC	001
电气易耗品表	Liste elektrischer Verbraucher	EC	002
照明概念设计大纲	Beleuchtungskonzept	EC	003
通信设备概念设计大纲	Konzept für Kommunikationseinrichtungen	EC	004
防雷、接地与等电位连接概念设计大纲	Konzept Blitzschutz, Erdung und Potentialausgleich	EC	005
阴极腐蚀防护概念设计大纲	Konzept kathodischer Korrosionsschutz	EC	006
电伴热概念设计大纲	Konzept elektrische Begleitheizung	EC	007
加热电路列表	Heizkreisliste	EC	008
要求规范 需求规范	Anforderungs Spezifikation	EC	009
规范明细表	Geräte Spezifikation	EC	010
回路列表	PLT-Stellenliste	EC	011
技术规范	Pflichtenheft	EC	012
测试规范	Prüfspezifikation	EC	013



Table A.2 (2 of 3)

文件种类	Dokumentenart	DCC	Identifier
建设工程量清单	Montage Leistungsverzeichnis	EC	014
E&I过程连接规范	Spezifikation PLT Prozessanschlüsse	EC	015
用户要求规范	Lastenheft	EC	016
安全要求规范 (SRS)	Spezifikation der Sicherheitsanforderungen	EC	017
供电系统研究	Netzberechnung Energieversorgung	ED	001
电缆选型计算	Berechnung der Kabel Dimensionierung	ED	002
照度计算	Berechnung der Beleuchtungsstärke	ED	003
阴极腐蚀防护系统计算	Berechnung kath. Korrosionsschutzanlage	ED	004
电伴热计算	Berechnung elektrischer Begleitheizung	ED	005
Ex-i计算表	Ex-i Berechnung	ED	006
热耗散汇总表	Zusammenstellung der Wärmeverluste	ED	007
电气单线图	Übersichtsschaltplan der Energieversorgung	FA	001
DCS/PLC/SIS结构图	Strukturdiagramm PLS/SPS/ESD	FA	002
管道仪表流程图 (P&ID)	Rohrleitungs- und Instrumentenfließbild (R&I-Fließbild)	FB	001
工艺流程图	Verfahrensfließbild	FB	002
HMI规范	Spezifikation Bedien- und Beobachtungsoberfläche	FC	001
功能描述	Funktionsbeschreibung	FE	001
功能块图	Funktionsplan	FF	001
因果矩阵	Ursache-Wirkungs Tabelle	FF	002
信号明细表	Signalliste	FP	001
I/O明细表	E/A-Liste	FP	002
触发点明细表	Grenzwertliste	FQ	001
配置参数明细表	Parameterliste	FQ	002
线路图	Stromlaufplan	FS	001
回路图	PLT-Stellenplan	FS	002
总线配线图	Bus Strukturplan	FS	003
主电缆槽布置图	Kabeltrassen Übersichtsplan	LD	001
分段电缆部件表	Kabeltrassenschnitt	LD	002
E&I总图?	Lageplan PLT	LD	003
仪表气源配置图	Lageplan Instrumenten Luftversorgung	LD	004
总图	Aufstellungsplan	LD	005
布置图	Installationsplan	LD	006

Table A.2 (3 of 3)

文件种类	Dokumentenart	DCC	Identifier
穿墙套管配置方案	Belegungsplan Kabel-Wanddurchführung	LH	001
机柜布置图	Schrankschrankbauplan	LU	001
配置方案	Belegungsplan	LU	002
端子接线图	Anschlussplan	MA	001
交叉布线图	Rangierplan	MA	002
接线示意图	Strukturplan der Verdrahtung	MA	003
电缆明细表	Kabelliste	MB	001
电缆敷设明细表	Kabelzugliste	MB	002
材料统计	Materialauszug	PA	001
备件清单	Ersatzteilliste	PB	001
仪表索引	PLT-Gerätelliste	PB	002
系统运行记录；系统日志	Systemspiegel	PD	001
质量计划	Qualitätsplan	QA	001
测试计划	Prüfplan	QA	002
缺陷清单	Mängelliste	QA	003
检查表	Prüfliste	QA	004
危险场所分类图	Gefahrenzonenplan	QB	001
供电安全概念设计大纲	Schutzkonzept Energieversorgung	QB	002
SIL分类	SIL Einstufung	QB	003
材料安全数据表（MSDS）	Sicherheitsdatenblatt	QB	004
证书	Zertifikat	QC	001
试验报告	Prüfprotokoll	QC	002
验收文件	Abnahmedokumentation	QC	003
SIF测试表	Prüfblatt für Schutzeinrichtungen	QC	004
SIL验证	SIL Überprüfung	QC	005
安装图	Montageanordnung (Hook-up)	TC	001
装配图	Einbauzeichnung	TC	002

Annex B

(informative)

Examples

Figures in Annex B are examples of document kinds for electrical and instrumentation projects in the process industry. They are taken from current projects and anonymised as far as required and as such are reproduced as is, and are given purely for the user's information.

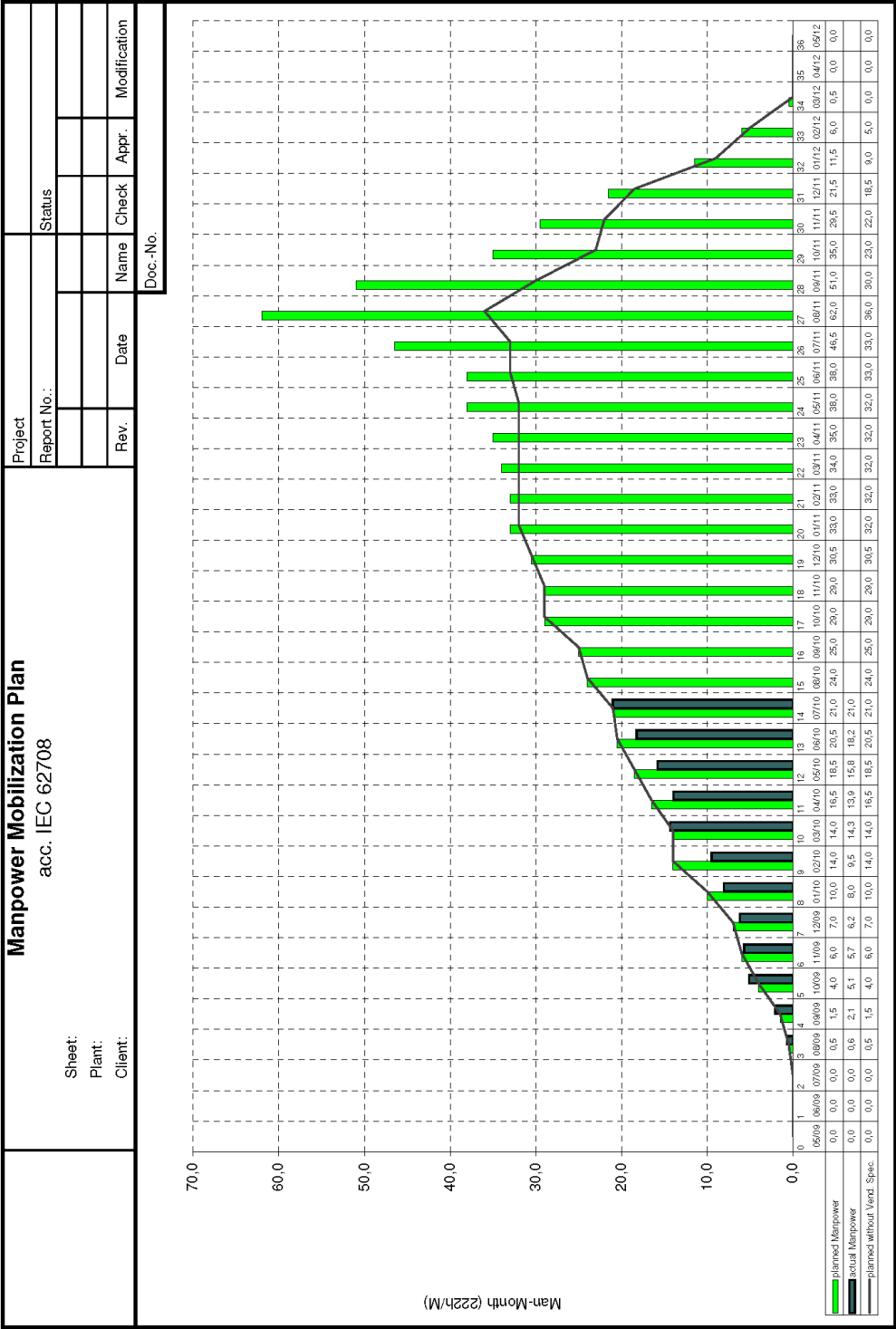
IEC

AVA Documents
Document Sharing Hub

# Company logo		Change state	# released
		Change date	# 2012-07-01
		Change note	
Customer	# Customer	DOC	&EBB
Document Title	# PLC-System Unit 4	Language	# EN
Document Type	Punch list	Version index	# A
Created by	# Name1	Total page number	# 1
Checked by	# Name2	Department	# department
Document Number	# AB123 123-4		

[illegible]

Figure B.2 – BB001 punch list



File: BE001_ManpowerMobilizationPlan.xls
printed: 04.07.12

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Figure B.3 – BE001 manpower mobilization plan

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15.09.11

Installation area data										R			
B51	Installation location	Outdoor, only antifreezing			B67	Remote hazardous area class	Zone 1, Group IIA						
B52	Corrosive influence by (1)	Coastal climate			B68	Remote area min. ign. temp.	T3 (> 200 °C)						
B53	Ambient temp. [min.](max.)	-15.0	40.0	°C	B69	Max. allow. sound press. level	85 dB(A)						
B54	Ambient work temp. [min.](max.)	-15.0	40.0	°C	B20	Remark (1)							
B55	Max. relative humidity	95.00 %			B21	Remark (2)							
B57	Altitude above sea level	20.00 m											
Process data					R	Process data (continued)					R		
B25	Fluid	Water			D55	Rel. dielectr. const. Epsilon r							
B41	Composition	H2O2			D66	Electrical conductivity				mS/cm			
B42	Corrosive components				D66	Isentropic exponent							
B43	Toxic components				D43	Max. allowable pressure drop	0.50 bar						
B44	Abrasive components				D69	Remark (1)							
B45	Suspended particles				D60	Remark (2)							
B39	Special fluid properties (1)				D61	Remark (3)							
B40	Special fluid properties (2)												
B46	Water hazard class (WHC)				Location data					R			
B47	Indicat. of danger (57/548/IEC)				B04	PI-Diagram / Sheet no.	13						
B50	Pollution restriction				B80	Reference location	2°-P-13-76009-A3-3F						
B48	Inline hazardous area				B84	Pipe spec. selected	A3-3F						
B26	Phase	(L) liquid			B97	Connection type	flanged						
Run case value				min.	norm.	max.	unit						
B80	Measuring range	0.00			11.00	m³/h							
D50	Mass flow rate	3486.00	3984.00	9960.00	kg/h								
D42	Actual flow rate	3.50	4.00	10.00	m³/h								
D51	Actual flow [L/N]				Nm³/h								
D24	Operating pressure p1	6.00	7.00	9.00	bar a								
D30	Operating temperature t1	30.0	30.0	30.0	°C								
D33	Operating density	996.00	996.00	996.00	kg/m³								
D36	Pressure [Boiling-](Critical-)	0.04		220.00	bar a								
D52	Temp. [Boiling-](Condensation-)	373.0			°C								
D10	Density at ref. cond.				kg/Nm³								
D11	Dyn. viscosity				cP								
D53	Molecular weight				g/mol								
D54	Compressibility factor (Z1/Zn)												
Loop functions													
Req. functions		Add. functions		Funct. set point		Interlock		Funct. realis.		PID No.	Remark		
IC								DCS		13			
Loop I/O list													
Signal-ID		Realisation		Design class		Ex. prot.		Type of signal		Signal rate		Signal characteristic	SIL
L		DCS				EE+1		analogue signal		4. 20 mA		Syst. powered	linear increasing
Loop elements													
Tag no.		Description		Part no.		Calibr. range [lower](upper)		Signal type		SIL		Remark	
FE7608		Onifice plate assembly		KFAA001		0.0 \ 500.0 mbar							
F17608		Flow dP-transmitter		KFEA001		0.0 \ 500.0 mbar		analogue signal					
Instrument data sheet										Code		IEC 62708 / Doc templates	
acc. IEC 62708										Plant			
										Unit			
										Loop Identific.		F7608	
Doc-ID-Code:										CC:		UA:	
Page										1 / 1			

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Figure B.4 – DA001 instrument data sheet

#Company#	#Customer#	#IC Dep#		
Preventive maintenance has the task of checking the I&C components case sensitive or at specified intervals. This contributes significantly to the availability of the I&C system and therewith the plant. This service is required for the system components listed.				
Type	DCS Part	Equipment	Task	Frequency
Test		Emerg. Push Button		once a year
Maintenance	Digital Input Module	#Company# Order Number 1E1234-1BH02-0AA0	replacement with spare part and fixing	general device I&C alarm
Maintenance	SMART Actuator	#Company# Order Number 1A3210-1AA2-0AB0	upload of device diagnostic data, task according to detail information	device maintenance alarm
Maintenance	pH-Analyzer	#Company# Order Number 1A3210-1AA2-0AB0	calibration	once a month
Maintenance	SMART Actuator	#Company# Order Number 1A3210-1AA2-0AB0	visual on-site inspection	once a year
Maintenance	DCS Server 123	#Engineering Software#	update	twice a year
Maintenance	DCS Server 345	#DCS System Software#	patch	case sensitive
Maintenance	DCS Server 345	#Malware Protection Software'	malware protection	daily

Test and Maintenance Recommendations
Rev 1.0 & EDC
page 1 of 1

Maintenance recommendations

print: 17:08 10.02.2012

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Figure B.5 – DC001 test and maintenance recommendations

# # Company logo	
# Customer	# Customer
Document Title	# PLC-System Unit 4
Document Type	Test and maintenance requirements
Created by	# Name1
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	Version Index
	# A
	Total page number
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	Department
	# department

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page: 1

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Figure B.6 – DZ001 test and maintenance requirements

EL_CONSUMERLIST															Print:	
Identification	Designation	Power P 100 P req. PN	Voltage V		Emergency supply in com- muni- cation	Speed rpm		Type of construction	Mechanical protection	Frame size	Delivery to mach. suppl- er	Ready to order	Distribution panel identification		R	
			Current Strom A	Part No.		Direction	Variable						Ex-Protection	Status		Building identification
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
180E03EM01	CONDENSER II - AIRCOOLER FAN	15.00	480	Yes	Yes	3600	No	MV 1	IP 54		Yes	No		No	HC22A	*
	LV Motor	16.50	35.42					Coupling	Ex d							
	PIDNO.:	18025	SOURCE.:													
	FEEDER TYPE.:	LV MOTOR	STATUS.:													
180E03EM02	CONDENSER II - AIRCOOLER FAN	15.00	480	Yes	Yes	3600	No	MV 1	IP 54		Yes	No		No	HC22B	*
	LV Motor	16.50	35.42					Coupling	Ex d							
	PIDNO.:	18025	SOURCE.:													
	FEEDER TYPE.:	LV MOTOR	STATUS.:													
180E03EM03	CONDENSER II - AIRCOOLER FAN	15.00	480	Yes	Yes	3600	No	MV 1	IP 54		Yes	No		No	HC22A	*
	LV Motor	16.50	35.42					Coupling	Ex d							
	PIDNO.:	18025	SOURCE.:													
	FEEDER TYPE.:	LV MOTOR	STATUS.:													
180E03EM04	CONDENSER II - AIRCOOLER FAN	15.00	480	Yes	Yes	3600	No	MV 1	IP 54		Yes	No		No	HC22B	*
	LV Motor	16.50	35.42					Coupling	Ex d							
	PIDNO.:	18025	SOURCE.:													
	FEEDER TYPE.:	LV MOTOR	STATUS.:													
180ESA60A-100-EC08	RECEPTACLE 480VAC3ØA3PH4WIREX	40.00	480	No	No	0	No	-	IP 54		No	No		No	HC22B	*
	Power outlet	50.00	75.26					-	Ex d						SERVICE OUTLET (ROD)	
	PIDNO.:	ESD0001	SOURCE.:													
	FEEDER TYPE.:	LV POWER FEEDER	STATUS.:													
180ESA60A-180-EC08	RECEPTACLE 480VAC3ØA3PH4WIREX	40.00	480	No	No	0	No	-	IP 54		No	No		No	HC22B	*
	Power outlet	50.00	75.26					-	Ex d						SERVICE OUTLET (ROD)	
	PIDNO.:	ESD0001	SOURCE.:													
	FEEDER TYPE.:	LV POWER FEEDER	STATUS.:													
Column 3: P100 = Mechanical power at the shaft at 100% plant capacity P req. = Mechanical power required (P100 + Safety margin specified by machinery/ process division) PN = Rated output (calculated by electrical or to be provided by supplier, if motor is ordered)															Column 8: Direction of rotation when facing drive end of motor. Column 15: 0 = for design 1 = for inquiry B = As built	
Electrical CONSUMER LIST acc IEC 62708															Code: Plant: Unit	
Doc-ID-Code:															Client Doc-ID-Code:	
R Date															R Date	
CC:															base:	
Page:															1 / 1	

IEC

Figure B.7 – EC002 electrical consumer list

[illegible]

Process Temperature

01	C12_CSO300010D-N01	C12_CSO300010D-N01	50	2'	60	28.1	30.9	3	2	0	6	10	8	5	-20	30	150	20	55	15.2	22.5	1	35.0	43_HKT28J	240	
02	C12_CSO334101-N01	C12_CSO334101-N01	15	1/2"	21	10	20.1	3	1	0	4	5	4	50	-20	30	150	20	90	8.5	12.5	1	12.0	28_HKT25J	240	
03	C12_HCS331201D-N01	C12_HCS331201D-N01	50	2'	60	10.9	14.6	7	0	2	0	6	10	50	-20	40	150	20	78	15.2	22.5	1	22.0	27_HKT28J	240	
04	C12_HCS331202-N01	C12_HCS331202-N01	40	1 1/2"	3.7	5.4		2	0	0	0	1	2	50	-20	40	150	20	73	13.2	14.0	1	7.0	11_HKT25J	240	
05	3-LEE-1/ C12 ML331205-N01	C12_HML331205-N01	150	6"	168	21.2	24.7	2	2	0	4	4	6	60	-20	40	150	30	82	34.4	44.0	1	35.0	41_HKT215J	240	
06	C12 ML331206D-N01	C12_HML331206D-N01	150	6"	168	22.1	23.1	0	1	12	0	5	5	60	-20	40	110	30	82	34.4	44.0	1	45.0	41_HKT215J	240	
07	3-LEE-1/ C12 ML331206D-N02	C12_HML331206D-N02	150	6"	168	22.1	28.1	0	1	12	0	4	5	60	-20	40	110	30	82	34.4	44.0	1	46.0	39_HKT215J	240	
07	C12 ML331206D-N02	ML331206D	50	2'	60	0	5.1							60	-20	40	110	30	82	17.0	25.2	1		9_HKT28J	240	
08	3-LEE-1/ C12 ML33114	C12_HML33114	20.9	24.3				3	0	0	0	8	8	50	-20	40	180	10	72	9.9	15.0	1	27.0	42_HKT25J	240	
08	3-LEE-1/ C12 D3103-N01	D3103	400	16	406	0.8		0	0	0	0	0	0	50	-20	40	180	10	10	50.1	288.0	12		12_HKT28J	240	
09	C12 ML331202-N01	C12_HML331202-N01	50	2'	60	4.2	4.6	3	1	0	2	2	4	50	-20	40	180	10	70	11.4	15.0	1	11.0	10_HKT25J	240	
10	C12 ML331210-N01	C12_HML331210-N01	15	1/2"	21	21	10.4	1	0	0	0	7	50	-20	40	150	30	85	10.7	13.0	1	30.0	18_HKT25J	240		
10	ML331210	ML331210	15	1/2"	21	3	10.4	1	0	0	0	6	50	-20	40	150	30	85	10.7	13.0	1	30.0	7_HKT25J	240		
11	C12_OG335102D-N01	C12_OG335102D-N01	80	3"	89	9	25.3	6	4	8	0	6	5	50	-20	40	150	40	85	28.6	30.0	1	30.0	39_HKT212J	240	
12	C12_OG335102D-N02	C12_OG335102D-N02	80	3"	89	9.3	31.4	4	4	8	0	7	5	50	-20	40	150	40	85	28.6	30.0	1	30.0	43_HKT212J	240	
13	3-LEE-1/ C12 ML33114	C12_HML33114	20.9	24.3				3	0	0	0	4	4	50	-20	50	150	40	85	28.6	30.0	1	19.0	19_HKT212J	240	
13	3-LEE-1/ C12 W335106-N01	C12_WG335106-N01	80	3"	89	15.5	14.1	5	2	0	0	5	50	-20	50	150	40	85	28.6	30.0	1	17.0	21_HKT212J	240		
13	3-LEE-1/ C12 W335106-N01	W335106	80	3"	89	6.2	9.5	5	2	0	0	4	50	-20	50	150	40	85	28.6	30.0	1	17.0	21_HKT212J	240		
14	C12 ML335101-N01	C12_HML335101-N01	25	1"	34	45.3		6	0	0	0	1	16	3	50	-20	30	150	30	88	13.6	21.0	1	52_HKT28J	240	
15	C12 ML335101-N02	C12_HML335101-N02	25	1"	34	45.2		0	0	0	0	1	11	3	50	-20	30	150	30	88	13.6	21.0	1	59_HKT28J	240	
16	Reverse																									
17	3-LEE-1/ C12 ML331222-N01	C12_HML331222-N01	80	3"	89	6.9		4	1	0	0	2	2	60	-20	50	150	40	85	28.2	30.0	1	4.0	15_HKT212J	240	
17	3-LEE-1/ C12 W335115-N01	W335115	80	3"	89	7.2		1	0	0	0	2	2	60	-20	50	150	40	85	28.2	30.0	1	4.0	15_HKT212J	240	
18	C13 CS0334102-N01	C13_CS0334102-N01	25	1"	34	30	38.5	1	0	0	0	8	11	6	50	-20	30	150	20	78	10.9	14.0	1	32.0	43_HKT25J	240
19	C13 ML32227P-N01	C13_HML32227P-N01	50	2'	60	18	41.7	0	2	6	0	11	5	50	-20	40	150	30	79	18.9	21.0	1	40.0	57_HKT28J	240	

Figure B.8 – EC008 heating circuit list

Print:

Installation area data										R	
B51	Installation location	Outdoor, only antifreezing			B67	Remote hazardous area class	Zone 1, Group IIA				
B52	Corrosive influence by (1)	Coastal climate			B68	Remote area min. ign. temp.	T3 (> 200 °C)				
B53	Ambient temp. [min.]{max.}	-15.0	40.0	°C	B69	Max. allow. sound press. level	85 dB(A)				
B54	Ambient work temp. [min.]{max.}	-15.0	40.0	°C	B20	Remark (1)					
B55	Max. relative humidity	95.00 %			B21	Remark (2)					
B57	Altitude above sea level	20.00 m									
Process data					R	Process data (continued)					R
B25	Fluid	Water			D53	Molecular weight				g/mol	
B41	Composition	H2O2			D54	Compressibility factor (Z1/Zn)					
B42	Corrosive components				D55	Rel. dielectr. const. Epsilon r					
B43	Toxic components				D56	Electrical conductivity				mS/cm	
B44	Abrasive components				D66	Isentropic exponent					
B45	Suspended particles				D43	Max. allowable pressure drop				0.50 bar	
B39	Special fluid properties (1)				D59	Remark (1)					
B40	Special fluid properties (2)				D60	Remark (2)					
B46	Water hazard class (WHC)				Location data					R	
B47	Indicat. of danger (67/548/EEC)				B04	PI-Diagram / Sheet no.	13				
B50	Pollution restriction				B80	Reference location	2°-P-13-78009-A3-3F				
B48	Inline hazardous area				B84	Pipe spec. selected	A3-3F				
B26	Phase	(L) liquid			B87	Connection type	flanged				
Runcase value				min.	norm.	max.	unit				
D50	Mass flow rate	3486.00	3984.00	9960.00	kg/h	B14	Line [DN]{[PN]}	2"	CLASS 300		
D42	Actual flow rate	3.50	4.00	10.00	m³/h	B93	Connection facing	RF, ANSI 16.5			
D51	Actual flow [i.N.]				Nm³/h	B82	Line material	Killed C.S. (A106-B)			
D24	Operating pressure p1	6.00	7.00	9.00	bar a	B64	Line diam. [inside]{outside}	52.48	60.30	mm	
D30	Operating temperature t1	30.0	30.0	30.0	°C	B15	Insulation [type]{thickness}			mm	
D33	Operating density	996.00	996.00	996.00	kg/m³	B66	Heating/cooling [trace]{temp.}			°C	
D36	Pressure [Boiling-]{Critical}	0.04	220.00	bar a		B70	Design pressure [min.]{max.}			27.00 bar a	
D52	Temp. [Boiling-]{Condensation-}	373.0			°C	B72	Design temp. [min.]{max.}			260.0 °C	
D10	Density at ref. cond.				kg/Nm³	B98	Remark (1)				
D11	Dyn. viscosity				cP	B99	Remark (2)				
Component process design					R	Component process design (continued)					R
N01	Manufacturer				N93	Flow element type	flange orifice				
N02	Manufacturer model no.				N10	Cleaning requirement					
N03	Type of construction				T44	Design max. flow	11.00			m³/h	
N06	Compon. conn. [style]{stand.}	flanged	ANSI B16.5		N04	Calibration range [lower]{upper}	0.0	500.0		mbar	
N43	Compon. conn. [DN]{PN}	2"	CLASS 300		T45	Max. calculated pressure loss				bar a	
N44	Facing compon. conn.	RF, ANSI 16.5			N12	Remark (1)					
N09	Material body/process conn.	316 L			N13	Remark (2)					
N97	Material meas. cell (wetted)										
N58	Plate thickness										
N59	Orifice bore type										
N88	Orifice inlet edge style										
N89	Beta d/D Bore dia.										
N90	Plate outside diameter										
N95	Clearance [up-]{downstream}										
N92	Vent/drain hole size										
Mechanical design					R	Additional accessories / Material part no.					R
N94	Stampings				N87						
T47	Installation position				N86						
N78	Flow direction	horizontal			T51						
T17	Internal connection style				T52						
T48	Tap conn. [type]{size}	--			T53						
T49	Material tapping conn.				N60						
T50	Material lining				N37	Remark (1)					
F01					N38	Remark (2)					
N25	Remark (1)										
N26	Remark (2)										
Requirement Specification acc. IEC 62708 Orifice plate assembly Code IEC 62708 / Doc templates Plant Unit Part no. KFAA001 TAG identific. FE7608											
R		Date	Client Doc.-ID:		CC:		UA:		Page 1 / 1		

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Figure B.9 – EC009 requirement specification

Print:

Installation area data										R	
B51	Installation location	Outdoor, only antifreezing			B67	Remote hazardous area class	Zone 1, Group IIA				
B52	Corrosive influence by (1)	Coastal climate			B68	Remote area min. ign. temp.	T3 (> 200 °C)				
B53	Ambient temp. [min.]{max.}	-15.0	40.0	°C	B69	Max. allow. sound press. level	85 dB(A)				
B54	Ambient work temp. [min.]{max.}	-15.0	40.0	°C	B20	Remark (1)					
B55	Max. relative humidity	95.00 %			B21	Remark (2)					
B57	Altitude above sea level	20.00 m									
Process data					R	Process data (continued)					R
B25	Fluid	Water			D53	Molecular weight				g/mol	
B41	Composition	H2O2			D54	Compressibility factor (Z1/Zn)					
B42	Corrosive components				D55	Rel. dielectr. const. Epsilon r					
B43	Toxic components				D56	Electrical conductivity				mS/cm	
B44	Abrasive components				D66	Isentropic exponent					
B45	Suspended particles				D43	Max. allowable pressure drop				0.50 bar	
B39	Special fluid properties (1)				D59	Remark (1)					
B40	Special fluid properties (2)				D60	Remark (2)					
B46	Water hazard class (WHC)				Location data					R	
B47	Indicat. of danger (67/548/EEC)				B04	PI-Diagram / Sheet no.	13				
B50	Pollution restriction				B80	Reference location	2°-P-13-78009-A3-3F				
B48	Inline hazardous area				B84	Pipe spec. selected	A3-3F				
B26	Phase	(L) liquid			B87	Connection type	flanged				
Run case value				min.	norm.	max.	unit	B14	Line [DN]{PN}	2"	CLASS 300
D50	Mass flow rate	3486.00	3984.00	9960.00	kg/h	B93	Connection facing	RF, ANSI 16.5			
D42	Actual flow rate	3.50	4.00	10.00	m³/h	B82	Line material	Killed C.S. (A106-B)			
D51	Actual flow [i.N.]				Nm³/h	B64	Line diam. [inside]{outside}	52.48	60.30	mm	
D24	Operating pressure p1	6.00	7.00	9.00	bar a	B15	Insulation [type]{thickness}				
D30	Operating temperature t1	30.0	30.0	30.0	°C	B66	Heating/cooling [trace]{temp.}				
D33	Operating density	996.00	996.00	996.00	kg/m³	B70	Design pressure [min.]{max.}	27.00 bar a			
D36	Pressure [Boiling.]{Critical}	0.04	220.00	bar a	B72	Design temp. [min.]{max.}	260.0 °C				
D52	Temp. [Boiling.]{Condensation.}	373.0			°C	B98	Remark (1)				
D10	Density at ref. cond.				kg/Nm³	B99	Remark (2)				
D11	Dyn. viscosity				cP						
Component process design					R	Component process design (continued)					R
N01	Manufacturer	XYZ Company			N93	Flow element type	flange orifice				
N02	Manufacturer model no.	678-BD			N10	Cleaning requirement					
N03	Type of construction	ISO 5167			T44	Design max. flow	11.00 m³/h				
N06	Compon. conn. [style]{stand.}	flanged	ANSI B16.5		N04	Calibration range [lower]{upper}	0.0	500.0	mbar		
N43	Compon. conn. [DN]{PN}	2"	CLASS 300		T45	Max. calculated pressure loss	0.5 bar a				
N44	Facing compon. conn.	RF, ANSI 16.5			N12	Remark (1)					
N09	Material body/process conn.	316 L			N13	Remark (2)					
N97	Material meas. cell (wetted)										
N58	Plate thickness	4.50 mm									
N59	Orifice bore type	straight									
N88	Orifice inlet edge style	sharp edge									
N89	Beta d/D Bore dia.	0.475	24.9	mm							
N90	Plate outside diameter	100 mm									
N85	Clearance [up.]{downstream}	700	1500	mm							
N92	Vent/drain hole size	n.a.	n.a.	mm							
Mechanical design					R	Additional accessories / Material part no.					R
N94	Stampings	Bore diameter/ material			N87						
T47	Installation position	horizontal			N86						
N78	Flow direction	horizontal			T51						
T17	Internal connection style	n.a.			T52						
T48	Tap conn. [type]{size}	flange tap	1/2"		N80						
T49	Material tapping conn.				N37	Remark (1)					
T50	Material lining				N38	Remark (2)					
F01											
N25	Remark (1)										
N26	Remark (2)										
Specification Sheet acc. IEC 62708 Orifice plate assembly Code IEC 62708 / Doc templates Plant Unit Part no. KFAA001 TAG identific. FE7608 R Date Client Doc.-ID: Doc.-ID-Code: CC: UA: Page 1 / 1											

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Figure B.10 – EC010 specification sheet

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1	Loop- Identification	Service	PID No.	Required functions	Remark	R	Date	R
2	1	2	3	4	5	6	7	8
4	A7602	Product to BL	14	I				
5	A7654	Heavies to BL	13	E				
6	F7608	Heavies to BL	13	IC				
7	F7609	E7608 MP Steam in	13	IC				
8	F7610	P7604 Min. flow	14	IC				
9	F7612	C7602 Recycle	14	IC				
10	F7613	Product to BL	14	IC				
11	F7651	P7603A Min. Flow	13	B				
12	F7652	P7603B Min. flow	13	B				
13	H7613	P7603 Off	13	S,SL				
14	H7614	P7603 Off	13	S,SL				
15	H7615	P7603 On / Off	13	S,SH,SL				
16	H7619	P7604 Off	14	S,SL				
17	H7620	P7604 Off	14	S,SL				
18	H7621	P7604 On / Off	14	S,SH,SL				
19	L7604	C7602 Bottom	13	IC,AH,AL				
20	L7605	D7603	14	IC,AH,AL				
21	L7654	C7602 Bottom	13	I				
22	L7655	D7603	14	I				
23	P7615	C7602 Top	13	IC,AH,AL				
24	P7616	C7602 upper section	13	DI,AH				
25	P7617	C7602 lower section	13	DI,AH				
26	P7619	C7602 Bottom	13	I				
27	P7664	P7603A	13	I				
28	P7665	P7603B	13	I				
29	P7666	E7608 MP Steam in	13	I				
30	P7667	D7603	14	I				
31	P7668	P7604A	14	I				
32	P7669	P7604B	14	I				
33	P7670	Product to BL	14	I				
34	T7614	E7610 Cooler out	13	I				
35	T7615	C7602 tray 1	13	I				
36	T7616	C7602 tray 6	13	I				
37	T7617	C7602 tray 28	13	I				
38	T7618	C7602 tray 48	13	IC				
39	T7619	E7608 Reboiler out	13	I				
40	T7620	C7602 Bottom	13	I				
41	T7621	E7609 Condenser out	14	IC,AL				
42	T7622	D7603	14	I				
43	T7623	Product to BL	14	I				
44	T7630	C7602 tray 43	13	I				
45	T7631	C7602 tray 15	13	I				
46	T7632	C7602 tray 24	13	I				
47	T7669	Heavies to BL	13	I				
48	T7670	E7610 Cooling Water Return	13	I				
49	T7671	E7610 Cooler in	13	I				
50	T7672	E7608 Reboiler in	13	I				
51	T7673	E7609 Condenser in	14	I				
52	T7675	E7611 Cooling Water Return	14	I				
53	U7605	Shut Down C7602 Feed	13	S				
54	U7606	Shut down P7603	13	S				
55	U7608	Shut Down C7602 Recycle	14	S				
56	U7609	Shut down P7604	14	S				
57	U7610	Split range D7603	14	C				
58	U7612	C7602 Recycle	14	C				
59	U7613	Product to BL	14	C				
60	U7633	Delta T17631 / T17632	13	C				
61	V7602	E7609 Fan	14	S,ASH				
62	Y7603	Heavies to BL	13	C				
63	Y7604	E7608 MP Condensate out	13	C				
64	Y7605	C7602 Bottom	13	S,OH,OSL				
Loop list acc. IEC 62708				Code	IEC 62708 / Doc templates			
				Plant				
				Unit				
R		Date	Client Doc-ID:					
Doc-ID-Code:				CC	EC	UA	DE	Page 1 / 2

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Figure B.11 – EC011 loop list

BILL OF QUANTITIES				Project	Revision	00							
INSTRUMENTATION				Bidder				Quantities					
Rev	BoQ Item	Description	Unit	Actual Total Quantity	Erection				Units - Central Devices	103	105 905	901	
					Unit Hours	Total Hours	Unit Rate USD	Total USD					
54		INSTRUMENTATION											
54.00		GENERAL DESCRIPTION OF WORK											
54.00.00.0000		Process connection, direct											
54.K1													
54.K1.00													
54.K1.00.0000													
54.K1.00.A110		Direct mounted < 80 °C	nos	0.00		0.00		0.00					
54.K1.00.A120		PI flanged, with flushing ring	nos	0.00		0.00		0.00					
54.K1.00.A210		Direct mounted > 80 °C	nos	0.00		0.00		0.00					
54.K2		Process connection, remote											
54.K2.00													
54.K2.00.0000													
54.K2.00.G110		P for gas service, above TP	nos	0.00		0.00		0.00					
54.K2.00.G210		P for gas service, below TP	nos	0.00		0.00		0.00					
54.K2.00.G410		P for reformer fire detection	nos	0.00		0.00		0.00					
54.K2.00.GR10		PI remote, above TP	nos	0.00		0.00		0.00					
54.K2.00.GT10		P for gas, above, two TP's	nos	0.00		0.00		0.00					
54.K2.00.L110		P for liquid service, below TP	nos	0.00		0.00		0.00					
54.K2.00.L210		P for liquid service, above TP	nos	0.00		0.00		0.00					
54.K2.00.P110		P with purge gas connection	nos	0.00		0.00		0.00					
54.K2.00.P120		P for liquid, in box, below TP	nos	0.00		0.00		0.00					
54.K2.00.P310		P for wet gas, in box above TP	nos	0.00		0.00		0.00					
54.K2.00.V110		P for LP, < 900#, below TP	nos	0.00		0.00		0.00					
54.K2.00.V210		P for LPS, < 900#, above TP	nos	0.00		0.00		0.00					
54.K2.00.V310		P for HPS, > 900# below TP	nos	0.00		0.00		0.00					
54.K3		Process connection, dP											
54.K3.00													
54.K3.00.0000													
54.K3.00.G110		dP for gas service, above TP	nos	0.00		0.00		0.00					
54.K3.00.G210		dP for gas service, below TP	nos	0.00		0.00		0.00					
54.K3.00.GR10		dPg for gas service, above TP	nos	0.00		0.00		0.00					
54.K3.00.GR20		dPg for gas service, below TP	nos	0.00		0.00		0.00					
54.K3.00.L110		dP for liquid, below TP	nos	0.00		0.00		0.00					
54.K3.00.L210		dP for liquid, above TP	nos	0.00		0.00		0.00					
54.K3.00.L310		dP with CC, above TP	nos	0.00		0.00		0.00					
54.K3.00.L410		dP liquid, in box, below TP	nos	0.00		0.00		0.00					
54.K3.00.LR10		dPa for liquid, above TP	nos	0.00		0.00		0.00					
54.K3.00.LR20		dPg for liquid, below TP	nos	0.00		0.00		0.00					
54.K3.00.P110		dP with purge gas, above TP	nos	0.00		0.00		0.00					
54.K3.00.P310		dP wet gas, in box, above TP	nos	0.00		0.00		0.00					
54.K3.00.V110		dP for LPS, below TP	nos	0.00		0.00		0.00					
54.K3.00.V210		dP for LPS, above TP	nos	0.00		0.00		0.00					
54.K4		Sensors, final check											
54.K4.00													
54.K4.00.0000													
54.K4.00.4110		PT, capillary, with FR pipe	nos	0.00		0.00		0.00					
54.K4.00.4120		PT, capillary, with tubus	nos	0.00		0.00		0.00					
54.K4.00.4210		dPT, capillary, with FR pipe	nos	0.00		0.00		0.00					
54.K4.00.4710		PT, capillary, with FR vessel	nos	0.00		0.00		0.00					
54.K4.00.4730		dPT, capillary, with diaphragm	nos	0.00		0.00		0.00					
54.K4.00.4810		dPT, capillary, with FR vessel	nos	0.00		0.00		0.00					
54.K4.00.4910		TM flanged, with flushing ring	nos	0.00		0.00		0.00					
54.K4.00.FA20		F, annubar, opposite support	nos	0.00		0.00		0.00					
54.K4.00.FE10		F, orifice	nos	0.00		0.00		0.00					
54.K4.00.FN10		F, magnetic, with ER	nos	0.00		0.00		0.00					
54.K4.00.FN20		F, magnetic, with remote TM	nos	0.00		0.00		0.00					
54.K4.00.FU20		F, ultrasonic	nos	0.00		0.00		0.00					
54.K4.00.FV10		F, variable	nos	0.00		0.00		0.00					
54.K4.00.FV20		Mass flow meter	nos	0.00		0.00		0.00					
54.K4.00.FVM0		Variable micro flow	nos	0.00		0.00		0.00					
54.K4.00.L110		LI, magnetic	nos	0.00		0.00		0.00					
54.K4.00.L120		LI, magnetic	nos	0.00		0.00		0.00					
54.K4.00.L210		LI measurement, flanged	nos	0.00		0.00		0.00					
54.K4.00.L220		LI displacer, sandwich, pipe	nos	0.00		0.00		0.00					
54.K4.00.L230		LI displacer, sandwich, vessel	nos	0.00		0.00		0.00					
54.K4.00.L420		LI fork, radar, capacity, etc	nos	0.00		0.00		0.00					
54.K4.00.L450		LI pilot with indicator	nos	0.00		0.00		0.00					
54.K4.00.LD10		LI direct, minus leg tubed	nos	0.00		0.00		0.00					
54.K4.00.T010		TW installation check	nos	0.00		0.00		0.00					
54.K5		Sensors, miscellaneous											
54.K5.00													
54.K5.00.0000													
54.K5.00.0020		Local electrical device	nos	0.00		0.00		0.00					
54.K5.00.0030		Local push button	nos	0.00		0.00		0.00					
54.K5.00.0040		T, local, ambient	nos	0.00		0.00		0.00					
54.K5.00.B020		Flame scanner	nos	0.00		0.00		0.00					
54.K5.00.L810		L, radioactive, stripper	nos	0.00		0.00		0.00					
54.K5.00.L920		L, radioactive, reactor	nos	0.00		0.00		0.00					
54.K5.00.L930		L, radioactive, vessel	nos	0.00		0.00		0.00					
54.K5.00.T010		TI, local	nos	0.00		0.00		0.00					
54.K5.00.T020		TTM, one head	nos	0.00		0.00		0.00					
54.K5.00.T030		TTM, two heads	nos	0.00		0.00		0.00					
54.K5.00.T040		T, mult, with signal cable	nos	0.00		0.00		0.00					
54.K5.00.T050		T, mult, with home run cable	nos	0.00		0.00		0.00					
54.K5.00.T060		T, thermocouples for flare	nos	0.00		0.00		0.00					
54.M4		Actors, final check											
54.M4.00													
54.M4.00.0000													
54.M4.00.0110		CV with positioner	nos	0.00		0.00		0.00					
54.M4.00.0120		CV with positioner and FBS	nos	0.00		0.00		0.00					
54.M4.00.0130		CV with positioner and SOL	nos	0.00		0.00		0.00					
54.M4.00.0140		CV with tank, POS and FBS	nos	0.00		0.00		0.00					
54.M4.00.0150		CV with 5/2 solenoid and FBS	nos	0.00		0.00		0.00					

Figure B.12 – EC014 construction bill of quantities

Project No:	Project No:	Owner Project No:
Job Code:	Job Code:	Owner Job Code:
Document No:	Owner Document No.:	
		Page 2 of 3

Engineering specification for instrumentation

Process connections and measuring points

Instrument tapping sizes			
Part 1 Connection on equipment			
Instrument type	Equipment connection	First block valve	Instrument connection
Pressure			
Pressure gauge / pressure switch	1" nozzle	1"	1/2" male thread ¹⁾
Diaphragm gauge / pressure switch	2" nozzle	2"	2" flanged
Pressure transmitter	1" nozzle	1"	1/2" male thread ¹⁾
Flanged pressure transmitter	2" nozzle	2"	2" flanged
Remote seal type pressure transmitter	2" nozzle	2"	2" wafer
DP transmitter	1" nozzle	1"	1/2" (F) ¹⁾
Remote seal type DP transmitter	3" nozzle ³⁾	3"	3" wafer ³⁾
Temperature			
Thermowell ²⁾	2" nozzle	---	2" flanged thermowell with 1/2" (F) thread
Gauge / RTD / thermocouple			1/2" male thread
Level			
Level gauges	1" nozzle	1"	1" flanged
Magnetic level indicator	2" nozzle	2"	2" flanged
Level switch (external float switch, side mounted)	1" nozzle	1"	1" flanged
DP level transmitter	1" nozzle	1"	1/2" (F) ¹⁾
Flanged level transmitter	3" nozzle ³⁾	3" ³⁾	3" flanged ³⁾
Remote seal type level transmitter	3" nozzle ³⁾	3" ³⁾	3" wafer ³⁾
Displacer level transmitter	2" nozzle	2"	2" flanged
Purge level transmitter	1" nozzle	1/2"	1/2" (F) ¹⁾
Capacitive level transmitter	2" nozzle	---	2" flanged
Level switch (vibrating, capacitive)	2" nozzle	---	2" flanged
Level switch (internal float)	3" nozzle (min.)	---	3" flanged
Stand pipe ⁶⁾	3" nozzle (min.)	1/2"	---

	Doc. ID-Code	Rev.

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Figure B.13 – EC015 specification E&I process connections

Company Logo	Site:		Plant Complex:		Building:	
	Process:		Sub-Process:		Page / of	1/1
	Technical Item:		PCT Loop:			
Department	PCT-Loop type		Pressure transmitter			
Version x.x						

Ex-i calculation sheet
Based on IEC 60079-11
! Only valid for combinations with with one intrinsically-safe electrical apparatus !

Explosion hazardous area classification	Zone	Explos.- Group	Temp. Class
	1	IIA	T3

Vergleich der sicherheitsrelevanten Grenzwerte

Intrinsically-safe electrical apparatus + cable	Comparison	dedicated apparatus	Intrinsically safe?	
U _i (V)	40	U ₀ (V)	27,6	Yes
I _i (mA)	100	I ₀ (mA)	91	Yes
P _i (mW)	2000	P ₀ (mW)	630	Yes
L _i - field device + L _c cable (mH)	0,1	L ₀ (mH)	3	Yes
C _i - field device + C _c - cable (nF)	15	C ₀ (nF)	83	Yes
Classification of the electrical circuit	Comparison	Explosion hazardous area classification	Certification ?	
Zone:	1	Zone:	1	Yes
Explos. - Group:	IIC	Explos. - Groupe:	IIA	Yes
T _i - Class:	T4-T6	T _i - Class:	T3	Yes

Apparatus:	Ex-i values	Manufacturer:	XXX
U ₀ (V)	27,6	Type:	6ES7 134-7TD00-0AB0
I ₀ (mA)	91	Attribute:	II 2 G (1) GD EEx ib [ia] IIC T4
P ₀ (mW)	630	Conformity No.:	KEMA 04 ATEX 1244
L ₀ (mH)	3	Amendment No.:	
C ₀ (nF)	83	Ex.-Group:	IIC

Cable		Manufacturer:	XXX
L _c (mH/100m)	0,1	Type:	RD Y (St) Y 2x2x0,5
C _c (nF/100m)	15		
Länge (m)	100		

Apparatus:	Ex-i values	Manufacturer:	YYY
U _i (V)	40	Type:	BIB 562
I _i (mA)	100	Attribute:	EEx ib d IIC T4-T6
P _i (mW)	2000	Conformity No.:	PTB Nr. Ex-85.B.2007
L _i (mH)	0 (ungefähr 0)	Amendment No.:	
C _i (nF)	0 (ungefähr 0)	Zone:	1
		Ex.-Group:	IIC
		T _i -Class:	T4-T6

Comment:

Name:		Date:		PCT Loop:		File Name:
Department:		Revision Date:		Revision:		
Verified:		Revision:		Date:		

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Figure B.14 – ED006 Ex-i calculation sheet

Rev.: 0, Dated at: XX.XX.XXXX
Printed at: 27/02/2012

Heat Loss Calculation - UPS-Room		
UPS-System	Item No.: UPS-1	Location: MCC-Room
Data:	Rated Capacity	150 kVA
	Efficiency	85 % *
Heat Loss Calculation:	Heat loss capacity = Rated Capacity * (1 - Efficiency)	
	Total Heat loss capacity:	22.5 kW
* efficiency of 85% due to the additional transformers at incoming outgoing of UPS considered		
UPS-System	Item No.: UPS-2	Location: MCC-Room
Data:	Rated Capacity	30 kVA
	Efficiency	85 %
Heat Loss Calculation:	Heat loss capacity = Rated Capacity * (1 - Efficiency)	
	Total Heat loss capacity:	4.5 kW
* efficiency of 85% due to the additional transformers at incoming outgoing of UPS considered		
DC-System	Item No.: DC-1	Location: MCC-Room
Data:	Rated Capacity	15 A
	Efficiency	85 %
	Rated Voltage	110 V
Heat Loss Calculation:	Heat loss capacity = Rated Capacity * Rated Voltage * (1 - Efficiency)	
	Total Heat loss capacity:	0.2475 kW
* efficiency of 85% due to the additional transformers at incoming of DC considered		
DC-System	Item No.: DC-2	Location: MCC-Room
Data:	Rated Capacity	100 A
	Efficiency	85 %
	Rated Voltage	110 V
Heat Loss Calculation:	Heat loss capacity = Rated Capacity * Rated Voltage * (1 - Efficiency)	
	Total Heat loss capacity:	1.65 kW
* efficiency of 85% due to the additional transformers at incoming of DC considered		
GRAND TOTAL Heat Loss Capacity	UPS-Room	28.8975 kW

1 of 1

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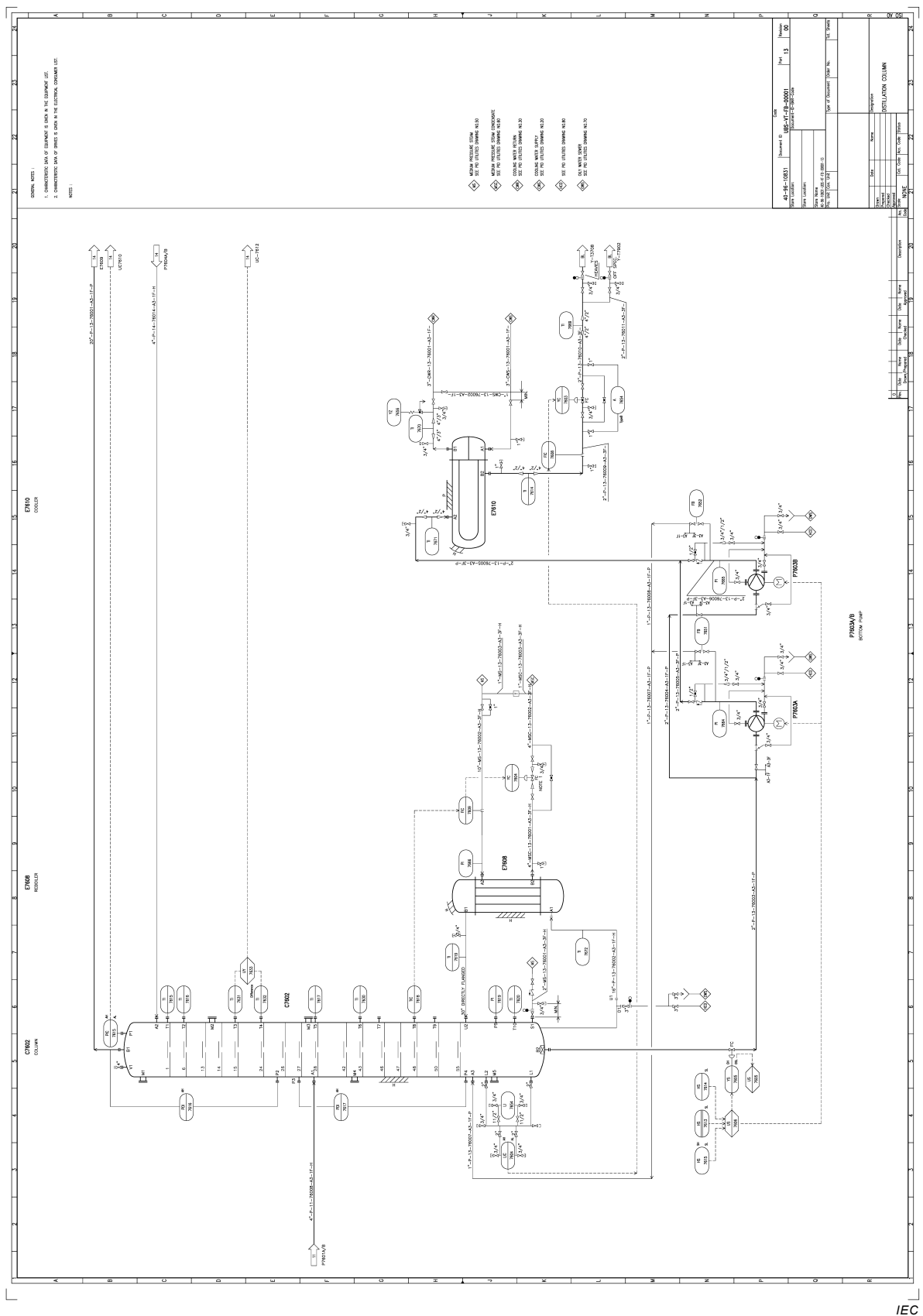
Figure B.15 – ED007 heat dissipation summary



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Figure B.17 – FA002 structure diagram DCS-PLC-SIS



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Figure B.18 – FB001 piping and instrumentation diagram (P&ID)

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Figure B.19 – FE001 function description