for the supply of technical documentation for fossil-fired and regenerative power stations

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Guidelines

for the supply of technical documentation for fossil-fired and regenerative power stations

VGB-R 171e

First edition 2003

Published by:
VGB PowerTech e.V.

Obtainable from:
VGB PowerTech Service GmbH
Verlag technisch-wissenschaftlicher Schriften
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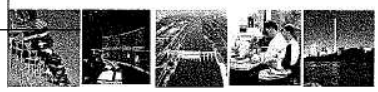

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Foreword

In the past, the various different project instructions for the supply of technical documentation always had to be agreed afresh between customers and contractors when executing a project. Every deviation from the standard in question entailed substantial and costly amendments and changes for the party affected.

These VGB Guidelines for the supply of technical documentation for fossil-fired and regenerative power stations represent clear and unequivocal documents relating to project tenders and execution, and are intended to ensure rational and smooth production and delivery of documentation as part of the co-operation between customer and contractor to increase efficiency.

These outline Guidelines give the contractor clear information about the agreed scope of supply of the hand-over documentation in as much detail as necessary, The objective is to obtain bids in response to the invitation to tender with prices that can be compared with each other, and contain all the customer's expectations in terms of delivery, as demanded by European legislation (sector guidelines}.

The experience gained by customers and contractors in preparing and supplying technical document for past projects has been incorporated in these outline Guidelines.

These outline Guidelines do not remove the need to examine nationa! standards, legislation and regulations regarding the delivery of technical documentation in the country of operation before signing the contract.

The VGB is grateful to the companies involved in drawing up the outline guidelines and their staff upon whom the burden of the work fell.

Essen, March 2003 VGB

PowerTech e.V.

Contents

Introduction

The supply of power station plant, systems and individual components, both within projects and as individual orders, entails the supply of the necessary documentation to allow operation of the plant.

This is necessary to ensure safe and efficient operation of the power station plant and equipment.

Although projects very clearly describe the scope of supply of power station plant and equipment, when it comes to the documentation substantial differences often exist between the customer's expectations and what the contractor actually provides.

This is partly due to the documentation structure not being laid down in advance, a lack of definition of the documentation scope of supply, and the wide variety of terms used when describing documentation.

The purpose of these Guidelines is to establish a framework for the

— scope of supply, and delivery deadlines;

— documentation structure and form;

— designations of documents, and designations within documents;

— hand-over/acceptance procedures;

— uniformity of terminology/terms.

These outline Guidelines apply to all documents necessary during project execution, such as planning, erection and commissioning, in order to ensure future operation and maintenance.

These Outline Guidelines lay down the preconditions for ensuring that the documentation supplied is complete and up-to-date, so resulting in cost reductions for all contracting parties.

They take account of the EU Directive 2004/17/EC (sector directive) entitled "Directive coordinating the procurement procedures of entities operating in the water, energy transport and the telecommunications sectors".

This imposes an obligation upon operators of plant in the above sectors to lay down firm tendering and evaluation rules when procuring plant, and then to adhere to them.

The relevant statutory and official regulations at the site location are to be applied, in conjunction with European laws, orders, technical regulations and standards.

IEC 62079 must also be observed in connection with the preparation of technical instructions for the operation, maintenance and servicing of plant and equipment, see Appendices 4 and 5.

These outline Guidelines set out the minimum requirements to be met and define the open areas to be filled in by the contracting parties when a contract is placed. The rules of these outline Guidelines and their Appendices must then be converted by the customer into a project-specific form, and agreement reached with the contractor as regards filling in the open areas.

The rules in these Guidelines and Appendices must to be observed. They must be expressed in precise form before the contract is concluded, and shall then constitute part of the supply contracts. These Guidelines and the document requirement lists corresponding to the expected scope of the order (Appendix 1} must be made available to the tenderer for inclusion in the contract and subsequent pricing.

The language of the documents to be supplied must be specified before the contract is concluded.

1 Area of application, and competences

These Guidelines and Appendices are to be used when ordering power station plant and equipment, systems, individual components and services, and regulate the provision of documents necessary for planning, erection, commissioning, operation, maintenance and demolition.

Responsibility for observing these Guidelines is with the contractor, who undertakes to enjoin all subcontractors similarly to observe them. Consequently, appropriate contractual agreements on the basis of these outline Guidelines and their Appendices are necessary.

The outline Guidelines apply to the operators of fossil-fired and regenerative power stations and their contractors and sub-contractors.

In addition, authorities and expert assessors are also advised to employ these Guidelines.

2 Terms and definitions

2.1 Document-related terms

Revision

A revision is an agreed determination that a new status shall exist in place of the previous status.

Revision index

The revision index is a code that together with a subject number indicates a specific design status.

As-built documents

Documents that reflect the ACTUAL status of the plant at the time it is handed over.

Data medium

A data medium is a material on which data can be recorded and from which they can be retrieved (IEC61355).

Three types of data medium are distinguished:

— paper and film

— digital data media

— X-ray films.

Document

A document is information on a data medium of any kind.

Documentation

Documentation is the systematic collecting and assembling of documents. (Collection of documents related to a given subject.)

Note: Documentation in this sense is not the activity of collecting, but the result of this activity.

Document designation

A document designation is an identifier of a specific document in relation to an object to which the document is assigned (IEC 61355).

Release

Release is approval after completion of an examination in accordance with certain instructions.

Object

Entity treated in the process of design, engineering, realization, operation, maintenance and demolition.

Notes

1 The entity may refer to a physical or non-physical "thing", or to a set of information associated with it.

2 Depending on its purpose, an object may be viewed in different ways called "aspects".

Aspect: Specific way of selecting information on or describing a system or an object of a system.

Note - Such ways may be:
- what the system or object is doing {function viewpoint);
- how the system or object is constructed (product viewpoint);
- where the system or object is located (location viewpoint).

Graphical documents

Graphical documents are drawings, diagrams, mimic diagrams and other graphical representations.

Text documents

Text documents are verbal descriptions that may include both graphical representations, and tables and lists.

Partial documentation

Partial documentation (see Section 3 as well) is a collection of selected documents extracted for a particular task.

Duplicate documentation

Duplicate documentation consists of those documents and data that permit operation and maintenance of the plant and management of crisis situations in cases where the implementation documentation held at the power station is lost, destroyed or otherwise inaccessible.

These documents should preferably be held on backed-up data media at a location outside the area of influence of the power station.

The nature and extent of any duplicate documentation to be supplied shall be agreed before the contract is concluded. In the absence of any agreement to the contrary, the duplicate documentation shall be a copy of the hand-over documentation.

2.2 Project-related terms

Acceptance

Acceptance is the declaration by the customer towards the contractor that the goods and services have been supplied in conformity with the contract, whereupon risk passes to the customer. Acceptance marks the beginning of the guarantee period.

Project

A project is a generic term for the sum of commercial and technical activities related to a specific object (iEC 61355).

A project is a venture characterised essentially by the uniqueness of its parameters and conditions in their entirety, e.g.

— the objective

— temporal, financial, staffing or other constraints

— delimitation against other projects,

— project-specific organisation

Project types

The following project types are distinguished:

— New power stations

— Conversions, expansions/extension and retrofits

— Demolition

— Major maintenance measures, (e.g. major inspections).

Project management documentation

The project management shall draw up or be given all documents that mainly contain information relating to the control and monitoring of

— deadlines

— resources (staff, materials)

— costs

— quality

necessary for the various activities such as planning, manufacture, erection, commissioning and operation, and also all documents that mainly contain information on the performance and rules of the various activities.

Project management documentation is **not** considered within the scope of these VGB outline Guidelines.

3 Technical Documentation

3.1 Structure of technical documentation and partial documentation

Technical documentation is understood as the systematic collection of all documents necessary for planning, erection {construction and assembly}, commissioning, operation and maintenance, plus all test results and verifications deliverable by the contractor within the scope of project execution.

Technical documentation shall be collected from the partial documentation illustrated in Fig. 1 and described below, and handed over to the customer as hand-over documentation with the as-buiit status.

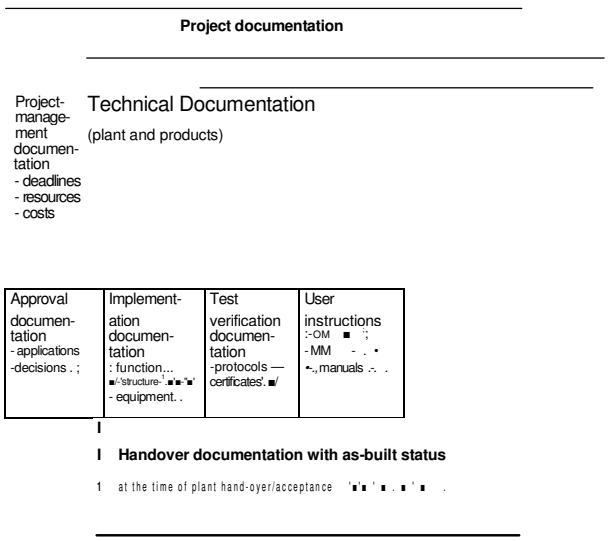

Fig.1. Structure in terms of partial documentation.

3.1.1 Approval documentation

The approval documentation is the collection of all approval applications and the approval decisions issued in response to these, plus expert opinions and the imposed conditions under which approvals are granted.

The approval documentation is prepared by the contractor after technical input from the customer's specialist engineering departments.

The primary arrangement characteristic of the approval documentation is the designation of the erection or revision application (e.g. 1st TEG application). The stamped copies of the implementation documentation retain their original designations, but in addition are marked as approval documentation in the same way as the approval decisions and associated expert opinions.

The structure of the approval documentation and the additional designation as approval documentation is generally laid down by the approval authorities and consequently binding on all parties. Traceability and completeness of individual approvals must be ensured.

Approval documentation must be delivered in good time so that no delay is incurred in the rest of the project execution. The delivery dates shall be laid down by the customer.

3.1.2 Implementation documentation

Implementation documentation consists of the technical documents describing and depicting the design and method of operation of the plant, systems and equipment, and their operation and maintenance. Internal manufacturing documents are excluded from this.

The priority arrangement characteristics of the implementation documentation are generally the designating of objects by object designation (e.g. plants, systems) and further designation systems agreed between the parties involved in the project (e.g. by type).

Project-specific graphical documents in the implementation documentation shall be prepared using CAD/CAE. The CAD/CAE systems and hand-over interfaces are to be agreed on a per-discipline basis for

— civil engineering

— mechanical/process engineering

— electrical engineering

— instrumentation and control

and laid down before the contract is signed.

Descriptive documents in the implementation documentation including lists of all kinds (e.g. parts lists, component lists, electrical consumers' lists, measuring point lists, spare parts lists) shall be handed over both as electronic files and in paper form. The electronic file format and number of paper copies shall be the subject of agreement.

3.1.3 Test verification documentation

The test verification documentation consists of the collection of quality assurance certificates for the plant and equipment, including any preliminary test documents. It includes both stamped copies of the implementation documentation (original stamped document, or authenticated copies of such) and also documents created specially for quality assurance purposes.

Test verification documentation which is also part of the approval process shall only be provided for that purpose in the form of copies, and the stamped originals will remain with the test certificate documentation.

The arrangement characteristics of test (quality assurance) verifications for items/components that occur repeatedly shall be laid down so that these need only be provided once.

Delivery of the test verification documentation shall be effected with the stamped originals or authenticated copies in binders, collated into packages by plant or system designation. It shall verify all test results, including the preliminary test documents. The binders shall be given synopses of contents and handed over to the customer in the agreed quantity.

The contents (form, structure and test requirements) of the test verification documentation shall be laid down as binding between customer and contractor in accordance with the specimen shown in Appendix 3.

The contractor shall have the documents of the test verification documentation after acceptance of the assembly/component ready to the customer to call up in final and complete form no later than 1 month after completion of assembly.

3.1.4 User instructions

Instructions shall be written as task-based and handed over in the form of manuals. They shall contain excerpts from the implementation documentation and other documents necessary in the light of the contents of the manual in question. Statutory provisions and conditions imposed by authorities shall be taken into account when writing the manuals.

As a rule, the Operation Manual (OM) and Maintenance Manual (MM) shall be drawn up by the contractor pursuant to the requirements set out in Appendices 4 (OM) and 5 (MM).

3.1.4.1 Operation Manual

The Operation Manual (OM) shall contain the information necessary for the operating personnel to operate both the power station unit as an overall plant, and its individual systems.

The contents, structure and coding of the Operation Manual are described in Appendix 4, and its design in Appendix 6.

The Operation Manual shall be delivered in paper form in the agreed quantity, broken down into system-related parts, as accompanying documentation (provisional Operation Manual) three months before commissioning.

As hand-over documentation, the Operation Manual shall be on delivered the agreed data medium and also in paper form. The data electronic d medium and number of paper copies shall be the subject of agreement.

The Operation Manual shall be delivered as hand-over documentation without delay, but no later than 3 months after acceptance (revisions to provisional Operation Manual or resupply).

3.1.4.2 Maintenance Manual

The Maintenance Manual (MM) shall contain the necessary information for the maintenance (servicing, inspection, repairs) of plant parts, technical equipment (machinery sets) and components, and the technical assessment of such measures, including technical performance and design data and descriptions of methods of operation. Where the supply was for components, the Maintenance Manual may also contain procedures for operating the components.

The contents, structure and designation of the Maintenance Manual are described in Appendix 5, and its design in Appendix 6.

The Maintenance Manual shall be delivered in paper form in the agreed quantity as accompanying documentation three months before commissioning.

As hand-over documentation, the Maintenance Manual shall be delivered on the agreed electronic data medium and also in paper form. The electronic data medium and number of paper copies shall be the subject of agreement.

The Maintenance Manual shall be delivered without delay, but no later than 3 months after acceptance. Delivery as hand-over documentation is may be effected by updating the accompanying documentation or by re-supply. The procedure to be followed shall be the subject of agreement.

3.1.4.3 Manuals for additional tasks

The supply of further manuals, e.g. assembly manuals, repair manuals, test manuals, etc. may be agreed between the parties to the contract.

3,2 Document preparation and hand-over phases

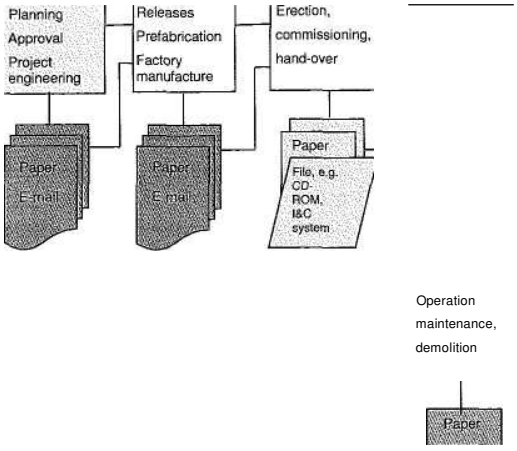

Fig. 2. Phase model showing the preparation and hand-over of documentation in the individual phases of project execution.

3.2.1 Accompanying documentation

Accompanying documentation consist of documents that will be replaced between the customer and contractor during the tender, project planning, design, erection and commissioning phases.

The documents in the accompanying documentation shall be handed over in paper form in the agreed quantity to the specified address of the customer. Alternatively, it may be agreed that digital information media shall be handed over, or data exchanged between customer and contractor via the Internet or an intranet.

3.2.2 Hand-over documentation

The hand-over documentation consists of all documents relating to the approved and constructed or delivered and accepted plant, systems, components, equipment and items (see Fig. 1). The terms "end documentation" or "final documentation" are also used for hand-over documentation.

The contractor and his sub-contractors shall ensure that the plant agrees with its documentation as regards completeness and correctness.

The deadline for delivering the hand-over documentation with the as-built status shall be agreed with the customer. Delivery may be in successive instalments, but shall be completed no later than 3 months after acceptance. Experience has shown that it is advisable to set a fixed deadline (e.g. at acceptance) for delivery of provisional hand-over documentation. This makes it easier for the customer to familiarise himself with the plant and examine the documentation. Moreover, early delivery of specimen documentation, i.e. selected parts of the documentation where details still need to be matched, is advisable. It should also be noted that the presence of certain documentation is compulsory for certain commissioning or operational activities, e.g. test verification protocols before making electrical connections, provisional Operation Manual before commencing operations, etc.

Documents requiring revising due to maintenance measures, conversions and adaptations under the scope of the guarantee shall be delivered as hand-over documentation no later than 2 months after completion of the measures in question.

3.2.3 Operational documentation

Operational documentation consists of all records of operation and operational data arising in the course of operating the plant, including commissioning and trials.

Operational recordings arising before the end of trials are generally at the responsibility of the contractor, and thereafter at the responsibility of the operator.

The priority arrangement characteristics of operational recordings are the objects arranged by KKS.

4 Stipulations

4.1 Document requirement

The document requirement necessary for the operation, maintenance and demolition of a plant shall be stipulated for each plant in accordance with the checklist in Appendix 1.

The document requirement lists enclosed when tenders are submitted shall be firmed up in detailed negotiations between customer and contractor as regards the final scope of the documentation to be delivered. Such document requirement lists constitute an integral part of the contract.

4.2 Technical Data

Part of the technical data included in the documents, particularly the implementation documentation, shall in the course project execution be compiled into object-related lists or databases, for the following purposes:

— ascertaining requirements or schedule of quantities (e.g. electrical consumers, measuring points);

— compiling design and ordering data (e.g. piping and fittings}.

This information shall be provided to the operator in machine-readable form for efficient operational management and maintenance. The scope and structure of this data shall laid down as binding between customer and contractor (see also Appendix 2).
The data formats shall be agreed between customer and contractor. Due to the large amount of existing structures and formats, no general specification can be laid down within these Guidelines.

The technical data is generally handed over in successive instalments and shall be agreed with the customer depending on the requirements and preparations for operation. It shall constitute an integral part of the hand-over documentation.

Technical data may also be ascertained and collected with the aid of computer-assisted design engineering systems (CAD/CAE). In this case, continued use of the design engineering system shall be harmonised and agreed between customer and contractor.

4.3 Object designation system

Agreement on the object designation system to be employed shall be reached between customer and contractor before the contract is concluded. The KKS Identification System for Power Stations shall be used for preference. (Reference is only made to the KKS system below for simplicity}.

The KKS system is to be used for designating both plants and plant sections, and their associated documents. The rules for applying the KKS and the KKS codes are contained in the publication "KKS-Identification System for Power Stations - Guidelines for Use, F, A and B codes (B105E)", published by Verlag VGB PowerTech Service GmbH (Essen). Particular reference is drawn to the Appendix of the said Guidelines B105, in which the "Specifications to be determined between the parties involved in the project" are laid down.

The use of the KKS system, particularly for designating the interfaces between existing plant and new plant under the project, is to be agreed between the customer and contractor as binding and unambiguous.

The overall planners or other contractors shall be responsible for ensuring the accuracy, completeness and consistency of the designations both of the documents they produce themselves, and of those produced by their subcontractors.

This applies both to designations within documents (plant designations) and of documents (document designations). They shall agree these with the customer.

A list of the KKS designations allocated shall be drawn up by the contractor for each scope of delivery. Further information in this list, e.g. P&I diagrams, the generating of this list from existing lists, and hand-over (electronic file format, number of paper copies as required), shall be agreed before the contract is concluded.

Lists of signs shall be drawn up and maintained for each scope of delivery. Appendix 7 contains a check list showing the detailed information to be agreed upon for drawing up a list of signs, and for manufacturing the signage. The time of hand-over of the list of signs shall be agreed before the contract is concluded, especially if the final signage is not manufactured by the plant or component supplier.

4.4 Handover/acceptance of the hand-over documentation

Each partial delivery instalment of the hand-over documentation shall be accompanied by a list of documents, showing all the documents supplied. The supplied documents are as rule to be handed over collated in the order as set out in the list of documents. This list of documents shall be maintained by computer. Its form and content shall be agreed between customer and contractor.

The delivery of the documentation shall be characterised as handover documentation. The handover documentation shall be delivered centrally to the contractually-agreed location.

The management of documents, further stipulations regarding acceptance/hand-over procedures, designation of documents, and stipulations regarding document form and data media are described in Appendix 8 and must be modified by the customer and contractor on a project-specific basis as necessary.

Partial deliveries of technical documentation shall be registered by the customer and therefore documented.

Acceptance of the hand-over documentation shall be confirmed by the customer after a formal examination. Confirmation shall be issued to the contractor within 2 months. Acceptance shall be deemed to have confirmed if this time limit is exceeded.

Bibliography

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DIN 199-4	Terminology associated with technical drawings and parts lists; Amendments
DIN 821-1	Files and folders; dimensions
DIN 1421	Arrangement and numbering in texts; clauses, paragraphs, enumerations
DIN 1422-1	Publications in sciences, technology, economy and administration; presentation of manuscripts and typescripts
DIN 4844-1	Safety markings - Part 1: Dimensions, distance of observation
DIN 4844-2	Safety markings - Part 2: Overview of safety signs
DIN 6771-5	Printed forms for technical documents; circuit diagram A3
IEC 61346-1	Industrial systems, installations and equipment and industrial products - Structuring principles and reference designations - part 1: Basic rules
IEC 61355	Classification and designation of documents for plants, systems and equipment
IEC 62079	Preparation of instructions - structuring, content and presentation
DIN 6779-10	Structuring principles for technical products and technical product documentation - Part 10: Power plants
IEC 61082-1	Preparation of documents used in electro technology — Part 1: General requirements
ISO 216	Writing paper and certain classes of printed matter: A and B series

DIN 476-2	Trimmed sizes of paper; C series
ISO 5457	Technical product documentation - sizes and layout of drawing sheets
DIN 824	Technical drawings; folding to filing size
ISO 6428	Technical drawings - requirements for micro copying
VGB-B 105 E	KKS-Identification system for power stations - guidelines for use and key with ring binder, 5* edition 2003, index C
VGB-B106E	KKS Application Explanations: Identification System for Power Plants Part A, B1-B4 with ring binder - edition 2004

Appendices

Appendix 1:

Checklist for required documents for handover documentation

Introduction

Clear agreements should be arrived at between the contracting parties (including sub-contractors) at the very outset of a project regarding the **kind, scope and designations** of documents on **handover/acceptance** of a power station. The frequently-used formulation "... all documents necessary fro operation and maintenance ..." is inadequate and often leads to extensive fine tuning and additional negotiations, usually at the wrong time.

Specifications should be drawn up to take into account the fact that the increasing representation of data on the output media of process control systems can also be regarded as part of documentation.

1 Application

This Appendix supports the stipulations regarding the **scope of delivery** for all technical documents in all engineering disciplines that are handed over to the customer at the end of a project.

It does not take the content and nature of the individual document kinds into account

2 Normative references

IEC 61355

Classification and designation of documents for plants, systems and equipment (IEC 61355:1997).

3 Terms

The definitions in the main part of the Guidelines apply, with the following additions:

Presentation form

Method of presenting an information content.

EXAMPLES: Pictorial form, drawings, plans, circuit diagrams, map, diagram, table, list, test form

Document kind

Type of document defined with respect to is specified information content and form of presentation (IEC 61355).

Document kind class

Group of document kinds have similar characteristics concerning information content, independent of the form of presentation (IEC 61355).

4 Information requirement

The information requirement and consequently the different document kinds which are necessary depend very much on

— the type of component (series-produced item, one-off item, etc.)

— the business case in question (with/without service contract), and

— other influencing variables.

The methods and tools intended for the management and updating of specified documents by the operator is to be included in the specifications; they determine the data media and formats.

For legal reasons (guarantee, claims for damages, proof of delivered characteristics and quality, etc.) the type of data medium accepted as legally binding before a court must be stipulated.

When specifying the number of documentation sets to be handed over, the space requirements of the data media and the operator's revision service are to be taken into account.

Outline Guidelines such as these cannot lay down a binding standard to cover all eventualities. The purpose of this Appendix is to provide aids that can be used in any particular project.

Document requirement list (DBL)

A document requirement list is to be drawn up for each type of component or supply; the following columns are recommended:

— document name

— document kind classification code DCC (e.g.as per IEC 61355)

— data medium

— electronic data file format

— reference to the detailed description of the document kind class regarding content

Document requirement list for: Compressor plant = Y3SCA10, =Y3SCA20				
Document name	**DCC**	**Data medium**	**Electronic data file format**	**Reference:**
Description	MDB	CD	PDF	
Operating instructions	MDC	Paper		
Operating instructions	MDC	CD	PDF	
Assembly drawing	MLU	CD	DXF	
Parts list	MPB	CD	XLS	with spare parts information
Circuit diagram	EFS	CD	DXF	see the leaflet
Test protocol	MQC	CD	PDF	

Fig. A1.1 ***Specimen*** *document requirement list DRL (not binding technically, and not complete)*

This list should be used as early as the invitation to tender, when it can constitute a valuable basis for preparing the tender (calculation}.

5.1 Document kind classification code DCC as per IEC 61355

The DCC describes a document in terms of its content, is internationally standardised and consequently is best suited for selecting the necessary documents. It consist a three-letter code, in which the letters have the following meaning:

1. Code letter A1 = technical area

2. Code letter A2 = main class

3. Code letter A3 = subclass

Examples: MMB piping list

EMB Cable list

The table below lists the main classes and subclasses for the 2nd and 3rd positions in the DCC (letters A2 and A3) using examples taken from power station engineering relevant for power station plant and components, irrespective of the engineering discipline.
The 1st position, for the technical area field, (code letter A1) is defined in the table below.

DCC A1	**DCC A2A3**	**Main class and sub-class**	**Examples and document kinds**
	A	**Documents describing documents**	
	AB	Lists (regarding documents)	List of documents
	B	**Management documents**	
	BA	Registers	Supplier list
	BT	Training-specific documents	Training programme
	D	**General technical information documents**	
	DA	Data sheets	Electrical equipment data sheet
	DB	Explanatory documents	System description
	DC	Instructions and manuals	Operating instructions, operation manual
	DE	Catalogues, advertising documents	Catalogue page (valid at the time of supply)

	E	**Technical requirement and dimensioning documents**	
	EC	Technical specification/requirements documents	technical specifications, instrumentation and control equipment list, consumer list, measuring point list, test specifications
	ED	Dimensioning documents	Calculation sheet
	F	**Function-describing documents**	
	FA	Functional overview documents	Overview diagram, network map
	FB	Flow diagrams	Process flow diagram, piping and instrument diagram
	FC	MMI layout documents	Screen display layout
	FE	Function descriptions	Closed loop description
	FF	Function diagrams	Function diagram, logic function diagram
	FP	Signal descriptions	Signal list
	FQ	Setting value documents	Settings list
	FS	Circuitry documents	Circuit diagram
	FT	Software-specific documents	Code list
	L	**Location documents**	
	LB	Earthwork and foundation documents	Foundation drawing
	LC	Building carcase documents	Statics drawing
	LD	On-site location documents	layout plan, cable routing drawing, earthing plan
	LH	In-building location documents	Building drawing, arrangement plan, cable routing drawing
	LU	In/on equipment location documents	Arrangement drawing, group drawing
	M	**Connection-describing documents**	
	MA	Connection documents	Interconnection diagrams, terminal connection diagram
	MB	Cabling or piping documents	Cable list, piping list
	P	**Product listing**	
	PA	Material lists	Tools list, material list
	PB	Parts list	Parts list, spare parts list
	PD	Product lists and product type lists	Product list, product type list
	Q	**Quality-related documents**	
	QC	Quality assurance documents	Material certificate, declaration of conformity
	T	**Geometrical form-describing documents**	
	TB	Construction drawings	Dimension drawings, part drawings
	TL	Arrangement documents	Layout drawings

Fig.A 1.2 code letters for "Main classes and subclasses of document kind classes"

The A2 and A3 code letters are combined with the A1 code letter for the technical area, as shown in the table below, to form the complete DCC document kind classification code.

DCCA1	Technical area
A	Overall management
B	Overall technology
C	Construction engineering (building construction and civil engineering)
E	Electro technology' (including control, information and communications technology)
M	Mechanical engineering
P	Process engineering (if separate from M)

[1] and instrumentation and control

Fig. A 1.3 Code letters for 'Technical Areas"

5.2 Data media

Three groups are distinguished for the purposes of these Guidelines:

— paper and film

— digital data media

— microfilms

5.2.1 Paper and film

With paper and film, information is applied to paper or transparent films in the form of text and graphical representations. The information is assessed by the eye of the person viewing. It can only be legitimately amended, deleted or added to by means of an intentional intervention on the surface of the medium material.

These kinds of data medium are **used for text and graphical documents.**

Sizes, formats: ISO A formats (ISO 216, EN 20216, DIN 476; ISO 5457).

Material: 80 gms paper, PE 0.07 transparent film.

5.2.2 Digital data media

A digital data medium is a storage medium upon which the data is stored and from which it can be rendered visible as a screen display (transient) or printed hard copy by means of appropriate software.

Depending on the process employed, storage can be **magnetic** (hard disk, diskette, tape), **magneto-optical** (magneto-optical drive) or **optical** (CD ROM, DVD ROM).

For "transporting" small quantities of data (e.g. text, tables) the **diskette** in 3.5" format (floppy disk) with a storage capacity of 1.44 MB (high density) is suitable. This kind of data medium is in widespread use and can be read and written to in any commercially-available PC.

The **CD ROM** (compact disk read-only memory) can typically store up to 650 MB. The data are "burned" on to the disk with special equipment, and can be read with the aid of a laser. A drive is used for this that belongs to the standard equipment of a modern PC. Deleting and overwriting is not possible.

The CD-ROM is particularly suitable for handing over large quantities of data (e.g. graphics) at the end of a project. With a "service life" of 10 to 30 years, it can be used for long-term archiving.

The **DVD ROM** (digital versatile disk ROM) can "accommodate" up to 17 GB of data and is suitable for storing extensive databases.

5.2.3 Microforms

General term for data media contain icrographics, generally on film (ISO 6196).

Storage is analogue, reduced in size (by a factor of 12-20 for 35 mm roll film) and is regarded as unchangeable. A storage density of 54 million pixels per 24 x 35 image is achieved, and the expected service life is up to 1,000 years. Simple technologies suffice to retrieve the information. This form of storage and retrieval is used for long-term archiving, but is being replaced by CD ROMS, DVDs etc. as digital technology advances. Familiar concepts are **microfilm, microfiche, aperture punched card,** and **COM** {Computer Output to Microfilm).

5.3 File formats

The file format specifies the type of file, in other words the internal structure it uses to hold the data, including the purpose and class (e.g. a word processing or a graphics file). A distinction is made between "coded information" or "CI", which allows the data to be evaluated by the computer, and "non-coded information" or "NCI", in which case no further machine processing is possible.

The file format used for holding data can be determined from the filename extension, which follows the file name after a dot and usually consists of three letters. For example, **.doc** stands for a text file (in MS Word), and **.tiff** for a graphics file in TIFF format.

Appendix 2:

Technical Data

Introduction

Situations occur in the course of power plant operations that require **rapid clarification.** For example, the following typical questions arise when a fault occurs:

— which items may be involved in the fault?

— where are these installed and arranged?

— who is the manufacturer?

— what tasks must a replacement unit fulfil?

— what settings must be restored?

The answers are usually spread of over a number of documents, but for rational and efficient fault analysis and localisation it is necessary to have the data available in electronic form in order to obtain the relevant information by selective access.

Moreover, appropriate computer-assisted evaluations can generate data compilations of any kind for further uses in operational management, maintenance, materials management, etc.

Stored technical data (plant data) fulfils a major function when assigning new designations in the event of retrofitting.

Sometimes this data is to be found in compressed documents created in the course of the engineering process {e.g. lists of consumers} and sometimes they are drawn up in separate work steps (e.g. list of tanks and vessels).

For this reason, an accurate statement of the scope and format of the plant data to be handed over is necessary as early as the invitation to tender/tender submission (calculation) phase.

1 Application

This Appendix applies to any stipulation in the scope of delivery that machine-readable plant data from all engineering disciplines should be handed over to the customer at the end of "a project.

The differing information requirements of the various kinds of technical equipment and items, and the large number of data processing possibilities (from simple listing programs to highly functioned data management systems), mean that this Appendix has to be limited to proposing examples of information collections that can be adopted for specific projects either directly or after modification.

No recommendations are given for the choice of data processing equipment.

2 Normative references

DIN 6779-10

Structuring principles for technical products and technical product documentation - Part 10: Power plants

VGB-B 105 E

KKS identification system for power stations, Guidelines for use and key

3 Terms

The definitions in the main part of the Guidelines apply, with the following additions:

Equipment

Components and parts used or required for particular purpose.

4 Plant data

Technical plant data are information about the **task and equipment** of technical equipment and items, and their spatial location.

Different requirements will be placed on the scope of the data fields, depending on the purpose and nature of the technical equipment.

Data describing the **task** includes requirements arising from the process, e.g.

— required output of pumps

— measuring range for measurements.

The **equipment** is described by its order number and manufacturer's name.

The location code or installation site code is used to describe the location.

No.	Information on technical equipment	For a specimen, see
1	Plant objects, all assigned codes	
2	Electrical consumers	
3	Measuring points/measurements	
4	Control systems	
5	Pump sets	
6	Blowers	
7	Tanks	
8	Heat exchangers	
9	Electric heaters	
10	Emergency generating sets	
11	Transformers	
12	Chargers	
13	Battery plant	
14	Rooms	

Fig.A2.1 Examples of technical equipment with technical data.

Electrical signals are stored in the instrumentation and control; central cable files exist for cables.

Examples:

Data field	Explanation
Code	All breakdown levels
Designation	40 places maximum

*Fig. A2.2 Example for **plant objects** ("List of designation codes")*

Data field	Explanation
Code	from the list of designation codes
Designation	from the list of designation codes
Measured object	Medium
Measurement range	From, to for the analogue value
Switching point	Switching point for limit value
Measurement detection location	Room where the measuring instrument is
Measuring instrument, type	Product number, order number, sensor, monitor
Measuring instrument, manufacturer	
Measurement transducer, type	Product number, order number, instrument amplifier, measuring transducer
Measurement transducer manufacturer	
Measurement transducer location	e.g. room number where the measuring transducer rack is
Measurement conditioning, type	Product number, order number of I&C sub-assembly
Measurement conditioning, location	Installation location of I&C sub-assembly
Measurement output, type	Product number, order number, instrument, chart recorder, monitor
Measurement output, manufacturer	
Measurement output, location	Local code for desk, panel

Fig. A2.3 Examples for technical equipment for measuring

Data field	Explanation
Code	from the list of designation codes
Designation	from the list of designation codes
Actuator, type	Product number, order number, jHimp set, actuator drive, solenoid
Actuator, location	Room where the actuator is
Switchgear, type	Contactor, LS
Switchgear, manufacturer	
Switchgear, location	e.g. room number where the switchqear panel is

Data field	Explanation
Open loop control unit, type	Product number, order number,, output unit, drive control modul
Open loop control unit, location	Installation location of I&C sub-assembly
Local control centre, type	Product number, order number
Local control centre, location	
Control input unit, type	Product number, order number, keyboard, monitor
Control input unit, location	Local code for desk, panel

Fig. A2.4 Examples for technical equipment for open loop control.

Data field	Explanation
Code	from the list of designation codes
Designation	from the list of designation codes
Delivery volume	
Delivery head	
Required power	
Type	Pump set
Manufacturer	
Installation location	Room where the set is

*Fig. A2.5 Examples for technical equipment for **pump** sets.*

Data field	Explanation
Code	from the list of designation codes
Designation	from the list of designation codes
Voltage	Total voltage
Capacitance	
Discharge time	
Number of cells	
Type	Product number, order number, cells
Manufacturer	
Installation location	Battery plant room

*Fig. AS.6 Examples technical equipment for **"Battery plant".***

Appendix 3

Test certificate documentation
(Quality documentation)

Table of Contents:

Introduction

Test verification documentation covers the collection of quality assurance documents of the plant. This documentation covers all quality assurance documents, from in-process inspections accompanying manufacturing and materials testing through manufacturing tests in the workshops, up to erection on site.

The required documents of the test verification documentation are not given an additional designation as "test verification documents", but the binders, in which the test verification documents are collected and arranged to give a clear overview, are marked as KKS.

1 Content of test verification documentation for steel products for machinery, boilers, apparatus and plant

The test verification documentation mainly consists of: ~

test certificates for products forms

— test verifications on the results of structural inspections carried out

— type test certificates

1.1 Test certificates for product forms

Product forms are e.g.

— plate (rolled or forged}

— pipes and pipe fittings {seamless or welded)

— bars and forgings (e.g. flat bar stock, flanges)

— bolts, nuts, expansion sleeves, turbine blades

— welding filler metal

— castings (large pump bodies, turbine casings)

— large forgings (turboset shafts)

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manufactured as a specific part {e.g. a pump body) as different parts of more than a number of systems (e.g. a flange). Materials tests are carried out on these product forms by their manufacturers (e.g. rolling mills, foundries) and evidenced by test certificates. These can be

- chemical analysis
- mechanical-technological tests
- non-destructive tests
- residual stress tests
- hardness tests
- dimensional accuracy tests

» descriptions of heat treatment processes

- verification inspections
- test instructions
- tolerance applications/welding releases
- fault recording
- pressure and tightness tests
- function tests
- X-ray examinations
- measurement protocols

The scope and extent of the tests and examinations depend on the nature of the product forms and are generally recorded on "Materials test sheets" as part of the specifications, like certificates.

Test certificates can be issued as individual or collective certificates.

1.2 Preliminary test documents/manufacturer's qualification

The preliminary test documents mainly record the following:

— type test certificates

— technical delivery conditions, and casting and forging drawings

— test types

— test instructions

— test equipment

— test result limits/assessment criteria

— test times/manufacturing and test sequence plans

— welding procedures

— sample location drawings

These are used for checking the test instructions and testing before, during and after manufacture and assembly - from single parts to systems - including commissioning.

The tests consist essentially of:

— inspections of the product forms on receipt

— manufacturers' quality assurance documents (e.g. for pumps, tanks) and for specific equipment and facilities, and also staff qualifications (e.g. welders)

— welding preparations

— inspections during and after manufacture (welding, forming)

— tightness and pressure resistance

— inspection of attestations and documents

both in the manufacturers' works and on site. The test requirements are formulated in general form in "Test Sheets" and in more specific form in the preliminary test documents for particular manufactured products. The preliminary test documents must be in the hands of the manufacturer in an approved form before the start of manufacture, since they contain

— the manufacturing and test sequence

— provision for confirming the tests have been carried out, and

— a representation of the finished product.

For identical products and manufacturing processes of the same kind, the preliminary test documents are only drawn up and approved once; they are copied appropriately for use and allocated to the individual processes by means of the KKS identification.

1.3 Test verifications

The results of the individual tests, checks and monitoring that accompany manufacturing are recorded in the test verifications. Test verifications can be issued as individual or collective certificates. The preliminary test documents and corresponding rules and regulations act as a model. As a rule, test verifications are assigned to the respective testing step in the preliminary test documents, or in the case of collective certificates, reference is made to these.

Test certificates, preliminary test documents and test verifications takes place after the KKS identifications. Further details must be agreed between the customer and contractor.

1.4 Type test certificates

Contain the proof of type tests.

2 Content of test verification documentation for civil engineering

The test verification documentation mainly consists of:

— test reports and results of agreed tests (e.g. thermal insulation, coating thickness, concrete covering)

— surveyor's report on the finished structure

— approval decisions (e.g. for.facade elements, bolts)

— verifications of manufacturing tests (e.g. type tests, materials tests)

— research reports from materials testing institutes (if necessary)

— quality verifications and certificates

— final approvals and inspection reports by authorities (if necessary)

3 Content of test verification documentation for electrical and I&C engineering

The test verification documentation is to be produced both for the central electrical engineering plant (station requirements plant) and I&C (main I&C) plant, and also for the so-called "black boxes" (electrical and I&C constituents of process engineering and component supplies, e.g. burner controls), and consists mainly of:

— verifications of manufacturing tests (e.g. type tests, manufacturing tests)

— verification of erection in conformity with the contract (e.g. assembly protocols, test reports, setting and adjustment reports)

— verification of electrical protection measures implemented (e.g. earthing conditions)

— verification of commissioning in accordance with the contract and regulations (e.g. overall interlock and function tests for switchgear included in the scope of supply)

Quality assurance documents for the main i&C engineering consist of the quality assurance documents for the IC& plant as a product (contractually-agreed performance and kind), confirmation of the objective of the I&C plant (I&C functionalities such as e.g. automation and information processing functions), and verification runs for possible modes of operation . Some of these quality assurance documents cannot be provided until a later phase of commissioning, since the plant must be optimised as a whole. The verification runs are to be carried out during trial operation.

Test verification documents and certificates for electrical equipment are frequently part of the corresponding equipment catalogue. Individual verification is no longer necessary in such cases.

4 Classification of the test verification documentation

Usually the classification takes place supplier-related after KKS. The individual contents are to be structured so that multiple filings are prevented as much as possible. Cross-references are allowed for this.

Each binder must have a table of contents.

The contractor is responsible for a complete and correct collection, including those of his sub-contractors.

The breakdown and content of the test verification documentation for piping is given below as an example:

4.1 Higher-level documents

— Approvals (ISO, ADHP O)

— Manufacturing test plans

— Supervisory staff

— Process tests (list)

— welding procedures

— welds (list)

— stamp transfer authorisation

— pressure sample check

— non-conformance reports

— list of radiography films

— miscellaneous

4.2 Materials certificates

— Lists of certificates

— Pipe material

— Hangers and supports

— Fittings such as e.g.
  - shut-off valves
  - safety valves
  - control valves

4.3 Piping (arranged by KKS)

— Site documents
  - assembly check lists
  - assembly test protocols -.
  - assembly isometrics
  - drawings of hangers and supports
  - parts lists (if appropriate)

Prefabrication documents
  - prefabrication check lists
  - prefabrication test protocols
  - isometrics
  - parts lists

4.4 Protocols

— heat treatment protocols

— radiography protocols

— ultrasound protocols

— surface crack detection protocols

— hardness tests

— other protocols

Appendix 4

Specifications for the Operation Manual (OM)

Introduction

The Operation Manual must be broken down as described below. The individual main sections must be divided by index sheets bearing the appropriate text. If appropriate, the main divisions can be further broken down by sub-dividers (see Appendix 6 for the design of the manual). IEC 62079 places the following particular requirements on drawing up instructions for plant operation:

— how the instructions are to be used

— operating instructions

— normal and safe operation

— automatically controlled and remote-controlled products

— extraordinary functions/situations

— displays to observe

— trouble-shooting instructions

— protection of persons

— table of contents, index and other lists, definitions and metasyntax

— page numbering (pagination)

— table of contents

— index

— list of operating elements

— definition of technical terms

— definition of symbols

— explanation of representation conventions

— legibility

— font and font size

1 Instructions for writing the Operation Manual

1.0 Definition of the Operation Manual

The Operation Manual contains all the operational and safety engineering instructions necessary for the operating personnel to operate the plant as intended and to cope with faults.

1.1 Use of the manual

1.2 Content of the manual

1.3 Definition of terms
(Abbreviations, symbols)

1.4 Power Station Designation System (KKS)

1.5 Safety information

Product liability, machinery guidelines, workplace guidelines

1.6 Description of the overall plant

1.6.1 Process engineering design requirements

This section shall give a brief description all the process-engineering objectives and explain the purpose of the plant. It shall also set out all the guarantee data such as mass flow rates, filtration efficiencies, quantity and quality of raw materials and discharged substances, temperature levels, etc.

1.6.2 Conditions and approvals of operation

This section shall set out all the prerequisites, constraints and conditions (e.g. protection against air pollution and water pollution) resulting from statutory provisions, conditions imposed by authorities, operational requirements and the rules of engineering. These shall be arranged by medium, such as water, flue gas, noise etc, or possibly by the overall operational situation affecting them (e.g. conditions for starting up, conditions for power operation, conditions after a malfunction during operation).

If the imposed conditions for operation affect other sections of the Operation Manual, they are to be dealt with there as well, at the very least by means of a reference to this section.

<

2 Operation of the overall plant

2.1 Function description of the project

Description of the overall operation processes and links between the individual systems

2.2 KKS plant code
(overall list)

2.3 Operation of the plant

{including chemistry for operational purposes)

• bringing about a state of readiness for operation (recommissioning)

start-up check list

• Start up

cold

hot

• Operation (power operation)

normal

non-standard operation

malfunction operation

• Coasting down (taking out of operation)

• Shutdown (standstill measures)

3 Operation of individual systems

3.1 Description of the methods of operation of individual systems and their components

3.2 KKS individual systems

3.3 Operation of individual systems

- Bringing about a state of readiness for operation
  start-up check list
- Start up
  - cold hot
- Operation
  normal
  non-standard operation
  malfunction operation
- Coasting down
- Shutdown

Section 3.3 is to be arranged by KKS function code.

Setting values

Details shall be laid down on a plant-specific basis (arranged by function code)

Logic diagrams

Details shall be laid down on a plant-specific basis. Process function plans (arranged by KKS function code)

Isolating

All operational actions to be carried out for standard isolated states are to be described here. Which isolated states are to be described here must be agreed between customer and contractor. Reconnection of isolated equipment is to be described under non-standard operation or malfunction operation.

The positions of manual valves and switches in the descriptions of types of operation and commissioning procedures are to be given in list form if at all possible, arranged in ascending KKS order.

Fault alarms

Fault alarms are be described at the overall level and for each individual system.

Which faults are to be described here must be agreed between customer and contractor.

A description of the cause of the fault and how to remedy it is not part of the fault description.

Appendix 5

Specifications for the Maintenance Manual (MM)

Introduction

The Maintenance Manual must be divided as described below. The individual main sections must be divided by index sheets bearing the appropriate text. If appropriate, the main divisions can be further broken down by sub-dividers. Each division must include a list of the documents it contains (list of documents: e.g. technical instructions, assembly drawings, dimensional drawings). See Appendix 6 for the design of the manual.

IEC 62079 places the following particular requirements on drawing up instructions for plant operation:

— how the instruction are to be used
— maintenance instructions
— general
— instructions on maintenance and fault rectification for specialist staff
— spare parts list
— instructions for special tools, equipment and materials
— materials
— instructions for repairing and replacing parts
— taking out of operation
— destruction
— recycling
— disposal
— table of contents, index and other lists, definitions and metasyntax
— page numbering (pagination)
— table of contents
— index

— list of operating elements
— definition of technical terms
— explanation of representation conventions
— legibility
— font and font size

1 Instructions for writing the Maintenance Manual

1.0 Definitions of the maintenance manual (see Section 3.1.4.2 of the Guidelines).

1.1 Use of the Maintenance Manual

1.2 Contents of the Maintenance Manual structured by KKS

1.3 Definition of terms
{with references to standards if appropriate)

1.4 Power station identification system
(if necessary: classification up to the component

1.5 Safety information
(Safety signs to ZH1/31 and DIN 40008-1, product liability, machinery guidelines, workplace regulations and guidelines, accident prevention regulations, overall environmental protection, e.g. regarding hazardous substances, soil, air, water).

2 Maintenance of systems

These are broken down as per KKS, e.g. M, MA, MAA,....

3 Maintenance of equipment units, and items

3.1 General description of equipment units, and items

— table of contents
— safety information
— purpose, design, method of operation/function

3.1.1 Maintenance of equipment units, and items

— general information
— monitoring
— maintenance, lubrication
— spare parts
— major inspection intervals
— inspection
— repair, including individual parts
— troubleshooting
— disassembly (removal and dismantling)
— re-assembly (assembly and installation)
— checks and adjustments on completion of assembly
— checks and measures on commissioning
— post-commissioning checks
— tools and assembly aids
— preservation

3.1.2 Operation of equipment units, and items

— pre-starting procedures
— start-up procedures
— shutdown/standstill procedures in the event of a malfunction
— safety information
— consumables and minor auxiliary items (lubricants)
— procedures in the .event of malfunctions
— technical data and test protocols
— graphical representations (dimensional drawing, drawings, photos, diagrams, etc.).

Appendix 6:

Design of manuals

Table of Contents

Introduction

The following rules apply to the design of manuals. Deviations from these rules must be specifically agreed between the project partners.

1 General requirements on the design of manuals

1. The production and revision of manuals and management of the data stock should be computer-assisted for all forms of information representation and be done on a zero-redundant data basis. Attention should be paid here to

a) uniform chapters (e.g. recording the formatting, positioning and text structure)

b) modular structure of chapters and text passages

c) database-compatible structure allowing links to other information systems, e.g. a plant database

d) reliable protection against unauthorised changes, and

e) safe, redundant storage.

2. The requirements are to be applied as appropriate for other forms of information representation (e.g. screen, multimedia).

3. Attention must be paid to compatibility if different media are used; for example, on-screen colour coding when printed in black and white hard copy must be supplemented by coding by shapes, or replaced.

4. The requirements of this section apply to the particular instance of manuals in paper form.

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2 Structure and layout

1. Manuals shall be produced in loose-leaf form, allowing changes at any time.

2. The formatting of the individual pages must be selected such that the pages can be easily reproduced (e.g. for the revision service or for use as check lists). Reproduction shall not result in loss of information or substantial impairment of legibility,

3. Text documents shall use A4 paper in portrait format.

4. Larger formats {e.g. for drawings and tables) shall be folded to A4 size with a filing margin or strip as per DIN 824. ISO 6428 must be observed for such larger formats, since it cannot be guaranteed that such documents will still be legible if reproduced reduced by a factor of (2 x V2).

5. The following points must be taken into account as regarding marking and handling:

a) Scope and structure should enable easy handling.

b) The contents of the individual binders must be indicated on the binder spines.

c) The documents are to be divided into chapters. Each chapter shall be preceded by a header page and a contents page.

d) Every page in a manual must be unequivocally identifiable (e.g. document number, chapter, section, page number, revision status).

e) The revision status must be clearly visible.

3 Presentation of instructions

The basic rules in IEC 62079, main section 6 (subsections 6.1 to 6.11.4) must be observed. The following Sections 3.1 to 3.5 of this Appendix contain more detailed or additional rules. IEC 62079 includes rules for:

communication principles

legibility

figures

graphical symbols

tables

diagrams and plans

flow charts and plans

electronic media, audio, video

emphasis warnings

colours and their significance

explanation of visible and audible signals

Font and font size

3.1

A good legible font (sans serif) e.g. Helvetica or similar, must be selected in an adequate size. The following therefore applies:

— body text in 10 point at least

— line spacing at least 120% of the font size

— headings in 12 point at least

3.2 Text structure and layout

1. Texts shall be arranged in short sentences and paragraphs as per DIN 1422-1, corresponding to their logical and content cohesion. If necessary, they shall be numbered as per DIN 1421. Sections are to be given headings as per DIN 1421.
2. Text shall be written to give the eye sufficient guidance (e.g. by suitable grouping of the lines or by using one-and-a-half line spacing). If this is not possible, suitable methods to assist in guiding the eye shall be employed (e.g. larger line spacing, horizontal assistance lines, line grouping).
3. The lines of lists or tables shall be grouped according to their meaning. The groups shall be separated from each other by guidance aids (see Section 2).
4. Body text shall be used sparingly and written to be understandable. The following are advised for improved comprehension:

   a) use precise, specific and everyday words

   b) use short simple sentences, avoiding negative forms, passive forms and nominalisations.

   c) put enumerations at the end of the sentence

   d) use the same sentence structures and terms for the same content.

3.3 Emphasis

1. If individual passages should be marked as being of different importance, this should preferably be done by typographical means. The different marking methods in the following paragraph should be used uniformly, sparingly and not superimposed on each other.
2. If individual words or phrases need to be particularly marked,

   a) boldface

   b) italics

   c) a different font size

   d) different fonts

   can be used.

3. To emphasis larger text areas or mark individual words or phrases, the following methods can be used in addition to the text structuring methods in Section 3.2:

   a) indents and reverse indents

   b) text edges

   c) margin markings.

3.4 Names and abbreviations

1. Names must be unambiguous and as short as possible. The same word must always be used to designate the same thing.
2, Different situations (e.g. activities, states, components) must be designated differently.

   Note:

   This is to avoid the same names being used with different meanings.

3. In addition, the designation system used in the power station should always be used in the manual, as well as plain language designations.
4. The same names and abbreviations should be used in the manual as in situ. Only one abbreviation should.be laid down for each name. Each abbreviation should only have one meaning.
5. Differences in meaning shall not be derived solely from the different use of upper and lower case letters.

3.5 Instructions for actions

3.5.1 Generally-valid instructions for actions

1. Instructions for actions lay down actions to be taken by personnel (inspections, control or switching actions, communications processes) precisely and unambiguously.
2. Instructions for actions are to be designed to match the particular features of the task in question.
3. Instructions for actions must be understandable as such without any need to resort to sources of information outside the manual. Where a reference is made, the location in the manual to which the reference is made must be unambiguously stated.
4. Instructions for actions shall be formulated in the imperative form.

3.5.2 Instructions for actions additional to the Operation Manual

1. Unless particular features of the task in question prevent it (see point 2 in Section 3.5.1 above), instructions for actions, especially concerning operation of the overall plant and of individual systems, shall be broken down into steps, the logical and chronological sequence of which shall be matched to the order of the procedures (step-by-step programmes}.
2. Steps must state both the activity to be performed (course of action), the object in question and any boundary conditions or constraints (e.g. location information). They can consist of more than one action. Preconditions for any step must be stated before the step, and formulated in such a way that only one sequence of steps is laid down. Steps may be grouped together into activity packages if useful, e.g. oriented around holding points or interim objectives.
3. Graphical means may be employed to represent step programmes.
4. If parts of the Operation Manual are to be used as check lists, provision shall be made for "action completed" notes to be entered.

4 Revision service

The contractor shall operate a revision service for the manuals from the delivery time for the manuals until expiry of his guarantee period for the plant. This revision service shall be set up in such a way that it can be continued unchanged by the customer after the end of the guarantee period. The method of proceeding shall be agreed between contractor and customer.

The following points are to be observed.

4.1 Operation Manual

1. A revision service shall be set up to ensure that the Operation Manual is always up to date. The task of this service is to ensure that:
   a) changes in any facts or situations covered by the Operation Manual are entered without delay, to the extent necessary for safe and reliable operation, in at least the Operation Manual kept in the control room and in the parts of it kept at the local control desks;
   b) system-specific information agrees with system diagrams and system descriptions;

c) editorial errors (e.g. misprints, incorrect abbreviations) are corrected;

d) a register of the revision status is individual pages is kept.

2. A replacement procedure shall be agreed with users of registered copies of the Operation Manual (e.g. replacement periodicity, feedback, address for despatch).

4.2 Maintenance Manual

1. A revision service shall be set up to ensure that the Maintenance Manual is always up to date. The task of this service is to ensure that:

   a) changes in any facts or situations arising during operation, and/or maintenance measures, are recorded in the manual in separate revision documentation until incorporated into the respective documents;

   b) system-specific information agrees with that in drawings and descriptions;

   c) editorial errors (e.g. misprints, incorrect abbreviations) are corrected;

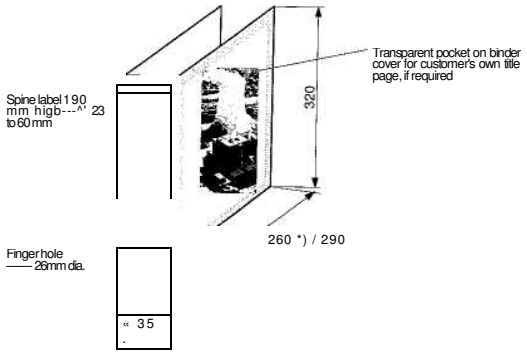
   d) a register of the revision status in individual pages is kept.

2. A replacement procedure shall be agreed with users of registered copies of the Maintenance Manual (e.g. replacement periodicity, feedback, and address for despatch).

5 Manual binders

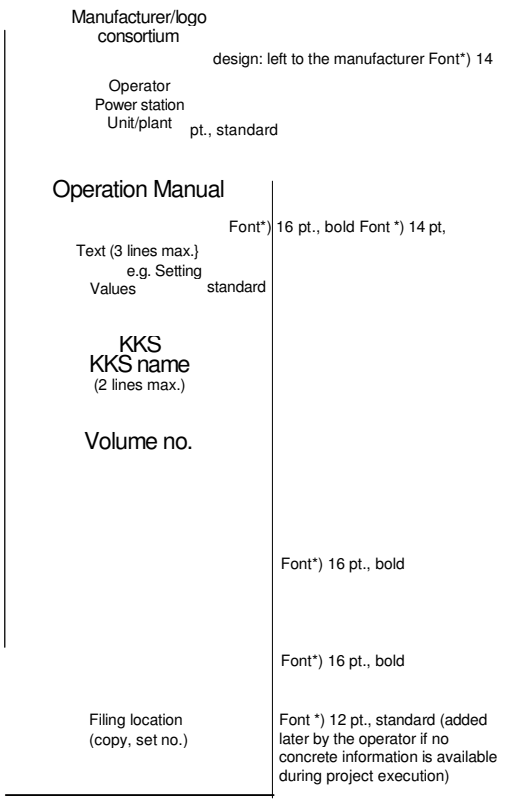
5.1 Binder design

The binders should be designed in accordance with DIN 821 -1.



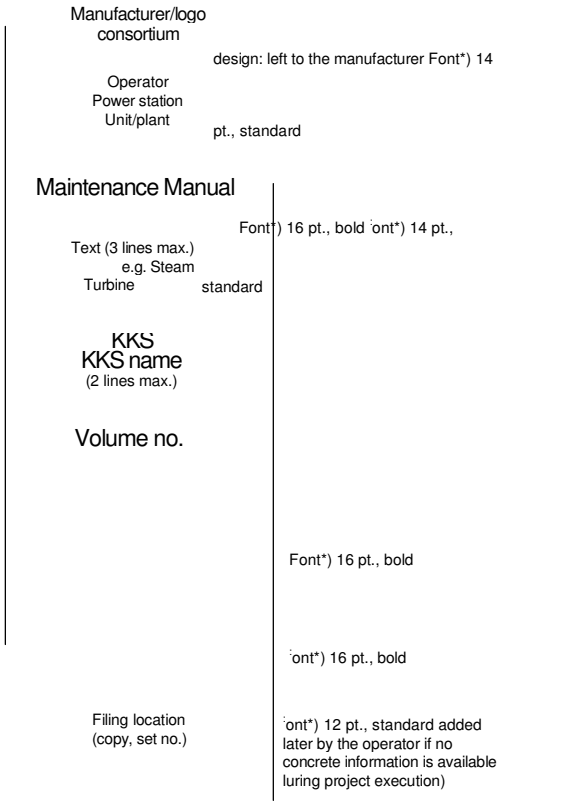
*) Depending on the type of binder mechanism (e.g. whether the arches are round at one side or both sides, or rectangular), the dimension of 206 mm fort he binder depth and the width dimensions can deviate from DIN-821 as „commercial/y available"

5.2 Spine label for the Operation Manual, design, content



*) Sans serif fonts are to be used, e.g. Helvetica, Arial, or Univers.

5.3 Spine label for the Maintenance Manual, design, content



*) Sans serif fonts are to be used, e.g. Helvetica, Arial, or Univers.

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Appendix 7

Check list for in-situ signs in power stations

Table of Contents:

Introduction

In order to ensure that power station plant can be unequivocally identified in situ, the plant, equipment units, components, items and equipment must be marked.

Signs are therefore affixed in situ to all structural, machinery, electrical and I&C systems.

This Appendix contains information on marking the plant by means of signs, colour coding and directional arrows.

Other markings, such as e.g. escape route markings and hazard indications, are not part of plant identification and are disregarded here.

In-situ signage allows piant parts to be found quickly and reliably for monitoring, lubrication, maintenance and repair purposes and in the event of faults, and thereby makes an important contribution to safe and economic plant operation.

In-situ power station identification by signage should state the plant designation and plain language name, or its abbreviation.

In addition, colour coding shall be used to give information on the medium and directional arrows to show the direction of flow.

If signage is priscribed by statutory provision or conditions imposed by authorities, their specifications shall be applied.

Delivery dates and all implementation details regarding temporary and final signage shall be agreed as binding with the contractor.

1 Scope of application/validity

This Appendix is to be applied to in-situ signage of power station plant. It may be amplified by rules specific to the power station, in which case rules in this Appendix may be disregarded if the previous signage used other criteria which are to be retained.

2 Signage texts

The signage texts consist of

the plant designation (process engineerii the ;ignation)

plain language name.

2.1 Process engineering designation

Plant parts are marked along process-engineering lines according to their function in the power station process in the areas of machinery and civil engineering, and electrical and I&C engineering.

The designation generally extends as far the AN position in breakdown level 2 (equipment unit).

If a unique designation is not possible at the equipment unit level, (e.g. a unit with two drives), the designation may extend to position A 3 in breakdown level 2.

2.2 Plain language names

In addition to the KKS plant designation, a plain language name is also shown on the signs in order to ensure reliable and fast identification of plant parts in situ. Plain language names should be given in full. If this is not possible for space reasons, abbreviations are to be used. The following should be noted here:

— Plain-language texts on signs and in project lists (see Appendix 2, Technical Data), must agree.

— Identical parts with identical functions must always have the same name or abbreviation.

— Use of the plant designation within *the* name is only permissible in exceptional cases.

For other languages, the full names and any necessary abbreviations must be agreed upon in detail.

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In-situ signage

3.1 Temporary signage

Temporary signs are to be provided in order to ensure unequivocal identification of plant parts during and after assembly. These may be removed if the final signs are affixed by the contractor immediateiy. The temporary signage is a compulsory precondition for commissioning. A list of signs shall be handed over by the contractor in any case.

3.2 Final signage

The final signage is generally affixed in steps and at a later time than the erection of the plant. It must be in place at the latest when the plant is handed over to the customer, if it is part of the contractor's contract.

4 Indicating media and flow directions

Media and flow directions are generally indicated separately or additionally by means of plant signage using colour coding and directional arrows. If external signs are affixed, the indication of the medium and flow direction can be integrated in the sign support. Colour coding of the letters and numbers to indicate the medium is out of the question.

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Necessary agreements on detail

	Agreements on detail
	Content of the signage list (e.g. KKS, plain language, installation location) and their generation (e.g. from existing technical data in the project} and file format.
	Sign sizes, depending on place of use and lettering
	Translation and use of full text and abbreviations national languages.
	Plain language names (method of writing, maximum number of ■ itters)
	Sign material, type and nature of the signs
	Type of lettering
	ont, font size astening of the signs
	rovision of temporary signs and their ig fastenin signs bunting information for sign ndication of medium and flow direction (colour coding, directiona irrows, frequency)

Appendix 8

Document management

Table of Contents:

Introduction

In the course of execution of a project, information is prepared, changed, **exchanged** between the partners, released and finally **handed over** to the customer as part of acceptance as the documentation of the supplied plant. The information is stored on a wide variety of data media and passes through numerous states in terms of content and validity.

In order ensure that required information can be found quickly and is up to date, computer-assisted document management is indispensable. Clearly-defined processes are necessary for the smooth exchange of documents.

The basis for a dealing documentation rationally is unambiguous **designating** and clear **rules for exchanging** documents, laid down as binding between customer and contractor and adhered throughout the entire project execution.

It is advisable to apply these stipulations for the service life.

Stipulations must be made regarding unambiguous designations and the exchange of accompanying documentation, and are described below.

1 Application

This Appendix applies to the designation of technical documents in all engineering disciplines, and for exchanging accompanying documentation and for handing over the handover documentation. Notes are also give on filing and archiving.

Documents occurring in correspondence are not dealt with.

The contractor is responsible for the **release procedure** and **revisions.**

2 Normative references

DIN 6779-10

Structuring principles for technical products and technical product documentation - Part 10: Power plants

IEC 61355

Classification and designation of documents for plants, systems and equipment (IEC 61355:1997); German version EN 61355:1997

ISO 9001

Quality management systems - Requirements (ISO 9001:2000-09)

ISO 7200

Technical Product Documentation - date fields in title blocks and document headers (ISO/DIS 7200:2001)

IEC 82045-1

Document management - Part 1: Principles and methods

VGB-B 105 E

KKS Identification System for Power Stations, Guidelines for use and code

3 Terms

The definitions in the main part of the Guidelines apply, with the following additions:

Presentation form
Method of presenting information content.
EXAMPLES: Pictorial form, drawings, plans, mimics diagram, circuit diagram, map, diagram, table, list, text form

Document kind
Type of document defined with respect to is specified information content and form of presentation (IEC 61355)

Document kind class
Group of document kinds have similar characteristics concerning information content, independent of the form of presentation (IEC 61355). **Document package**
For the purposes of these Guidelines, a collection of documents for despatch purposes.

Document designation
Identifier of a specific document in relation to an object to which the document is assigned (IEC 61355).

Document life cycle
Period from the conceptual idea to the logical and physical deletion of a document (EN 82045)

Document set
Composition of documents logically belonging together (IEC 61355)

Electronic document management system (EDMS)
Computer-based application dealing with the rnanagement of documents throughout the document life cycle (IEC 82045-1)

Content
Subject information of a document {IEC 82045-1)

Metadata for documents
Data for the description of documents and their management (IEC 82045-1}

4 Designation of documents

The essential basis for finding information rapidly and selectively when it is stored in different documents on different data media is an unambiguous and class if icatory designation.

4.1 Metadata for documents

All documents must be identified with the following features, in line with ISO 7200:

Feature	Mandatory/ optional	Explanation, synonyms
identifying		
Legal owner	M	
Document number	O	Draw ng number, item number, file refere
page/serial number	O	with reference to the document number
Language identifier	**O**	ISO 639
Revision index	(M)	Revi on index, version, version number s
Date of issue	M	
File name	M	
identifying/ classifying		
Document designation	M	as perIEC 61355
descriptive		
	M	Name 1
Supplementary title	O	Name 2
Administrative		
Responsible department	O	
Author	**O**	person in charge, draughtsman
Responsible person	M	reviewer, person in charge
Approver	M	person releasing, examiner
Document status	O	validity
Number of sheets/pages	**O**	with reference to the document number

Fig A8.1 Metadata for documents

The **legal owner** is the originator of the document.

The **document number** is unique within the organisation of the legal owner.

The **sheet/page number** identifies individual "sheets" of the document. In the case of multiple-page documents, the full document number must appear on every page with the page number.

The **revision index** identifies different version, variants, and technical statuses of released documents. A letter or number or combination of these may be used. The version with the "higher" value replaces all issues with "lower" values. This entry is allocated to the issue date.

The **issue date** is the date when a specified version of a released document is available for the intended use. The issue date can simultaneously be the revision index.

The **document designation** allows a unique relevant designation within a project, irrespective of supplier. See also Section 4.2.

Title and **supplementary title** describe the content of the document.

The **document status** indicates the point reached by the document in its life cycle. Examples are:

— A provisional; for information only

— B in preparation; for approval

— F released, e.g. for manufacturing

— R as built

— U invalid

The **responsible department** is responsible for the technical content and for updating.

The **author** is the person who prepared the document.

The **responsible person** has sufficient knowledge of the technical content and can answer queries. They belong to the organisation of the legal owner.

The **approver** releases the document for the application in question after it has been checked.

4.2 Document designation

The document number, item number, drawing number and registration number, refers to the filing and archiving organisation of the legal owner and will differ from supplier to supplier. In order to carry out **relevant** searches, a system that is independent of the supplier is necessary. This task is performed by the document designation as per IEC 61355.

With this method, the first part generates the reference to the **object** portrayed (plant part, system, product, etc.) and the second part gives the kind of **document class.**

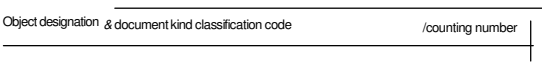

Fig. A8.2 Structure of the document designation.

Contents of the document designation:
The reference designation (KKS, DIN 6779-10) is used as the **object designation** for plants and systems with their technical equipment {KKS, DIN 6779-10). In certain instances of e.g. product documents (type data sheets, dimension drawings, etc.) that are not assigned to a plant object, other object designation systems can be employed, e.g. a type code. The allocation of type codes to object designations must be ensured.
The **document kind classification code** consists of the prefix "&" and three letters, which are defined in IEC 61355. A selection for handover documentation is laid down in Appendix 1. Examples of document classes are reports, contractual documents, instructions, guidelines, flow diagrams, circuitry documents, connection-describing documents, parts lists, arrangement documents, etc.
The **counting number** is used to identify individual sheets/pages of a document (same object designation and DCC). A maximum of six positions are available after the slash.
The three-part document designation allows documents to be uniquely addressed within a plant. An item number for identification can therefore be dispensed with. If this structure is expanded by a **project code,** it can serve the purposes of enterprise-wide document management.
The document designation is then used as a mutual **plan reference** to enable navigation between the individual documents.

Where a computer-based document management is used, the following can be searched for on the basis of this dual approach, for example:

— all flow diagrams (search for DCC = "PFB")

— all documents in the water steam cycle (search for object = "=L%")

— all circuit diagrams of the generator power breaker
(search for object = "BAC%" and DCC = "EFS")

— all civil engineering documents (search for DCC = "C%")

— all data sheets in all engineering disciplines (DCC = "%DA").

4.3 Entries in title blocks

4.3.1 Drawing title blocks

This drawing title block is an example for use in manufacturing and construction drawings, assembly drawings, system diagrams, P&I diagrams, etc.

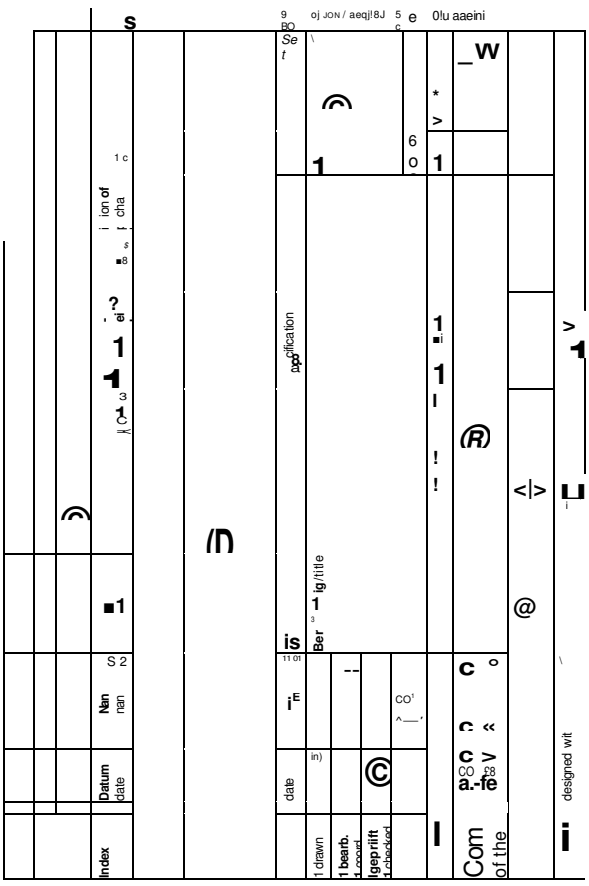

Fig. A8.3 Drawing title block (not to original size)

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Field no.	Entry, content
1	Name of what is depicted in the drawing (title)
2	Drawing number of the drawing author, can be subdivided in a way specific to the user
3	Index {letters only) for the drawing number in field 2. The first edition of a drawing has no index.
4	Further possible subdivisions of fields 2 and 3.
5-7	Data and name for drawn, processed, checked.
8	Date and name for any necessary additional check
9	Abbreviation of the department responsible for the drawing
10	Scale, or principal scale (always in 1st place) and other scales for details.
11	Manufacturing specifications {used to be a legend above the title block, but this is no longer possible today for reasons of space due the large amount of information and requirements).
12	Field for additional requirements by the drawing author, e.g. counting number sheet, page
13	Object designation, preferably KKS
14	Document kind code (DCC, previously document kind key) as per IEC 61355.
15	Information on the CAD system used to create the drawing and the name of the data file.
16	Fields in this line are generally subdivided according to the organisational requirements of the drawing author.
17	Fields in this line are generally arranged according to the organisational requirements of the drawing author.
18	Any information from the drawing author for the customer, e.g. project code.
19	Attributes of the customer, e.g. company name (logo), plant name, customer drawing number
20	Field free for subdivision and use by the drawing author, e.g. drawing is "replaced by", "replacement for", "origin"
21	Revision note to the index status of the drawing in field 3: date; processed, checked, description of the revision

Fig. A8.4 Instructions for filling in the drawing title block

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4.3.2 Title block for electrical and I&C documents as per DIN 6771-5

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Field no. 2	**Field name** Power station unit, joint coding	**M 0 (M)** (M)	**id** x	**cl**	**de**	**ad**	**Note:** DIN 6779-10	**Example Project-specific data** *ttS*
3	Object designation, preferably KKS	M	x	x			KKS	*= LAC10AP001*
4	Document kind classification code DCC	M	x	x			DIN EN 61355	*&EFF*
5	Counting number (fields nos. 1 to 4)	(M)	x					*01*
6	Status, revision code, index	(M)	x					*C*
7	Revision dale	(M)	x				YYYY-MM-DD	*2000-12-30*
8	Name of reviser	(M)				x		
9	Revision note	(M)				x		
10	Date of first version	M	x				YYYY-MM-DD	*1999-05-02*
11	Name of coordinator at the supplier	M						*Mayer*
12	Name of person checking/approving at the supplier	M						
13	Text 2 (e.g. function area)	0			x			*40*
14	Text 2 (e.g. functional chain)	0			x			*YLAC00*
15	Text 3	0			x			
16	Text 4	0			x			
17	Text 5 (e.g. allocation to automation system)	0			x			*AS107*
18	Title of document content	M			x			*Feedwater pump system*
19	Supplementary title of the document content	0			x			*SpWPp 1*
20	Document class in plain language	0		x	x			*Function diagram*
21	Supplier company name/logo	0	x					*XYS Company*
22	Text 6 (e.g. supplier department)	0			x			
23	Page number (field no. 31)	0	(x)					
24	Total number (field no. 31)	0			x			
25	Origin:	0				x		
26	Replaces:	0				x		
27	Replaced by.	0				x		
28	Power station operator name	M			x			*Customer*
29	Power station name	M			x			*Somewhere power station*
30	Operator's drawing number	0	(x)				at the operator !	
31	Supplier's drawing number	0	(x)				at the supplier	

M = Mandatory; O = Optional; (M) = only if relevant

id = identifying; cl = classifying; de = descriptive; ad = administrative

Note: the "Example" column should be filled with project-specific data.

Fig. A8.6 How to fill in the title block for electrical and I&C engineering documents

5 Registration

Registration of document fulfils two main purposes:

— summary of all the documents in a project

— allocation of documents to partial documentation

— representation of the revision status and document status

— information on the filing location and distribution at the customer

— selective retrieval of information

When a document is first registered, at least the identifying characteristics of the document designation should be used. Additional information about the document, such as the binder number or filing location, can be added as required.
Document registration is generally computer-assisted. This list of documents is also handed over to the customer.
Details on the content and structure of the document list shall be agreed upon by the customer and contract and entered in the table below.

Feature	**M/O/(M)**	**Project stipulation Yes / no**
Document designation	**M**	yes
Revision index	**(M)**	yes
Date of issue	**M**	yes
Document status	0	
Title	**M**	yes
Supplementary title	0	
Legal owner	**M**	yes
Responsible department	0	
Contractor's document number	0	
Customer's document number	0	
Sheet/page number	0	
Binder number	0	
Filing location	0	
Distribution key	0	
Despatch date	0	

M = Mandatory; 0 = Optional; (M) = only if relevant

Fig A8.7 Document list features

6 Exchange

A smooth exchange of information is based on the rules for **document control.**

From the point of view of document exchange, it should be ensured that

— valid versions of relevant documents are available at the respective operation locations

— inadvertent use of obsolete documents is prevented.

NOTE: internal release and revision procedures etc. are not dealt with here.

6.1 Exchange during project execution (accompanying documentation)

Various amounts of information have to be exchanged between customer and contractor during all phases of a project. When work initially starts on an order, the customer communicates the objective by handing over the target specifications, for example. The performance specifications derived from this by the contractor (or parts thereof) must be approved by the customer, which often necessitates their reworking. See also Fig. 2 in Section 3.2 of these Guidelines.

The exchange takes place on various data media:

— Paper

— digital data media

— as an e-mail attachment.

Electronic mail (e-mail) represents a particularly practical form of data exchange. As well as the actual message, documents can be "attached" and sent with it. Information requiring protection should be encrypted with this form of data transmission.

As the processes can be varied in form, repeated any number of times and different data media can be used at any time, no generally-valid rules can be laid down.

An office or post - e.g. the project management of the customer/contractor - should be agreed as the recipient of the mail (conventional post or e-mail).

The document package consists of:

— a cover note

— list of replacement documents

— technical documents

The **cover note** should state:

— the purpose of the consignment (for approval, information or reworking);

— the deadline for its return or a reply.

The **list of replacement documents** lists the documents (individual documents or document sets) delivered in the document package. Distribution is done by the relevant project management.

No.	Document designation = object & DCC/ZT	Rev. ind.	D stat.	Date of issue	Title	Action
1	=BAC10GS101 &EFS/01	B	**F**	2002-08-08	Generator breaker switch	N
2	=UBA06 &CLH		**A**	2002-08-09	Internal requirement building, control room	A
3	MUF4712	A	**U**	2002-08-10	Measuring transducer 4711, data sheet	E
4	=CRA01 &ELU		**B**	2002-08-11	A-cabinet, arrangement	G
5	=LAY00 &PFB	B1	**R**	2002-08-12	Water steam cycle system	N

Action: A = exchange, E = remove, G = approve, N = re-file

Fig. A8.8 Specimen list of replacement documents with revision index and document status

6.2 Exchange at the end of the project (handover documentation)

At the end of the project, the revised documentation is handed over at the agreed time, in the scope and kind as agreed at the start of project execution.

It shouid be noted that part of the handover documentation can be part of a process control system and is available there on-line.

The customer shall check the documentation for completeness, and confirm this in writing.

Completeness is evidenced by the **list of documents** also handed over. The table in Fig. AS.7 shall be used to determine the fields in this list.

If delivery of an upkeep tool is linked with the handover of the documentation, installation and training measures shall be carried out as appropriate.

7 Document filing

A distinction must generally be made when filing between paper and digital documents. During project execution, information is exchanged on paper or electronic media; hand-over documentation, however, is increasingly provided on electronic data media and then stored in existing data/document management systems.

The "filing method" depends on the customer's requirements and is heavily dependent on the functionalities (searching, updating, distributing, etc.) of the supported IT system.

The following groupings are possible and usual:

— by partial documentation (approval documentation, implementation documentation, test verification, user instructions)

— by engineering discipline (construction, mechanical, electrical, instrumentation and control)

~ by document kind class (function-describing documents, location documents, etc.)

— by technical plant objects (sorted by KKS)

— by project phases

— etc.

It is advisable to set up a Documentation Centre with the appropriate facilities and procedures during project execution, which can then ensure a smooth/uninterrupted transition to the using phase.

8 Archiving

Archiving is understood as the organised storing of documents for a specified period of time.

The storage periods are laid down by law, and have a considerable influence on the medium employed - whether paper, microfilm or digital data media.