

Employer
SAKO BRNO A.S.

Project
**High-efficient combined heat and power facility utilizing renewable sources (OHB
II - line K1)**

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PART III, APPENDIX 14.7

DOCUMENTATION



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(OHB II - line K1)**
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1. GENERAL

Documentation is an integrated part of the Contract Object and shall in general follow the project execution.

Documentation includes complete operation and maintenance documentation as well as the project documentation for the Contract Object.

The operation and maintenance documentation shall include all necessary documentation for operation, maintenance and further development of the Contract Object in a reliable, safe and healthy manner, e.g.

- General documentation
- Operation manual and instructions
- Maintenance manual and instructions
- Design documentation
- Technical documentation of all systems, sub-systems and components, divided into mechanical, electrical and CMS/automation components
- Quality assurance documentation
- Test logs and certificates

This documentation shall comprise, but not be limited to, as-built 3D model, drawings including process flow diagrams and piping and instrumentation diagrams, system specifications, component specifications, function specifications, design calculations, calculation data, production specifications, inspection plans, quality assurance reports, certificates, correspondence with authorities, ATEX documentation, CE- documentation, operation instructions for all operation modes including start-up, shut-down and emergency power operation, trouble-shooting guidelines, maintenance instructions, safety instructions, installation manuals, commissioning & test reports, component catalogue, component list, spare parts list, lubrication list, setpoint lists etc.

The Project Documentation is considered as the Contractor's documents to be submitted to the Employer by the Contractor as part of the Contract Object during project execution, i.e. Contractor's documents for project management, planning, design, manufacturing, construction, erection, installation, test and commissioning etc. Special attention shall be made to Part III Appendix C1 *Reviewable Project and Design Data*, which describes some of the main packages of the Project Documentation to be submitted for the Employer's review and where necessary for the Employer's coordination with other contractors during the project execution.

A large part of the Project Documentation will also be included in the Operation and Maintenance Documentation.

The Contractor's Operation and Maintenance Documentation constitutes the basis for the integration of documentation into the Control and Monitoring System (CMS), the Computerized Maintenance Management System (CMMS) and the Document Management System (DMS).

The CMS, CMMS and DMS will be the general tools to perform all tasks associated with operation and maintenance of the Complete Plant. The Contractor's electronic version of the Operation and Maintenance Documentation shall therefore be interlinked with the CMS and CMMS, and the Contractor's design, structure and layout of the documentation shall be arranged and customized

for this purpose and allowing this objective. The structure shall be in accordance with the Employer's wishes.

2. OVERALL REQUIREMENTS

The overall requirements are valid for complete Line Documentation.

2.1 Organisation

The Contractor shall designate a person responsible for all the Contractor's documentation, which shall be stated in the Contractor's organisation chart.

2.2 Document Schedule

The Contractor shall prepare a schedule of all documents to be prepared as part of the Works. The schedule shall include title, filename and a short description. Additionally, the schedule shall include the revision, status and the date of issue (or expected date of first issue for the document, which has not been issued yet). The Document Schedule shall be updated monthly, reference is made to Appendix B3 *Requirements for Planning and Reporting*.

2.3 Language

All Documentation shall be in the language stated in article 2 of the Contract. The Employer may accept that some of the documentation provided e.g. standard data sheets and technical specifications are in English.

2.4 Identification System

Documents and component shall be named and referred to in accordance with the KKS System as described in Appendix B8 *Component numbering system (KKS)*. The KKS numbering shall be used thoroughly in the documentation. The Contractor shall write KKS numbers on the drawings next to each component.

Diagrams and lists shall further be provided with all necessary cross references to facilitate usage.

2.5 Exchange of documents

The Contractor shall establish document management system which will be used for all document exchange during project execution.

Documentation shall be supplied in electronic form and uploaded to the document management system.

Documentation shall be supplied in a readable format (PDF) as well as in the original editable/workable format for the Employer. If the workable version is supplied in a format which is not editable by the Employer's current software as listed below, suitable software shall be included in the Contract Object.

The Employer has the following software:

- Autodesk AutoCAD, DWG-format, for 2D drawings
- Autodesk NavisWorks, NWD-format, for viewing of 3D models
- MS Office
- MS project version
- Adobe Reader

2.6 The Contractor's Documentation System

The Contractor shall prepare, distribute and archive documentation according to fixed procedures approved by the Employer and in accordance with Authorities requirements.

All documentation prepared in relation to the Contract Object shall be filed by the Contractor for a minimum of 10 years after handing-over. After this period, the Employer shall be provided with the opportunity to receive the documentation free of charge.

Documentation concerning cancelled subjects shall be kept until a period of 12 months after the end of the Warranty period has expired.

2.7 Drawings

The Contractor shall deliver all drawings required for the design and construction of the Contract Object. Drawings includes plans, elevations, sections, isometric and other views, arrangement drawings, equipment drawings, process flow diagrams, piping and instrumentation diagram etc.

The drawings shall be prepared in accordance with a documentation standard agreed with the Employer and the Employer's instructions regarding drawing header, drawing number, drawing registration number, recipient list etc.

Schemes, diagrams and tables shall allow for the Employer's insertion of numbers and terminal symbols.

Drawings shall be prepared in AUTOCAD's DWG format.

When submitting drawings in a larger format than A3, a copy of the drawing in A3-format shall be included.

The format sizes shall comply with ISO 216, A series. Largest format: A1.

As a minimum, drawings, tables, diagrams and descriptions must be printable in A3 format enabling the copies to be readable with a text height of min. 2 mm, unless otherwise agreed with the Employer. All circuit diagram drawings, functional plans, component drawings etc. shall be readable in A4 format.

All drawings, tables, diagrams and descriptions shall be submitted marked with symbols following the most recent standards and norms:

- CSN, Czech standards
- EN, European Standard in the English version
- ISO/IEC, standards submitted by the International Organisation for Standardization and the International Electrotechnical Commission respectively.
- DIN Deutsches Institut für Normung e.V., or British Standards Institution.
- The Employer's specifications.

Blueprints shall be typed in black on a white background.

2.7.1 PROCESS DIAGRAMS

Process Flow Diagrams (PFD)

PFDs are diagrams to indicate the general flow of plant processes and equipment. The PFDs shall show the relationship between major equipment of the Contract Object.

The Contractor shall submit PFDs according to ISO 10628 and 3511. The overview PDF must show the entire process in a diagram with subprocesses and main components. PDFs for sub-processes or function chain shall be prepared for each part process or functional chain. The degree of details should be selected with consideration to the above-mentioned purposes.

Piping and Instrumentation Diagrams (PID)

Each sub-process shall be accompanied by one or more detailed PIDs with KKS numbers for all aggregates and measuring points inserted in accordance with DIN 28004. The PID shall be numbered with drawing number according to KKS, and there shall be mutual references appearing for all pipe lines etc. between the part processes.

Symbols on process diagrams should be created as intelligent AutoCAD- or Microsoft Visio-fields with attributes containing basic process data and specifications.

2.7.2 3D MODEL

The Contractor shall undertake the entire design of the Contract Object in a digital 3D-CAD environment, where all discipline models (civil, mechanical, electrical etc.) in standard detail shall be included as well as all design carried out by Subcontractors, where appropriate in accordance with the Appendix C1 *Reviewable project and design data*.

3. REQUIREMENTS FOR SPECIFIC DOCUMENTATION

3.1 General

For minimal but not exhausting list of specific documentation refer to the part III appendix C1 *Reviewable Project and Design Data*.

3.2 Piping Systems

The documentation for the piping systems contained in the Contract Object shall include but not be limited to:

- Pipe plan and sections on the scale of 1:50 to the extent necessary for a detailed design of pipe supports and equipment.
- Pipe isomerism including list of materials, pipe dimensions, workshop and site weldings, calculation data, safety devices and positions for pipe supports, specials and measuring devices.
- Wall thickness calculations for the pipeline components used.
- Lists of supports stating maximum and standard load, thermal movements and types and manufacture of supports.
- Detailed drawings of all pipe supports and equipment.
- Hand over documentation of materials used (certificates etc.).

4. OPERATION AND MAINTENANCE DOCUMENTATION

The Operation and Maintenance Documentation shall include all necessary documentation for operation, maintenance and further development and optimization of the Contract Object in a reliable, safe and healthy manner including but not limited to:

- General documentation
- Operation manual and instructions
- Maintenance manual and instructions
- Design documentation
- Technical documentation of all systems, sub-systems and components, divided into mechanical, electrical and CMS / automation components
- Quality assurance documentation
- Test logs and certificates

This Operation and Maintenance Documentation shall comprise, but shall not be limited to:

- as-built 3D model
- drawings including process flow diagrams and piping and instrumentation diagrams
- system specifications
- component specifications
- function specifications
- design calculations
- calculation data
- production specifications
- inspection plans
- quality assurance reports
- certificates
- correspondence with authorities
- ATEX documentation
- CE-documentation
- operation instructions and curves for all operation modes including start-up, shut-down and emergency power operation
- trouble-shooting guidelines
- maintenance instructions
- safety instructions
- installation manuals
- commissioning & test reports
- component catalogue
- component list
- spare parts list
- lubrication list
- setpoint lists

A draft operation and maintenance documentation shall be delivered prior to start commissioning according to the Contract. The draft version shall be minimum 95% complete concerning quantity and minimum 90% complete concerning quality.

At Preliminary Takeover, the Contractor shall deliver the final operation and maintenance documentation as a part of Line Documentation.

During the Warranty period the final Line Documentation shall be kept updated by the Contractor by sending correction sheets and uploading revised files. The Contractor shall include a document

list which clearly indicate the actual revisions in the document packages, and which documents have been amended during the Warranty period.

4.1 Hard copy documentation

The structure of the hard copy of the documentations shall be agreed with the Employer. The Contractor shall be willing to adjust his structure, without extra payment, to ensure a standardisation of structure of the hard copy documentation from all contractors. All hard copy documentation is part of the Contract Object.

Number of paper copies shall be agreed with the Employer and shall as minimum be 2. Prints on paper shall always be accompanied by electronic files.

The hard copy binders shall be assembled according to the following instructions:

- All dividers shall be in colour and numbered successively. The font size of the number on the dividers shall reflect its level in the table of contents, i.e. the lower the level the smaller the font size.
- The first page(s) of each binder shall be a detailed table of contents for the binder in question. There shall also be a table of contents for each divider.
- For each component there shall be a data sheet stating the data of the component, including as a minimum: KKS number, unambiguous type designation (type, serial number, size and model), technical data (IP class, colour code, power consumption etc.), detailed information on Contractor (contact, company address, telephone number, fax number, e-mail etc.). If the component is part of a larger unit (electric motor, gear, frequency converter, pump) reference shall also be made to the binder/divider which contains relevant data sheets.
- A detailed table of contents shall be prepared for chapters/sections that extend over more than one binder. The table of contents shall be included in each relevant binder and shall list the contents of the entire chapter/section. Moreover, it shall be indicated in which binder each chapter/section can be found.
- Each drawing shall be preceded by an introductory sheet. Where there is more than one drawing, a drawing list shall be included. All drawing lists shall include a descriptive text to make it easier for the Employer to locate the drawing.
- All binders containing documentation shall have the same front page and back. The back of the binder shall state the chapter as well as the number (binder x of y). The design of the front page and the system applied to the back shall be approved by the Employer.

Deviations from the above shall in each case be approved by the Employer in writing upon written request from the Contractor.

4.2 Electronic Documentation

All documentation shall be delivered in an electronic version.

The Contractor shall prepare documentation and data which enable integration between the CMS and the CMMS (e.g. component operating hours, etc.)

Documents and data shall be entered into the system only once, i.e. double entry is not allowed.