NUCLEAR PHYSICS INSTITUTE CAS
public research institution

CONTROL HUTCH FOR THE BEER INSTRUMENT AT ESS

PROJECT SPECIFICATIONS AND REQUIREMENTS

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Annexes:

Annexe 1 – BEER – Control hutch technical requirements and design description

CONTENT

1. TERMS OF REFERENCE

1.1. SCOPE OF THIS DOCUMENT

This document, in conjunction with referenced annexes, establishes the requirements for the tendering, procurement, manufacturing, delivery and installation of the BEER Instrument Control Hutch to be installed at the European Spallation Source in Lund, Sweden.

1.2. TERMS

Herein, the term "contractor" shall refer to the parties responsible for providing the scope of work defined below. The term "customer" shall refer to the purchaser and its representatives, including the ESS.

The contractor is responsible for manufacturing, installation, inspection, integration and testing, packaging, shipping, and other stipulated services in accordance with the requirements of this specification.

Requirement level interpretation

The keywords "must", "shall", and "should" in this document are to be interpreted as follows:

1. "must", "shall", or "has/have to" is an absolute requirement of the specification.
2. "should" means that there may exist valid reasons in certain circumstances to ignore a particular item or ease a requirement, but the full implications should be understood and carefully weighed and mutually agreed upon before choosing a different course.

1.3. EXCEPTIONS

Any exceptions to the specifications in this document shall be clearly noted as such in the contractor's proposal documentation. If the contractor proposes exceptions from this specification, alternative solutions shall be presented. The customer shall form a validation team to examine the feasibility of the proposed alternatives. Conditions for design modifications are described in Section 4.5.

1.4. APPLICABLE DOCUMENTS

The delivered assembly, including accessories, shall follow:

- European directives
- Swedish laws and standards
- Relevant Europeans and ISO standards
- ESS standards and regulations

The list of applicable documents is provided in Section 11.

2. INFORMATION

2.1. INTRODUCTION TO THE EUROPEAN SPALLATION SOURCE

The European Spallation Source ERIC (ESS) is a European Research Infrastructure Consortium (ERIC), a multi-disciplinary research facility based on the world's most powerful neutron source with a vision to enable scientific breakthroughs in research related to materials, energy, health and the environment, and address some of the most important societal challenges of our time. The initial suite of neutron instruments will consist of 15 instruments and a test beamline with

further integration of instruments following to complete the projected suite of 22 instruments. Instruments will include hardware and software necessary to conduct neutron scattering experiments, collect data and distribute it to users and archive all necessary information related to the experiments. Specific experimental conditions or preparations that may be required by the experimental programs will be supported by ESS laboratories or other partner laboratories.

Details about the project can be found under:

https://europeanspallationsource.se/ess-mandate

The facility will host several neutron beamlines that are being constructed by so-called in-kind partner institutes. The Nuclear Physics Institute of the CAS, V. V. I. (NPI) from the Czech Republic, participates in the design and construction of the BEER instrument, together with Helmholtz-Zentrum Hereon in Geesthacht, Germany.

2.2. INTRODUCTION TO THE BEER INSTRUMENT

The BEER project (Beamline for European Engineering Materials Research) is realised as a part of a multidisciplinary complex of international research centre ESS – European Spallation Source constructed in Lund in Sweden. 17 European partner countries participate in its construction mainly in the form of in-kind contributions, thus the development and supplement of individual scientific and technological units.

The diffractometer BEER (see Figure 1) is an experimental device focused on research of advanced materials for wide field of applications - i.e. research in engineering materials with various degrees of complexity as for example in-situ and in-operando experiments for material characterization, thermo-mechanical processing or joining of materials. The continuous development of advanced structural materials and novel manufacturing processes are key for European manufacturing industry to stay competitive and ensure clean transport and clean energy generation. This includes the development of sustainable material and processing solutions protecting natural resources. More about BEER instrument can be found here:

https://europeanspallationsource.se/instruments/beer

Please refer to *BEER - Concept of Operation* [ESS-0124310] for further information.

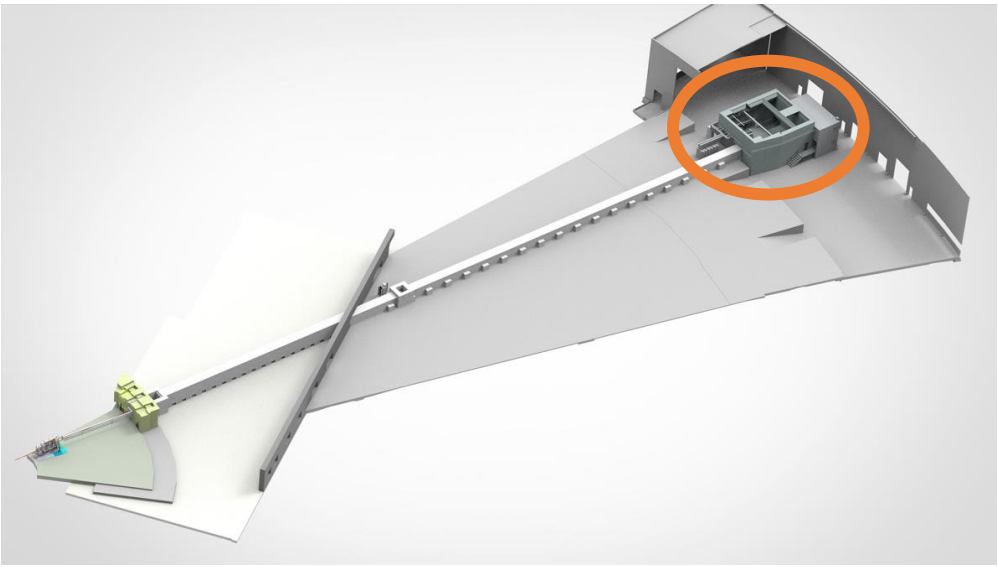

Figure 1 - The layout of the whole BEER instrument across the different halls. The experimental cave and control hutch are marked with the oval.

2.3. INTRODUCTION TO THE CONTROL HUTCH

The control hutch of the BEER instrument is located in the E01 hall at around 158 m from the target behind the experimental cave. Together with it, they form the instrument end station, which is accessible to users. The purpose of the control hutch is to accommodate users while they stay on the experiment, providing temporary office space for the scientific work together with the instrument control terminals. Users have to have easy access to the experimental cave personal entry used for frequent ingress during the setting-up-experiment period. Another purpose of the control hutch is to accommodate the space for the sample and sample environment preparation, including the off-beam experiments. This area has to have quick access to the experimental cave sliding door, which is the way in for the voluminous samples or sample environments. Based on functional requirements and special constraints, a conceptual design of the experimental cave and control hutch was made. Detailed information about the requirements and proper solutions can be found in Annexe 1 *BEER – Control hutch technical requirements design description*.

The 3D view of the instrument cave and control hutch conceptual design is shown in Figure 2.

NOTE: the experimental cave is not part of this project's scope.

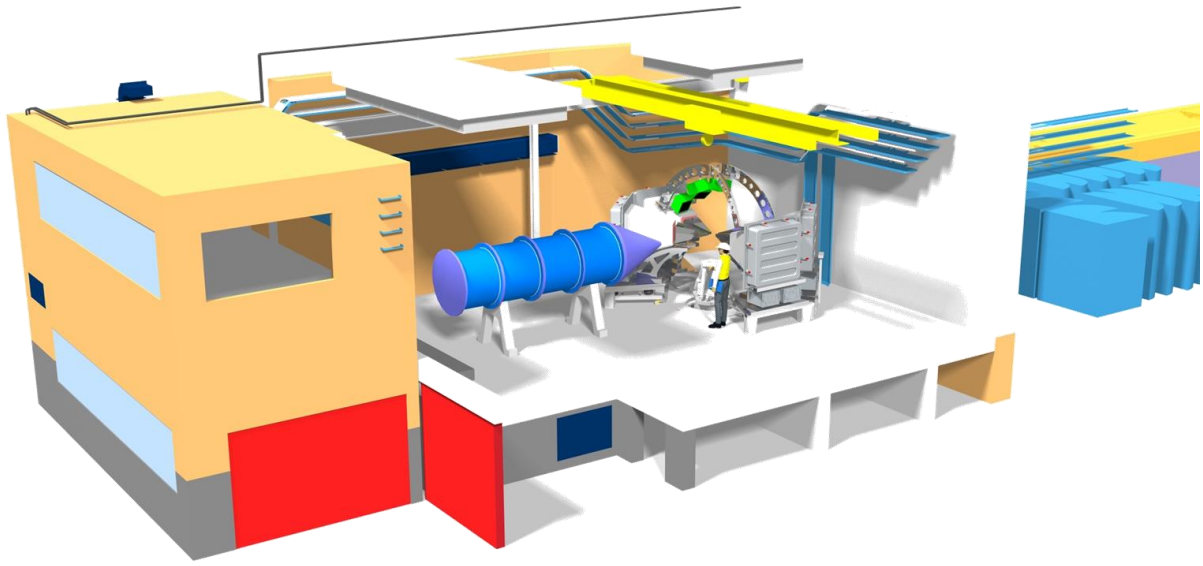

Figure 2 - 3D view of the BEER instrument cave interior and the adjacent hutch

2.4. CONSTRUCTION PHASES AND REVIEW PROCESS

The ESS instrument construction is divided into three phases, which are concluded by an acceptance process called Tollgate reviews (TG):

Phase 2 – Detailed Design (TG3)

Phase 3 - Manufacturing and procurement (TG4)

Phase 4 - Installation and integration (TG5)

This contract concerns the finalisation of Phase 2 and execution of Phases 3 and 4 for the control hutch.

2.5. CURRENT STATUS AND OPTIONS FOR MODIFICATIONS

The BEER instrument is in the design phase, except for the neutron optics system (neutron guides), which is already in production. The detailed design documentation for the control hutch has been finished and evaluated by ESS within the TG3 review. The contractor may propose modifications or alternative solutions in the offer under the conditions described in Section 4.5.

3. SCOPE OF WORK

The contractor shall be responsible for the procurements, manufacturing, delivery, installation, integration and commissioning of the complete control hutch to ESS. The following deliverables and services are expected to be delivered with the control hutch:

Physical deliverables

- The control hutch structure
- Staircase for access to the experimental cave personal entry
- Lights, electricity distribution (internet and power lines with sockets) and air conditioning.

Services

- Update and verification the design according to the design specification.
- Preparation of design documents for CDR
- Factory acceptance tests (FAT)
- Delivery to ESS storage facility
- Transport to ESS site and installation
- Site Acceptance Test (SAT)
- Training of operating staff at ESS premises

Documentation

- Documentation as described in Section 5

Excluded parts

The following components are explicitly excluded from the scope of work:

- The control hutch media (compressed air, cooling water, etc.) distribution (described in *BEER - Sub-System Design Description – Auxiliary System* [ESS-0432355])
- The socket boxes for Sample Environment System (described in *BEER – Sub-System Design Description – Auxiliary System* [ESS-0432355])

4. SPECIFICATIONS

4.1. GENERAL REQUIREMENTS

The system has to be designed and manufactured according to the ESS and European standards. A selection of documents describing the ESS standards and requirements which are relevant for this contract is given in Sections BEER project documents 11.1 (BEER project documents) and 11.2 (ESS Guidelines and regulations). These documents will be provided to the contractor on request. In case of uncertainty or need for additional information, the

contractor shall contact the customer and/or representatives of the relevant ESS technical groups.

The delivered sub-systems have to comply with European standards (see Section 11.3). EU declaration of conformity will be required as a part of the final System documentation.

4.2. COORDINATE SYSTEMS

The primary coordinate system at the ESS is the Target Coordinate System (TCS). The position of TCS within the Swedish National Reference System and also other coordinate systems used at the ESS and their position with respect to the TCS are described in the *Main Coordinate Systems at the ESS* [ESS-0035090].

4.3. SYSTEM REQUIREMENTS

The list of system requirements for the current design is provided in Annexe 1.

4.4. A DETAILED DESCRIPTION OF THE CONTROL HUTCH

The detailed technical description with drawings, material specifications and interface description is provided in **Annexe 1** with links (*BEER – Control hutch technical requirements and design description*) and links within, which makes an integral part of the system specifications.

4.5. DESIGN CHANGES

Modifications of the design details given in Annex 1 are possible under the following conditions:

Before CDR:

The contractor may propose modifications or alternative solutions provided that they comply with the system requirements (Section 4.3). In such a case, the contractor shall describe the concept of the proposed modifications in a technical report as a part of the offer documents. The level of details of this description must allow for evaluating the feasibility and compliance of the proposed modifications with the system requirements. If accepted, the contractor shall implement these modifications in the detailed design documents to be submitted for CDR in the project's first stage. These documents must prove that the modifications do not negatively affect the functional and safety properties of the system and comply with interfaces to the other system, such as the experimental cave and common electrical and utilities project.

In particular, changes in the material used in the control hutch must be accompanied by fire resistance safety analysis proving that the modified design meets the safety requirements according to EKS 11 standard, Code of Statutes of the Swedish National Board of Housing, Building and Planning (Boverket) with fire resistance class R30.

Specific component types proposed in the design description (Annexe 1) can be replaced by other types with equivalent parameters unless this option is explicitly excluded.

After CDR:

Any changes are possible only through the formal procedure starting with the submission of a "Design Changes Request" with reasoning and analysis of consequences for costing, performance and safety and compatibility (interfaces) with other sub-systems. The proposed changes must be evaluated and approved by both the customer and by ESS prior to any further steps in their implementation being taken. The changes are only possible if necessary due to

(i) physical constraints, (ii) conflicts with interfaces to other sub-systems, (iii) ESS safety and operational requirements or (iv) on request of the customer.

5. DOCUMENTATION REQUIREMENTS

5.1. DOCUMENTATION IN THE TENDER RESPONSE

The following information shall be provided by the contractor as part of the offer in the tender response:

- A technical report describing the offered system with a focus on any proposed modifications and alternative solutions with respect to the description in Annexe 1. The level of details of the report should be sufficient to assess the compliance of the offer with tender requirements.
- Costing of all items, services and documentation described in this document
- Project schedule
- Previously documented history of delivering similar systems

5.2. DESIGN AND MANUFACTURING DOCUMENTATION

The present detailed design documentation (see Annexe 1) with drawings will be provided by the customer. The contractor is expected to implement any changes to this design (see Section 4.5) and provide:

- 3D model in .stp or CATIA v6 format
- Detailed production drawings in .pdf
- Updated Bill of Materials for Activation Inventory

5.3. SYSTEM DOCUMENTATiON

- Detailed design description
- Interface description
- System integration and verification plan, including
    - FAT and SAT procedures description
    - Installation plan
    - Requirements on resources (heavy equipment, special tools, staff etc.) required for installation, integration and verification of the System.
    - Requirements for storage, transportation, handling and packaging

5.4. SHIPMENT DOCUMENTS

See Section 8.6. for details.

5.5. PROJECT DOCUMENTS

- Project Quality Plan (PQP)
- FAT reports, including measurements qualifying key dimensions, and functionality
- Inspection and test plans
- Non-conformance and deviation reports
- Parts list and drawings

- Materials certificates/data sheets
- Material traceability report
- Welders qualification acc. to ISO 9606 / ISO 14732 / certificates of welders
- Dimensional reports
- Visual inspection report
- Risk assessment and Method Statement (RAMS)
- EU declaration of conformity for CE marking according to DIN EN ISO/IEC 17050-1
- Additional documents according to modifications

6. QUALITY ASSURANCE REQUIREMENTS

6.1. QUALITY MANAGEMENT SYSTEM

The contractor must maintain and apply a quality management system compliant with ISO-9001 for all processes and services needed to make the product.

6.2. PROJECT QUALITY PLAN (PQP)

The contractor must create and apply a PQP. The PQP lists, in the correct order, all critical task, processes with activities and duration of tasks, inspections, and tests of the phases "manufacturing" and "assembly". The PQP must be released at the CDR with defined witness points, hold points, and report indications. A template for a PQP is shown in ESS Template for Project Quality Plan [ESS-0037830].

6.3. DECLARATION OF CONFORMITY

The Contractor shall provide an EU declaration of conformity for CE marking according to DIN EN ISO/IEC 17050-1.

6.4. SUB-CONTRACTORS AND/OR SUPPLIERS

The contractor must apply the same project management and quality assurance requirements of this requirements specification for its subcontractors and suppliers. The Customer reserves the right to visit the supplier's or subsupplier's premises upon prior notice to perform an audit or review the progress of the contractually agreed deliverables.

7. PROJECT MANAGEMENT

7.1. PROJECT STAGES AND MILESTONES

The execution of the contract scope of work is expected in the following stages:

Stage 1: Design: Verification and (if necessary) update of the detailed design documentation described in Annex 1. Presentation of the detailed design at the Critical Design Review (CDR) at ESS. The documentation and CDR shall cover all modifications with respect to the existing control hutch design. Transition to the Stage 2 is subject to the ESS approval of manufacturing readiness (RFM).

Stage 2: Production: Manufacturing and assembly of the control hutch components at the contractor's premises. The production phase is completed by FAT and delivered to the ESS site. Transition to the Stage 3 is subject to the ESS approval of installation readiness (RFI).

Stage 3: Installation: The control hutch shall be installed in accordance with the installation plan for the Neutron Scattering Systems (NSS) of ESS. The project is completed by site acceptance tests (SAT).

Completion of one stage and transition to another one is conditioned by ESS approval through the review procedures as indicated in the list above. Close cooperation between the contractor, the customer and the ESS teams is therefore necessary for the successful and timely completion of the project.

7.2. PROJECT SCHEDULE

The contractor must set up a project schedule, and this shall be set before the contract is signed. The project schedule starts with the kick-off meeting and ends with the final acceptance. The planning must indicate:

- All defined milestones
- Delivery dates for review documents to the customer
- The time needed to approve review documents by the customer (~10 working days)
- Dates of customer's deliverables to contractor's site (if applicable)
- All main tasks
- Actual timeline
- Delivery dates of the ordered products/batches to ESS
- FAT and SAT dates

7.3. ACCEPTANCE TESTS AND REVIEWS

The reviews are organized as meetings or carried out by email communication. The form and location of the reviews may be changed in mutual agreement. The list o expected reviews are given in Table 1.

The Contractor should provide all necessary documentation for each review at least 2 weeks before the review date. For details about the reviews and tests, see Section 8.

Table 1 - Review meetings approvals and tests to be performed

ID	Name of Meeting / Review	Form
KOM	Kick-off Meeting	meeting
CDR	Critical Design Review	meeting
RFM	Ready for Manufacturing	e-mail
FAT	Factory Acceptance Test	meeting
RFD	Ready for Delivery	e-mail
SAI	Site arrival inspection	e-mail
RFI	Ready for Installation	meeting
SAT	Site Acceptance Test	meeting

7.4. COMMUNICATION

The delivery of relevant data between the contractor and customer, such as review documents, data files or open issues, must be formally transferred via email and should be done by the persons defined for communication.

The contractor shall inform the customer about the project progress and issues of concern at least once per month in progress reports.

Meetings can be held online via videoconference tools if agreed by both parties. The inviting party shall prepare an agenda and meeting minutes. The actions resulting from these meetings shall be clearly defined and distributed, along with the minutes themselves, to all responsible persons. Open issues shall be recorded in an open issue list maintained by the contractor.

All communication, drawings, material certificates, and related documentation must be in English.

7.4.1.POINT OF CONTACT

The principal point of contact for the project execution and coordination between the contractor and ESS is the Lead Instrument Scientist for BEER nominated by the Customer:

Premysl Beran (Premysl.Beran@ess.eu), tel. +46721792504, ESS Technical Directorate, Instrument Scientists Group

The Customer can nominate other contacts for communication for particular project stages or tasks.

8. EXECUTION OF THE PROJECT

8.1. KICK-OFF MEETING (KOM)

The "project kick-off meeting" should be held within 2 weeks after the contract is signed. The list below summarises the minimum that shall be discussed:

- Project Schedule
- Communication Strategy
- Requirements for design modifications and CDR

8.2. CRITICAL DESIGN REVIEW (CDR)

All modifications of the detailed design implemented by the contractor shall be reviewed by the customer and by ESS representatives at the CDR. For this review, the contractor shall provide

- A production version of the detailed technical design, as specified in section 5.2
- A preliminary version of the system integration and verification plan as specified in section 5.3

8.3. READY FOR MANUFACTURING (RFM)

Manufacturing readiness shall be approved by ESS and confirmed by the Customer on the basis of CDR output. The approved CDR documentation and released Project Quality Plan are required for the RFM review.

8.4. FACTORY ACCEPTANCE TEST (FAT)

Representatives of the customer and ESS (if required) shall be present during the FAT. The contractor shall inform the customer team at least 20 working days before the tests. At the end of the tests, a report shall be sent to the customer for validation.

The content of the FAT and required equipment shall be described in the Quality Plan (Section 6.2). The FAT shall include, but is not limited to:

- Measurement of critical dimensions
- Check parts and components according to Inspection and Quality Plan

The Contractor shall provide the measurement tools required for FAT.

8.5. READY FOR DELIVERY (RFD)

Readiness for delivery must be approved by the ESS and confirmed by the customer. Necessary documents to be provided by the Contractor include:

- Approved FAT protocol (see Section 8.4).
- Design documentation in the "as manufactured" state (see Section 5.2)
- Materials and components certificates/data sheets (see Section 5.5)
- Shipment documents (see Section 5.3)
- Detailed installation and alignment plan
- Requirements for resources required for handling and storage

8.6. DELIVERY

All tangible deliverables shall be delivered in accordance with DAP (2010 Incoterms), at the ESS premises in Lund, Sweden or such other final destination defined by ESS.

All deliveries shall be pre-advised 48h prior to the arrival at the destination via email to logistics@esss.se. A confirmation with a time slot for unloading will be sent to the notifier.

All deliverables shall be executed in accordance with the Logistics Guidelines [ESS-0042559] (i.e. technical guidelines regarding transportation further specifying: delivery notice time, minimum packaging specs, delivery notes, opening hours of receiving at ESS ERIC or warehouse, time of storage at Partner premises without charge after FAT, etc.)

All deliveries shall also be accompanied by an appropriate proforma invoice (evidencing the replacement value of the delivered equipment) and such other delivery documentation to enable ESS ERIC to properly store and insure the equipment.

For goods/material/equipment purchased by ESS ERIC and delivered to the Supplier for use in execution of this scope of work, that are expected to be returned to ESS ERIC, the Supplier shall consult the ESS ERIC procedure for the Off-site Lending of Hardware [ESS-0048868]. The procedure describes the responsibilities, routines and processes in regard to the lending of equipment.

8.6.1.DELIVERY ADDRESS

Delivery location: Transportgatan 5 F03 / Gate E, 224 84 Lund, Sweden

Site location: Partikelgatan 2, 224 84 Lund, Sweden

Site owner: European Spallation Source ERIC, Address: Box 176, S-221 00 Lund, Sweden.

8.6.2.SHIPMENT

The start of the shipment will be communicated to ESS by email at least **14 days** prior to shipment and confirmed once the shipment is sent.

Prior to shipment, the Contractor must inform ESS about the delivery dates, quantity, size and weight of the packaging, resources required for unloading and storage, as well as requirements for safe handling and storage of all packages.

No shipment can be made without a previous agreement by ESS.

The components delivered to ESS must be accompanied by

- Parts list for all replaceable parts with appropriate identification and specifications
- Materials certificates/data sheets (if not included in FAT)

8.6.3.HANDLING AND PACKING

- The packing must have means to use classical handling tools. The packed parts must be protected during transport and storage against possible harms such as weather elements, mechanical shocks, strain, and rubbing which can damage surfaces.
- Packing-cases must be of a stout and robust nature suitable for lifting and transportation without damage using a forklift truck or crane.
- The contractor must inform ESS about the amount and size of packages.
- Each package must contain a packing list, indicating at least:
    - Serial number
    - Item description
    - Quantity ordered
    - Quantity shipped
    - Packed in sub-package number
- The package must be marked with:
    - The Customer's and ESS contact email addresses and phone numbers
    - Weight of the package
    - Support points for transport and lifting

ESS will supply the local handling tools for unloading the goods at ESS.

8.6.4.IDENTIFICATION AND MARKING OF COMPONENTS

In order to provide traceability of the components, any loose or pre-assembled component should have an identification marking. Where this is not feasible, exceptions shall be communicated and agreed. The marking should be permanently fixed on an exposed surface showing, at least:

- Weight of the element,
- ESS Identifier (provided by the Customer)
- Part number
- Drawing number

8.7. SITE ARRIVAL INSPECTION (SAI)

Upon arrival at the ESS site, staff appointed by the Customer shall inspect the Control Hutch elements to ensure the integrity of the transport. The inspection should include at minimum document control, visual inspection and metrology on critical parts. If the SAI fulfils the requirements, the Customer shall accept provisional reception.

8.8. READY FOR INSTALLATION (RFI)

For the RFI to be concluded, the Contractor shall provide a detailed installation and integration plan, including:

- Clear assembly plans
- Updated installation schedule
- Risk assessments and method statements (RAMS)
- Installation procedures
- Information on any temporary services needed

8.9. INSTALLATION

Installation works at the ESS site will be coordinated by the Installation Package Leader appointed by the customer. ESS shall be responsible for the operation of the forklift or crane, but the contractor is responsible for the delivery, integration, and commissioning of the final assembly. Any external resources (services, personnel, tools) required by the contractor from the customer or ESS must be specified and agreed upon in advance (see RFI).

For the activities performed by the contractor's staff at the ESS site, the Contractor must fill in the RAMS (Risk assessment and Method Statement) according to the ESS template [ESS-2071941]. The staff of the Contractor working on site is subject to ESS regulations [ESS-0093892]. The Contractor is responsible for necessary work permits and training of its staff.

8.10. SITE ACCEPTANCE TEST (SAT)

The preliminary plan for SAT is described in the BEER System Integration and Verification Plan [ESS-0432367]. The SAT shall include, but is not limited to:

- Check that all control hutch components are installed on site according to the documentation package
- Visual check of main components and their finishing
- Check all functional dimensions according to the documentation package

8.11. FINAL PROJECT ACCEPTANCE

The project shall be deemed complete upon signing of the SAT report and all final documentation, including:

- As built technical drawings
- Performed FAT Protocol
- Recommended spare parts list
- Materials certificates/data sheets
- Certificates of welders
- Main equipment data sheets
- Instruments calibration certificates
- Maintenance and User's manual
- Certificate of compliance with the requirements
- EU declaration of conformity

9. WARRANTY

The warranty on workmanship and stability of the control hutch components shall be 5 years from the SAT. Rights to request services under the warranty period shall be transferred to ESS.

10. SUGGESTED MILESTONES AND PAYMENTS

The main milestones with tentative completion dates and proposed payments are given in the following Table 2.

Table 2 - Tentative milestones, schedule and payments

ID	Milestone	Tentative date	Payment
WP09.1.2	Procurement contract signed	D	0%
WP09.1.3	Detailed design approved (RFM)	D + 6 month	0%
WP09.1.4	Delivered to site, start of the installation (SAI, RFI)	D + 11 months	50%
WP09.1.5	Access for installation of equipment (SAT)	D1 + 3 months	50%

The time schedule shall be studied so that it is aligned with the schedule of the experimental cave. The table above assumes that the initial date (D) is common for both the experimental cave and control hutch projects. The hutch should be finished not later than 3 months after the date of access to the experimental cave (D1).

11. REFERENCES

The documents marked as *ESS-xxxxxxx* are documents from the ESS repository. Their current versions can be found in the ESS CHESS repository. If the contractor does not have access rights to this repository or additional documents such as review templates etc., the customer will provide the necessary documents upon request.

11.1. BEER PROJECT DOCUMENTS

Design	
BEER - Sub-System Design Description – Auxiliary System	ESS-0432355
BEER – Concept of Operation	ESS-0124310
BEER - Interface Description	ESS-0432366
BEER - Complete 3D Model of the instrument	ESS-0432373
Quality management	
BEER - System Validation Plan	ESS-0432370
BEER - System integration and verification plan	ESS-0432367
BEER - System Operations and Maintenance Manual	ESS-0432372
BEER - Instrument Hazard Analysis	ESS-0432364
BEER - Project Quality Plan	ESS-0432363

11.2. ESS GUIDELINES AND REGULATIONS

Design and construction	
Main coordinate systems at the ESS	ESS-0035090
ESS Instrument Technical Interfaces	ESS-0403282
Safety requirements	
Risk assessment and Method Statement (RAMS)	ESS-2071941
Project management	
ESS Procedure for Change Control of ESS Facility	ESS-0001879
Guideline for Shipping	ESS-0042559
Information to contractors working on site	ESS-0093892
Quality management	
ESS Guideline for Factory Acceptance Test (FAT) and Site Acceptance Test (SAT)	ESS-0094204

11.3. EU DIRECTIVES, STANDARDS AND REGULATIONS

Norm	Description
Eurocode 0 (EN 1990)	Basis of structural design
Eurocode 1 (EN 1991)	Actions on structures
Eurocode 2 (EN 1992)	Design of concrete structures
Eurocode 3 (EN 1993)	Design of steel structures
EN 1090	Execution of Steel Structures and Aluminium Structures
EN 13670	Execution of Concrete Structures
EKS 11	Boverket mandatory provisions amending the board's mandatory provisions and general recommendations (2011:10) on the application of European design standards (Eurocodes)

12. GLOSSARY

CDR	Critical Design Review
ESS	European Spallation Source ERIC
FAT	Factory acceptance test
KOM	Kick-off meeting
NSS	Neutron Scattering Systems
PQP	Project quality plan
RAMS	Risk assessment and Method Statement
RFD	Ready for delivery
RFI	Ready for installation
RFM	Ready for manufacturing
SAI	Site acceptance inspection
SAT	Site acceptance test

TCS	Technical Coordination System
TGn	Tollgate review *n*