Dodatek č. 2

ke Smlouvě o dílo uzavřené dne 23. 1. 2017 (dále jen „***Smlouva***“) mezi Smluvními stranami

1. Smluvní strany

1.1. Objednatel:

Ústav jaderné fyziky AV ČR, v. v. i.

se sídlem: Husinec - Řež č. p. 130, 250 68, Česká republika

zastoupená: RNDr. Petrem Lukášem, CSc., ředitelem

zapsaná v Rejstříku veřejných výzkumných institucí vedeném Ministerstvem školství, mládeže a tělovýchovy České republiky

bankovní spojení: [redacted]

IČO: 61389005

DIČ: CZ 61389005

(dále také jen „***Objednatel***“)

a

1.2. Zhotovitel:

Centrum výzkumu Řež s.r.o.

se sídlem: Husinec-Řež č.p. 130, PSČ 25068

zastoupená: Ing. Martinem Ruščákem, CSc., MBA, jednatelem, Ing. Jiřím Richterem, jednatelem a Ing. Jaroslavou Klimasovou, jednatelkou

zapsaná v obchodním rejstříku vedeném Městským soudem v Praze, oddíl C, vložka 89598,

bankovní spojení: Komerční banka, a.s., Českomoravská 2408/1a, 190 00 Praha 9,
číslo účtu: [redacted]

IČO: 26722445

DIČ: CZ26722445

(dále také jen „***Zhotovitel***“)

(Objednatel a Zhotovitel dále také jen „***Smluvní strany***“).

2. ÚVODNÍ ÚSTANOVENÍ

2.1. Smluvní strany uzavřely shora uvedeného dne Smlouvu na realizaci předmětu veřejné zakázky „Dodávka heliového chladícího systému terče u spalačního zdroje", zadávané podle zákona č. 137/2006 Sb., o veřejných zakázkách, ve znění pozdějších předpisů.

2.2. Ke Smlouvě uzavřely Smluvní strany dne 24. 1. 2017 Dodatek č. 1.

2.3. Následně Smluvní strany seznaly, že jako Příloha č. 1 část A (TIK 2.2) byla ke Smlouvě nedopatřením přiložena předchozí, již neaktuální verze TIK 2.2, namísto verze posledně dohodnuté mezi Objednatelem a ESS a podepsané ze strany Objednatele dne 16. 1. 2017 a ze strany ESS dne 26. 1. 2017. S ohledem na uvedené se Smluvní strany níže uvedeného dne dohodly na níže uvedené změně Smlouvy, spočívající v nahrazení neaktuální verze TIK 2.2 verzí aktuální, a v souladu s ustanovením odstavce 17.4 Smlouvy uzavřely ke Smlouvě tento Dodatek č. 2, a to v režimu změny nikoliv podstatné ve smyslu zákona č. 134/2016 Sb., o zadávání veřejných zakázek, ve znění pozdějších předpisů.

2.4. Termíny a definice s velkými písmeny používané v tomto Dodatku č. 2 mají stejný význam jako ve Smlouvě, není-li Smluvními stranami výslovně ujednáno jinak.

3. ZMĚNA SMLOUVY

3.1. Příloha č. 1 část A (TIK 2.2) Smlouvy se plně nahrazuje zněním přiloženým k tomuto Dodatku č. 2, tedy dokumentem s názvem „SCHEDULE TIK.2.2 (PART OF WP 12.2.4) VERSION 2 – TARGET HELIUM COOLING SYSTEM TO THE IN-KIND CONTRIBUTION AGREEMENT SIGNED BETWEEN EUROPEAN SPALLATION SOURCE – ERIC AND NUCLEAR PHYSICS INSTITUTE OF THE CZECH ACADEMY OF SCIENCES ON 10 DECEMBER 2015", ve znění ze dne 26. 1. 2017.

3.2. Ve zbývajícím rozsahu (tj. v části B) zůstává Příloha č. 1 Smlouvy nedotčena.

4. ZÁVĚREČNÁ USTANOVENÍ

4.1. Ostatní ustanovení Smlouvy, ve znění Dodatku č. 1, zůstávají v platnosti a účinnosti a nedotčena jakýmikoliv změnami.

4.2. Tento Dodatek č. 2 nabývá platnosti a účinnosti dnem jeho podpisu oprávněnými osobami obou Smluvních stran.

4.3. Tento Dodatek č. 2 je sepsán v českém jazyce ve čtyřech (4) vyhotoveních, z nichž každé vyhotovení má platnost originálu. Každá ze Smluvních stran obdrží po dvou (2) vyhotoveních.

Příloha: SCHEDULE TIK.2.2 (PART OF WP 12.2.4) VERSION 2, ve znění ze dne 26. 1. 2017

Smluvní strany stvrzují tento Dodatek č. 2 podpisem na důkaz souhlasu s celým jeho obsahem.

V Řeži dne 25. 4. 2017

Za: Objednatele

[redacted]

Jméno: RNDr. Petr Lukáš, CSc.

Funkce: ředitel

Ústav jaderné fyziky AV ČR, v. v. i.

V Řeži dne 21. 4 2017

Za: Zhotovitele

[redacted]

Jméno: Ing. Martin Ruščák, CSc., MBA

Funkce: jednatel

Centrum výzkumu Řež s.r.o.

[redacted]

Jméno: Ing. Jiří Richter

Funkce: jednatel

Centrum výzkumu Řež s.r.o.

[redacted]

Jméno: Ing. Jaroslava Klimasová

Funkce: jednatelka

Centrum výzkumu Řež s.r.o.

SCHEDULE TIK.2.2 (PART OF WP 12.2.4) VERSION 2 – TARGET HELIUM COOLING SYSTEM TO THE IN-KIND CONTRIBUTION AGREEMENT SIGNED BETWEEN EUROPEAN SPALLATION SOURCE – ERIC AND NUCLEAR PHYSICS INSTITUTE OF THE CZECH ACADEMY OF SCIENCES ON 10 DECEMBER 2015

Revision history table		
Version	**Comments**	**Sections amended**
1	First version, endorsed by IKRC # 7 in November 2015	N/A
2	Agreed between ESS ERIC and NPI CAS on 16 December 2016	Section 1.1, sections 4.1 and 4.3, section 5.4, section 5.5.2 and section 7

1. SCOPE

This document describes the Scope of Work (SoW) required to complete the Target Helium Cooling System contribution to the ESS programme.

1.1 General work-unit description

The Target Helium Cooling System has the main function to remove heat from the target wheel. The Target Wheel and the spallation material are hit by the proton beam, which will generate a heat load. The Target Helium Cooling System will keep the temperature below 500°C both in the structural material of the wheel and on the surface of the spallation material. Keeping the tungsten surface temperature below 500°C will avoid oxidation of the tungsten in the event that air infiltrates the Target Vessel. To fulfil this maximum temperature requirement, the Target Helium Cooling System is designed to provide a helium mass flow rate of 3.0 kg/s.

The coolant temperature at the inlet to the target shall be ≈40°C. This will reduce the operating temperature level of the target and also will minimise target displacement due to thermal elongation of the shaft during the ramp-up period from zero-proton current to operating temperature. The design must allow online purification of the coolant, and must be able to handle the potential of dust contamination, mainly from the tungsten spallation material. The potential activated / contaminated helium gas shall be kept enclosed at all times except for accepted leakage rates.

Detailed requirements are specified in the System Requirement and Solution Documents and also in the Interface Documents. These are listed in 2.2 Reference Documents.

The Target Helium Cooling System is designed according to the block diagrams shown in Figures 1 and 2. The In Kind Partner will elaborate the concept deign into a final design based on their experience.

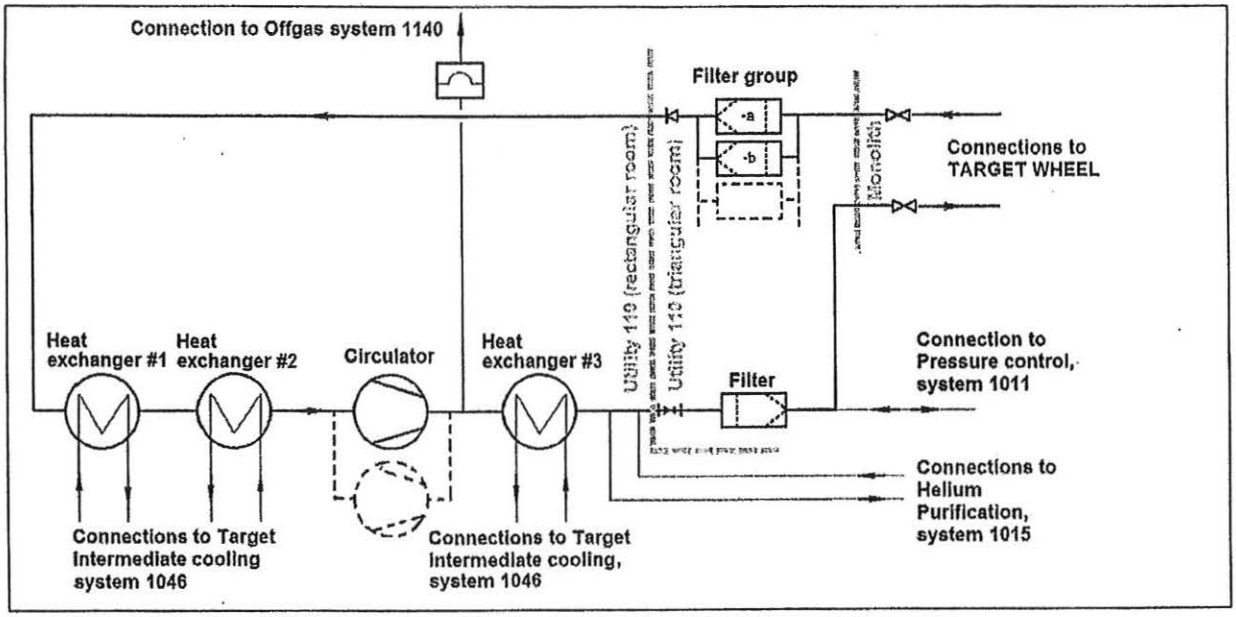

Figure 1 Block diagram for Target Primary Cooling System (TPC)

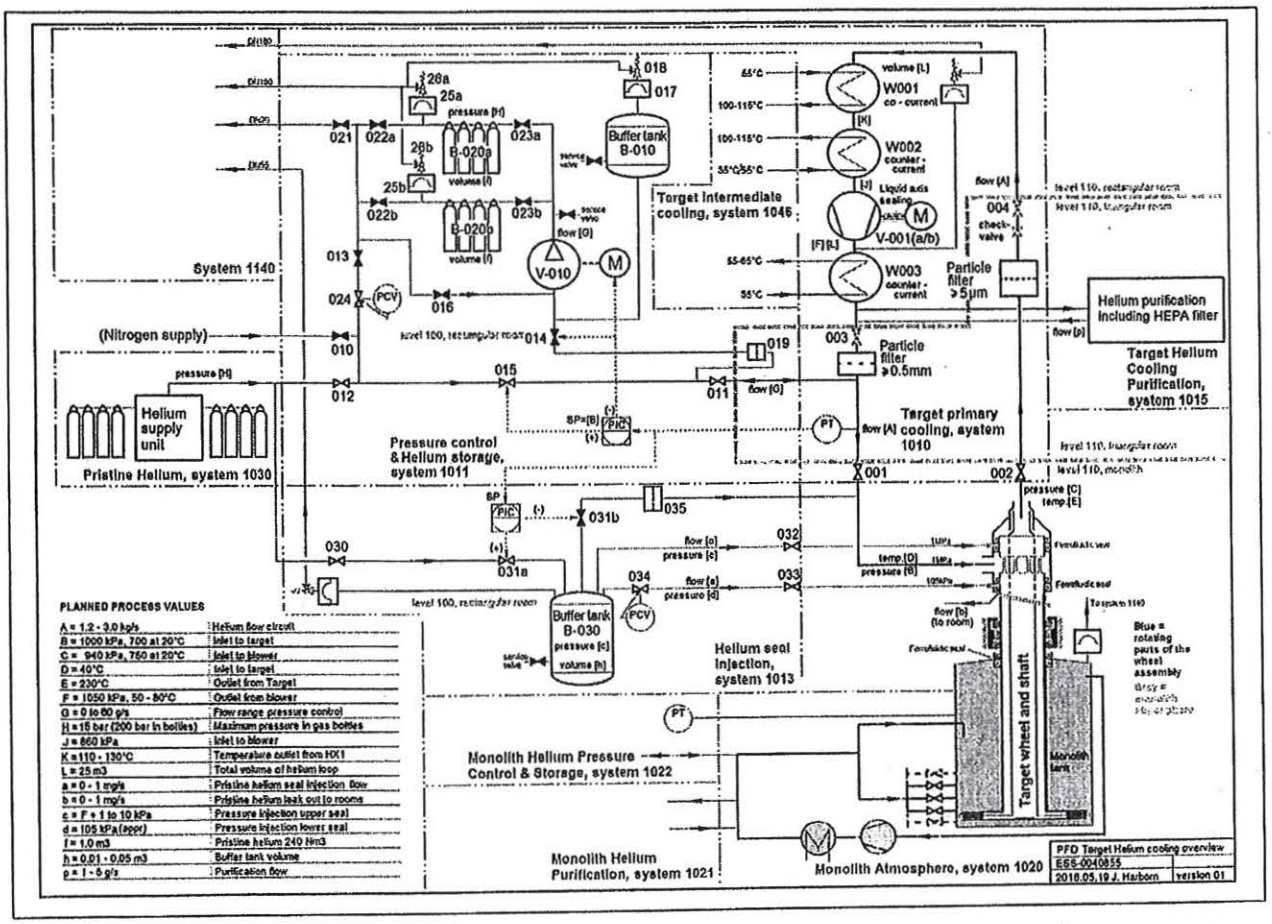

Figure 2. Block Diagram for Target Primary Pressure Control System (Pristine Helium, Monolith Pressure Control, Monolith Helium Purrification, Monolith Circulation, Target Helium Purification is not included in TIK 2.2)

Work Units under in kind partner responsibility:

The following subsections of this document present a description of the tasks to be performed by the IN-KIND PARTNER related to the Target Helium Cooling System.

Engineering design of the systems

Based on the criteria and boundary conditions set by EUROPEAN SPALLATION SOURCE - ERIC, the IN-KIND PARTNER team will have lead responsibility for developing the final (detailed) design, including supporting engineering analyses of the following components:

- Circulators
- Heat Exchangers
- Filters
- Cyclones
- Valves
- Pipes
- Indicators
- Pressure vessels

The baseline design concept, as described in the TDR and therein referred documentation, System Requirements Document for the Target Helium Cooling Systems ESS-0012524, System Design Description (SDD) for the Target Cooling Systems ESS-0012527 and their reference documents will form the starting point for the engineering work. The technical staff of IN-KIND PARTNER and EUROPEAN SPALLATION SOURCE - ERIC in cooperation must review the design continuously. All design changes and modifications of requirements and constraints during the construction project shall follow a quality assured change control process. The WPM for the Target System will, in collaboration with the In Kind Partner, decide if changes have to be handled through the ESS Change Control Process. Changes to the design will be handled on a regular basis in the monthly meetings with the In Kind Partner.

The Target Helium Cooling System requirements and design features that are part of the established ESS Programme baseline and are therefore under configuration control include:

- Design Pressure – 1.3 MPa
- Operating pressure – nominal 1.0MPa, maximum 1.1 MPa (11bar (a))
- Mass flow rate – 2.85 kg/s
- He temperature at target inlet/outlet – 40/240 °C
- Pressure drop from the Target Wheel Drive & Shaft inlet to outlet $\leq$ 0.09 MPa at above nominal operating pressure, flow and temperatures
- Total pressure drop from the Target Helium Cooling System $\leq$ 0.06 MPa

As part of the engineering efforts for the components all relevant interfaces with stakeholders and adjacent systems shall be identified and addressed. Sufficient specifications for radwaste management, controls, instrumentation, maintenance, handling, operations, safety, assembly, testing, installation and commissioning shall be provided as part of the engineering work for the design review milestones. Such specifications shall be part of the delivery for the previously listed components.

A description of the technical solution and the physical system, together with these specifications, shall be presented in one or several documents. The documentation shall also include validation and verification plans to ensure that all requirements are satisfied.

Maintenance tools and modifications to the civil structures (for instance, wall penetrations) are not included in the scope of supply. However, the necessary maintenance tools will be identified and interface

requirements for the civil structure will be provided. Regarding instrumentation and control, only sensors and cables (except for the main helium circulators and helium storage compressor which will be delivered with a local control unit) will be supplied. The control system hardware and programming is out of scope, but the control logic (that is, the algorithm for operating the helium loop) is within scope.

Engineering Development and Demonstration

Engineering development and demonstration (EDD) activities are aimed at addressing uncertainties that introduce risk in the ability of the design to satisfy the stated functional requirements. EDD results should be obtained with time to allow changes to the design, if warranted, with minimum impact on the project schedule. All relevant experience from ongoing EDD efforts on the ETHEL loop at Lund University should be incorporated in the design. EDD experiences that are announced after signing this TIK will be handled by the Change Control Process.

No EDD efforts are foreseen for the IN-KIND PARTNER. Proposed additional EDD efforts can only be considered after a detailed definition, aims, and cost of the demonstrations are agreed by all Parties.

Manufacturing process review

The detailed engineering of each component shall include assessment of its manufacturability. The aim is to identify manufacturing and inspection processes that will allow fulfilment of the ESS quality requirements.

Procurement and manufacturing

Once the design and manufacturing processes for the components have been finished, IN-KIND PARTNER shall be responsible for the manufacturer selection, the manufacturing process tracking, and, finally, reception and acceptance.

The inspection criteria shall be agreed with the EUROPEAN SPALLATION SOURCE - ERIC staff to guarantee the integration of IN-KIND PARTNER into EUROPEAN SPALLATION SOURCE - ERIC's quality system.

Assembly and cold testing

The components manufactured by IN-KIND PARTNER shall be assembled for the performance of cold tests. The testing program, to be determined by mutual agreement of the Parties, may consist of geometric measurements, static pressure tests, pump performance tests, leak tests, and similar tests to confirm the system meets design specifications.

Delivery to ESS and participation in integration into the Target Station and cold commissioning

The IN-KIND PARTNER will deliver, install, and test the target Helium cooling system and associated components at the ESS site. The division of responsibilities, authorities, and tasks required for the installation and cold commissioning of the Target Helium Cooling System will be decided and mutually agreed by both Parties.

Requirements for the design, fabrication, assembly and testing

Detailed accident analyses for ESS systems remain to be performed, so final specification of measures required for safety are yet to be finalized. The current basis for design and fabrication of the Target Helium Cooling System is that the cooling is not a safety function, but the mechanical integrity of the system is assumed to be a safety function (SaF). To ensure that we provide the required mechanical integrity, the IN-KIND PARTNER must follow the RCC-MRx Class 3 requirements in designing, fabricating, assem-

bling, and testing this system. RCC-MRx Class 3 can be fulfilled by compliance with the usual PED standards EN 13445 and 13480 plus some additions, which are given in the RCC-MRx code. See also the comparison in ESS-0037516. Any additional third party review and inspections beyond those required in RCC-MRx that may be imposed by the Swedish regulator (SSM) will be coordinated and paid by EUROPEAN SPALLATION SOURCE - ERIC, i.e. the IN-KIND PARTNER is only responsible for meeting the documentation, review, and inspection requirements specified in RCC-MRx (Class 3), working with EUROPEAN SPALLATION SOURCE - ERIC to facilitate the additional SSM-required reviews and inspections, and providing allowances in the schedule for such activities.

Regarding cobalt content in stainless steel components, the following requirements must be met:
• Stainless steel piping: No specific requirements on cobalt content.
• Valves in the main loop: Hardfacing in valves must not consist of or be lined with alloys with a cobalt content not exceeding 0,20%.
• Valves not in the main loop: No requirement to have hardfacing in these valves. If hardfacing is chosen the cobalt content must not exceed 0,20% as for valves in the main loop.

Titanium and titianium alloys are acceptable for use as the rotor elements in the turbo compressors supplied as part of this system. EN-13445-compliant tube-in-shell heat exchangers are acceptable for use in this system. All valves in the system must comply with RCC-MRx or equivalent.

Should these requirements change, the ESS change control process will be used to evaluate the cost and schedule implications. Adjustments to delivery dates and budget will be negotiated with the IN-KIND PARTNER and implemented into a revised baseline. The change control process, including the IN-KIND PARTNER's role, is described in the Target Baseline Management Process document (ESS-0016499).

2. RELATED DOCUMENTS

2.1 Applicable Documents

[CCP] Change Control Process, ESS-0001879.

[CMP] Configuration Management Plan, ESS-0003688.

[RMP] Risk Management Process, ESS-0000263.

2.2 Reference documents

[TDR] ESS Technical Design Report, ISBN 978-91-980173-2-8

Title	CHESS nr	Rev
SDD Req Target Helium Cooling Systems	ESS-0012524	3
SDD Sol Target Helium Cooling Systems	ESS-0012527	3
ESS Interface Control Document	ESS-0005717	2
ACC -TS ICD	ESS-0005734	2
ICS - TS ICD	ESS-0005738	1
TS - RMH ICD	ESS-0005742	1
SI - TS ICD	ESS-0005745	2
TS - NSS ICD	ESS-0005748	2
ICD: Fluid Systems - Target Systems	ESS-0005826	1
ICD-R 1010-TSS	ESS-0016380	1
ICD-R 1010_Target Intermediate Cooling	ESS-0018673	2
ICD 1010_Target	ESS-0019346	3
ICD-R Target Helium Cooling_ProcessControl-MPS	ESS-0019347	1

ICD-R Target Helium Cooling-CF/Building	ESS-0020682	1
ICD: Remote Handling Systems – Target Systems	ESS-0020837	2
ICD: Target Systems - Accelerator Systems	ESS-0022919	1
ICD: Monolith Systems - Target Systems	ESS-0023804	2
ICD-R Target Helium Cooling_RWH	ESS-0037668	1
ICD-R 1011-Fluids supply&process(FS)	ESS-0038061	1
ICD-R Target Helium Cooling Purification System - 1010	ESS-0043689	1

3. TERMS AND DEFINTIONS

CDR	Critical Design Review
Facility element	This item corresponds to the product contribution of the partner. It is an element of the ESS Product Breakdown Structure.
PBS	Product Breakdown Structure
PDR	Preliminary Design Review
SAR	System Acceptance Review
SAT	Site Acceptance Test
SoW	Scope of Work

4. PROJECT DEFINITION

4.1 Deliverable Item definition

The IN-KIND PARTNER shall provide its contributions in accordance with the following time schedule:

Start date: May-2016

End date: Jan-2019

Major milestones that meet the needs of the overall ESS Program are identified in the table below. Intermediate milestone dates should be identified to allow tracking of progress between these major milestones. These intermediate milestones will be established based on mutual agreement between EUROPEAN SPALLATION SOURCE - ERIC and the IN-KIND PARTNER.

WBS	Activity ID	Activity or Milestone Name	Completion Date
Target Helium Cooling System			
12.2.4.1	A78500	MS: IN KIND START Target He Cooling system	May-16
12.2.4.2	A54230	MS: Critical Design Review	June-17
12.2.4.3	A60780	MS: Contract to Supplier Awarded	Dec-17
12.2.4.3	A67590	MS: SAT for Target He Cooling System Complete	Jan-19

This overall contribution is set to the ESS Cost Book value of 5.59 M€.

Each of the delivery milestones will be used in the Earned Value tracking (chapter 5.1) process.

4.2 Project Stages Definition

The contribution by the IN-KIND PARTNER proceeds in two stages as defined below.

4.2.1 Stage 1: preliminary and detailed design phase

Stage 1 of the contribution is the detailed design and engineering phase that prepares for and precedes potential procurement of the facility element. Within Stage 1 the design is detailed and verified by way of analysis and/or test down to the lowest level selected by the IN-KIND PARTNER. This includes but is not necessarily limited to:

- Carrying out detailed optimization of the facility element mechanical, fluid, thermal, optical, electro-optical, electronic and electrical subsystems in relation to the requirements.
- Expanding and consolidating the Interface Control Document(s) for the facility element including description of the interfaces with the Site Infrastructure and the Integrated Control System (e.g. clearance for stations, access, power, storage, pre-assembly areas, data format and rate, signals).
- Scheduling for the manufacture, assembly and testing and establishing integrated logistics requirements and solutions for the future operation of the facility elements.
- Documenting:
  - The logistics needs in a Component Operation and Maintenance Manual (COMM) for the facility element (e.g. test equipment, storage, transportation, handling and packaging, expected preventive and corrective maintenance activities),
  - The design descriptions of the facility element in a System Design Description document– SDD – with its associated references (e.g. drawings, P&ID).
  - The updates of the verification activities in the related System Verification Plan,
  - The updates of the related System Requirement Document,
- Contributing to the RAMS analyses, including analyses to validate the initial maintenance planning defined in the COMM.

The analyses performed before Stage 1 shall be expanded and consolidated. The detailed conformity between the proposed design and the requirements shall be developed and demonstrated. The detailed design shall be elaborated such that:

a) A thorough and complete evaluation of the ability of the design to fulfil the requirements is possible and is supported by an appropriate traceability between the requirements and the proposed design features.
b) The development process for hardware and software is well established including manufacturing methods, processing and tooling requirements.
c) The procurement documentation for each sub-system of the facility element is ready for competitive procurement. This includes technical specifications and statements of work for vendors or manufacturers.
d) The IN-KIND PARTNER is able to provide the documentation for the supply of the facility element.

For the Target Helium Cooling System, the IN-KIND PARTNER will join the ESS project soon after the completion of the Concept Design phase, which ends with the Preliminary Design Review (PDR). The IN-KIND PARTNER will lead the detailed design phase. Stage 1 ends with the successful completion of the Critical Design Review (CDR).

4.2.2 Stage 2: Realization and verification

Stage 2 is the phase for realizing the design descriptions produced during Stage 1 and carrying out the verification of the facility element. The product will be verified by way of analysis and/or test and/or inspection and/or demonstration. This includes but is not necessarily limited to:

- Contracting with a screened supplier, screening being based on a fair and well balanced list of criteria,
- Following up when applicable the fabrication actions and transportation process,
- Carrying out intermediate verifications during the fabrication at the factory and/or at the site (ESS or IN-KIND PARTNER premises) e.g. inspection of material certificates, part dimensions before welding,
- Taking over the documentation provided by the supplier,
- Storing and handling the product in conditions that ensure its integrity,
- Delivery of all components comprising the facility element to the ESS site,
- As needed, support for re-assembly of any portion of the facility element that required disassembly for shipping purposes,
- Carrying out the verification activities as defined in the System Verification Plan of the facility element, which includes support for the Site Acceptance Test to be conducted at the ESS site,
- Reporting and documenting in a System Verification Report the outcomes of the verification activities,
- Presenting the verification outcomes during the System Acceptance Review of the facility element.
- Transfer of all relevant documentation to the ESS WU coordinator.

Stage 2 starts upon successful completion of Critical Design Review of the facility element. Stage 2 ends with the successful completion of the System Acceptance Review (SAR).

4.3 Project Schedule and Key Milestones

Milestone	Short description	Planned/ Baseline date	Location	Comment
	Kick-off meeting	TBD (T0)	Partner premises	
	Progress meetings	T0+ 4 weeks	Partner premises	
CDR	Critical Design Review for the Target Helium Cooling System	June-2017	ESS Lund	
SAT/SAR	Site Acceptance Test and System Acceptance Review for the Target Helium Cooling System	January-2019	ESS Lund	

4.3.1 Kick-off meeting

The main objective of the kick-off meeting is to confirm the mutual understanding of the Scope of Work specified herein, including the applicable specifications.

In particular the partners shall:

- Present and review the project plan, schedule and work breakdown structure (the baseline proposals),

- Introduce the key resources and team members,
- Review the risk register and establish an agreed prioritization of risks
- Complete the milestone definition list
- Make a technical presentation of the proposed solution,
- Present management plans as applicable.

The participants shall take the minutes of the meeting and record the action items.

4.3.2 Status meetings

A status meeting shall be held every month during the whole duration of the project. Status meetings may be held at the ESS or partner's premises or over the telephone/video conferencing facilities available.

The purpose of the meeting is to review progress, risks, review/decide on change requests and discuss upcoming activities and potential challenges.

The Partner is responsible for carrying out the SoW in a timely manner, fully in accordance with the time schedule referred to above.

The Partner shall provide a written progress Monthly Status Report at least 3 working days in advance of the next scheduled Progress Meeting.

The Parties shall take the minutes of the meeting and record the action items.

4.3.3 Stage 1: critical design review

The Critical Design Review concludes Stage 1. The CDR assesses if the design meets all facility element requirements with acceptable risk and within the cost and schedule constraints.

The CDR demonstrates that the maturity of the design is appropriate to support proceeding with full-scale fabrication, assembly, integration, test, and future operation and decommissioning.

The contents of the CDR data package shall be established as a minimum 2 weeks before the review. As a minimum it shall contain all deliverables as specified in 4.4.2.

The review shall be organized as defined in the Target Project Quality Plan ESS-0027134 and the Target Project Process for Project Phase Transition ESS-0037005.

No detailed schedule of a review meeting is requested but for planning purposes it can be expected that a review may last 3 working days.

4.3.4 Stage 2: system acceptance review

The System Acceptance Review examines the facility element and its documentation, and inspection, demonstration, test data and analyses that support its verification as defined in the Verification Plan and Report. The SAR ensures that the all system requirements have been satisfied and that the integration activities of the facility element can start as defined in the facility element Integration Plan.

The review shall be organized by EUROPEAN SPALLATION SOURCE - ERIC and will involve the Work Unit Coordinators (see Section 5.4) as well as appropriate representation by the Quality Assurance and Safety organizations of EUROPEAN SPALLATION SOURCE - ERIC. The chair of the review board is appointed by EUROPEAN SPALLATION SOURCE - ERIC. The membership of the board is communicated to the review participants at the earliest possible time.

The contents of the SAR data package shall be established as a minimum 5 weeks before the review. As a minimum it shall contain all deliverables as specified in 4.4.3.

The successful completion of the System Acceptance Review is a prerequisite for crediting values to the Partner.

4.4 Deliverables

The major deliverable for this IN-KIND CONTIBUTION AGREEMENT is the functioning Target Helium Cooling System. The data and document deliverables associated with successful completion of this agreement are described in the remainder of this section.

4.4.1 Status reports

During the execution of the SoW, the Partner shall submit to the EUROPEAN SPALLATION SOURCE - ERIC monthly status reports containing (as according to Enclosure 1: Monthly Status Report):

1. The status of the SoW since the preceding report;
2. The progress expected to be made in the next following period and any other pertinent issues related to the Project Results;
3. Updated Milestone Tracking Table
4. Desired changes to existing baseline
5. Risk Management
6. Updated electronic versions of the partner plans

During the execution of the SoW, the System Status Report related to the facility element will be maintained by the EUROPEAN SPALLATION SOURCE - ERIC WU Coordinator. The EUROPEAN SPALLATION SOURCE - ERIC WU Coordinator and the Partner will ensure that the System Status Report reflects the current development maturity of the facility element and especially that testing or operating restrictions and limitations due to an uncompleted development are reported.

4.4.2 Stage 1 data package

The Stage 1 data package shall cover all activities undertaken during Stage 1. The data package shall document the technical baseline items and the trade offs that lead to this definition, the detailed design of the facility element, including the design and operation documentation for all the equipment (software and hardware) that are necessary for handling, transport, storage, installation, maintenance and operation thereof when applicable. The data package shall demonstrate compliance with the applicable requirements and establish verification plans. The data package shall rely on templates provided by EUROPEAN SPALLATION SOURCE - ERIC.

This package shall include but not be limited to:

- System Requirement Document,
- System Design Description and related documents and data (drawings, general arrangement drawings, P&ID, FE models, etc.),
- Interface Control Documents
- Manufacturing Process Specification
- Manufacturing Verification Plans
- System Analysis Report
- System Verification Plan.

The Stage 1 data package shall also contain documentation, e.g. technical/performance specification, to initiate a competitive tender for the procurement of the facility element and to support the project activities. Information related to the value of the procurement, or any details related to costs born by the Part-

ner, are exempt from inclusion in the Stage 1 data package. The Stage 1 data package should additionally include but not necessarily be limited to:

- a complete documentation package for the procurement of the facility element including as a minimum a statement of work, manufacturing follow-up description, applicable and reference documentation
- The Project Schedule for construction
- Risk register

4.4.3 Stage 2 data package

The Stage 2 data package shall cover all activities undertaken during Stage 2. The data package shall contain the "as-built" documentation and verification records showing the compliance with the facility element requirements.

This package shall include but not be limited to:

- Updated System Requirement Document,
- Updated System Design Description and related documents and data (drawings, general arrangement drawings, P&ID, FE models, etc.),
- Updated Manufacturing Process Specification,
- Updated System Verification Plan "as-built" design descriptions (drawings, P&ID, etc.),
- System Verification Reports.
- Updated Interface Control Document(s) when applicable,
- Updated System Analysis Reports,
- Manufacturing Verification Reports,
- Component Operation and Maintenance Manual.

4.4.4 Final report

The Partner shall issue a final written report to the EUROPEAN SPALLATION SOURCE - ERIC within four (4) weeks of the earliest occurrence of the following: (a) completion of the stages, or (b) the expiration of this Agreement, or (c) prior termination of this Agreement. Such report shall include a comprehensive summary of the contributions made, works and services undertaken and Project Results achieved.

4.4.5 Documentation package for supply

The Partner shall deliver at the completion of the project:

- Stage 1 data package,
- Stage 2 data package,
- Data sheets,
- Certificates,
- All CAD models and as-built drawings.

5. TASKS APPLICABLE TO ALL PROJECT STAGES

5.1 Project management and control

ESS is mandated to use Earned Value Management as a tool for managing progress and performance. This translates into a requirement for tracking deliverables from partners. The information below, chapter 5.1.1 – 5.1.6, specifies the requirements concerning scheduling and progress reporting needed to comply

with this requirement. Templates and instructions for managing the milestone schedule, including the associated earn value basis are found within the Applicable documents.

5.1.1 Use of a Planning Tool

The partner should use a planning tool (MS Project, Oracle Primavera, Deltek Open Plan or similar). The purpose of this requirement is to enforce a systematic approach to planning, both creating and maintaining the plan.

As part of the monthly status report, the current schedule should be made available for to ESS in electronic format.

5.1.2 Delivery Milestones

Each distinct delivery should have a milestone with a date. This also includes part or incremental deliveries.

5.1.3 Milestone Definition List

Each Milestone should have a number, name and a definition (captured in a Milestone Definition List). The definition should both explain the content and fulfilment of the milestone and delivery.

5.1.4 Interim Milestones

If the duration of the project work producing the deliverable is more than 6 months, the plan should also contain interim milestones. The purpose with interim milestones is to measure progress and to be used for signalling issues in the fulfilment of the delivery (in the interest of both parties).

5.1.5 EV – Weighted MS value

Each milestone, both interim and delivery milestones, should be associated with a weight (percentage between 0-100). The aggregated fulfilment of all milestones should result in 100%.

5.1.6 Monthly Forecasting

In conjunction with the status reporting, the partner should also provide an updated forecast for the upcoming milestones, as well as the final delivery milestone.

5.2 Risk Management

ESS uses Risk Management as one of the Project Management tools to assist the execution of the Programme. The Partner's contribution in this field is vital and shall therefore form a part of ESS Risk Management Process.

The contribution shall be characterized by risk awareness and open communication regarding risks. The common view of risks and uncertainties are utilized as a stepping-stone to the identification and exploitation of opportunities.

5.2.1 ESS Risk Management Process

Risk Management shall be incorporated as a part of the day-to-day work with the contribution. The partner shall work according to ESS Risk Management Process, including:

- Plan Risk Management
- Identify risk,
- Analyse risk,
- Risk treatment, and
- Monitor and control risk.

5.2.2 ESS risk criteria

When analysing risk, ESS' risk criteria shall be used. Using ESS' criteria for likelihood and consequence enables the partner and ESS to analyse risks in a uniform way.

The ESS acceptance criteria clarify what risk level that ESS accepts, and when risk treatments are required. All combinations of likelihoods and consequences correspond to a risk level, either being high, medium or low. This is graphically presented in the ESS risk matrix.

Risk treatments are the measures being taken in order to treat the risk to an acceptable level. High-level risks can never be accepted and require treatment. Medium-level risks can be accepted without treatment if the treatment is not proportional to the gained improvements. Low-level risks can be accepted without treatments.

5.2.3 Risk register

The risk register shall contain the gathered knowledge of identified risks, including the assessed risk exposure. The register shall show identified risks in order of priority, including risk treatment plans.

The Partner should preferably use the ESS Risk Management software system, used for systematic documentation of risk registers. If not, the partner risk register format shall be according to ESS' requirements.

5.2.4 Risk status report

Risk status reports shall include a summary describing news and relevant changes to the risk exposure, including on-going Risk Management activities. It shall furthermore contain an updated risk register including risk treatment status.

5.3 Configuration management

Changes to the established ESS Programme baseline shall be approved and documented as defined in the Change Control Process [ESS-0001879]. Full and part delivery milestones should be under change control. This means that both parties need to agree on changes to the milestones.

The ESS programme participants shall follow the principles of configuration management as laid down in the ESS configuration management plan [CMP], or equivalent best practices. In particular:

1. The ESS programme participants shall identify each document, drawing, subsystem or part, establishing the item configuration and relation to the hardware and software at any time in the study.
2. The ESS programme participants shall apply the change control process [CCP], in agreement with best practices.
3. The ESS programme participants shall ensure that all personnel that use or generate information can easily access the tools implemented to ensure configuration control.□ EUROPEAN SPALLATION SOURCE - ERIC shall provide a central repository for all information and that this repository is properly backed up.

5.4 Organization

The persons nominated as the Work-Unit Coordinator according to 6.3 in the agreement are:

For NUCLEAR PHYSICS INSTITUTE OF THE CZECH ACADEMY OF SCIENCES: Petr Lukáš
For EUROPEAN SPALLATION SOURCE - ERIC: Ulf Odén

The Work Unit Coordinators are expected to work closely as partners in executing the entire work scope defined in this agreement.

The EUROPEAN SPALLATION SOURCE - ERIC WU Coordinator is primarily responsible for the interface documents, coordination with other ESS work units and reporting to EUROPEAN SPALLATION SOURCE - ERIC management about the progress of the work scope. Project changes at level D (Reference ESS Configuration Management Document) and above will be processed by the EUROPEAN SPALLATION SOURCE - ERIC Work Unit Coordinator.

The IN-KIND PARTNER Work Unit Coordinator is primarily responsible for executing the work scope defined in this Schedule and has the authority to process changes at level E (the level inside the work unit) according to the ESS configuration Management Plan.

5.5 Product & Quality assurance and safety

5.5.1 Applicable law, legislation and standards

All IN-KIND PARTNER national safety laws and legislation applicable to the design, development, manufacturing, installation, testing and operation of the supply shall be followed and fulfilled.

All operator (Swedish) national safety laws and legislation applicable to the design, development, manufacturing, installation, testing and operation of the supply shall be followed and fulfilled as defined in the requirement document for the facility element by EUROPEAN SPALLATION SOURCE – ERIC (ESS-0014268). Specific requirements for design and fabrication of the Target Helium Cooling Systems are provided in section 1 of this document.

The Parties shall implement and maintain throughout the Project a quality assurance and safety approach that generally covers all aspects of ISO9001 and all specified reliability, quality assurance and safety requirements.

Division of responsibility for the conduct of third party reviews is detailed in Section 1.1.

5.5.2 Quality Plan

The IN-KIND PARTNER shall prepare a consistent and comprehensive Quality plan for its contribution and submit it to approval by the ESS WU Coordinator on 31 March 2017 the latest. The Quality plan shall generally comply with the recommendations of the ISO 10005:2005 Standard.

The documentation required might be principally generated from the Partner's Quality Management System when applying a system manual with defined procedures. However, a Quality plan does not replace such a quality management system, but may complement to the issues of the cooperation.

6. DOCUMENTATION FORMAT

All documentation and correspondence shall be in English.

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

The civil design models and drawings shall be based on Revit.

The electrical drawings shall be in EPlan format.

All mechanical models and drawings shall be editable in Catia V6. Drawings shall also be provided in PDF.

7. TRANSPORTATION AND DELIVERY

All tangible deliverables shall be delivered DAP (Delivered at Place) Incoterms 2010, unloaded at the final destination of ESS Lund.

8. WARRANTY

Warranty issues are fully addressed in the main part of this In-Kind Contribution Agreement.

IN WITNESS WHEREOF, the Agreement has been executed in two (2) originals, of which the Parties have received one (1) each.

EUROPEAN SPALLATION SOURCE - ERIC

26/01/2017
Date

[redacted]

Roland Garoby
Name (in block letters)

Technical Director
Position

NUCLEAR PHYSICS INSTITUTE OF THE CZECH ACADEMY OF SCIENCES

JANUARY 16, 2017
Date

[redacted]
Signature

PETR LUKÁŠ
Name (in block letters)

DIRECTOR
Position

Centrum výzkumu Řež s.r.o.
15