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| Gamma Blockers Project Quality Plan |
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|  | Name | Role/Title |
| --- | --- | --- |
| Owner | Karol Szymczyk | WU Coordinator, NCBJ |
| Reviewer | Marcin WojciechowskiSławomir WronkaKent Wigren | Mechanical Engineer, NCBJGeneral Coordinator, NCBJQuality, ESS Accelerator Division |
| Approver | Iñigo Alonso | WU Coordinator, ESS Accelerator Division |

**SUMMARY**

This Quality Plan describes the quality assurance and quality control for the Gamma Blocker (GB) project aimed at the development, manufacturing, delivery and installation GB system for ESS ERIC.

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# Scope

This Quality Plan establishes and describes the quality strategies and actions that NCBJ plans to implement to meet the specified requirements for the Gamma Blocker (GB) system for ESS Dump section and HEBT section. Two independent gamma blockers systems, in A2T section, and in Dump section, will be installed in ESS tunnels. The major goal of the Plan is to ensure that the quality of the products contracted for the delivery as per the In-kind Contribution Agreement is in accordance with the requirements of ESS ERIC.

## System Description

The main Gamma Blocker function in both cases is to absorb residual gammas from the activated target and tuning beam dump, in order to allow hands-on maintenance work in the (A2T) and dump-line areas. As a result, the dose level inside the accelerator tunnel will decrease, because of the stopped gamma radiation from the activated target and activated dump, inside the beam pipe. The gamma blockers will only be used during beam off mode.

# Input to this Quality Plan

* ESS-0060388 In-kind Contribution Agreement Schedule AIK 6.1 Development and delivery of Gamma Blockers to the In-kind contribution agreement signed between the European Spallation Source Eric and the National Centre for Nuclear Research (NCBJ)
* ESS-0008351 Hands on maintenance conditions for ESS accelerator.
* ESS-0019931 ESS Procedure for designing shielding for safety
* ESS-0087526 Considerations for Gamma Blocker design related to radiation safety
* ESS-003729 Motion Control Components Standard for ESS Applications. (2016, January 20).
* ESS-0037830 ESS Project Quality Plan Template
* ESS-0067962 A2T.ID and DMPL.ID L3 Requirements
* ESS-0126537 A2T.ID L4 Requirements
* ESS-0126538 DmpL.ID L4 Requirements
* ESS-0126539 A2T.ID and DmpL.ID L4 interface requirements

# Quality Goals

The major quality goals for the Project are the following:

* Design of the GB products, fully compliant with ESS ERIC specification and requirements
* Manufacturing of the Products according to the time schedule set forth by the project plan.
* Design and manufacturing costs 100% within the available budget
* Inspection and test to ensure manufacturing and assembly of GB system units are in compliance with NCBJ Design approved by ESS ERIC
* testing and other verification activities to ensure as-built GB products meet performance specification and requirements
* Delivery, on-site test and installation of GB systems at ESS ERIC according to the time schedule.

# Management Responsibilities within this Quality Plan

The Parties will establish the following organizational structure:

* General Coordinators
* Work-Unit Coordinators

The general coordination of work and the clarification of technical issues for the execution of Agreement (General Coordinators)

* For the Partner: Sławomir Wronka

The person nominated as Work-Unit coordinator according to 6.3 in the agreement [IKA] are:

* For the Partner (Work-Unit Coordinator): Karol Szymczyk

The following person of the Partner will take part in the provision of the works and services:

* Sławomir Wronka
* Karol Szymczyk
* Marcin Wojciechowski

# Documentation and Storage of Data

The documentation will be prepared according to agreed templates and coding. Inspection, Test and other verification Reports will collect data from manufacturing and assembly test and inspection, and from verification tests and other verification activities.

* All documentation and correspondence shall be in English
* All office documents shall be in MS Word and PDF format
* All mechanical models and drawings shall be editable and linked. Drawings shall be also provided in PDF

All documents shall be categorized as:

* Monthly reports - prepared every month
* Technical Reports
* Quality reports

# Control of Records within this Quality Plan

The Project history file will be printed and stored on recorded CD/DVD and archived in the NCBJ Institute archives. The documents will be retained for a minimum 10 years. Moreover, all documents will be stored on the CHESS.

| Table 1 <<Sample table title>> |
| --- |
| Record | Place for archive | Retention period |
| Preliminary Design Review deliverables and protocols | CHESS Archive of the NCBJ Institute: CD/DVD, printed version | Life of Facility10 years |
| Critical Design Review deliverables and protocols | CHESS Archive of the NCBJ Institute: CD/DVD, printed version | Life of Facility10 years |
| Verification reports of requirements and specification verification | CHESS Archive of the NCBJ Institute: CD/DVD, printed version | Life of Facility10 years |
| Quality reports of procurement, manufacture and assembly inspections and tests | CHESS Archive of the NCBJ Institute: CD/DVD, printed version | Life of Facility10 years |
| Radiation calculation | CHESS Archive of the NCBJ Institute: CD/DVD, printed version | Life of Facility10 years |
| Mechanical report | CHESS Archive of the NCBJ Institute: CD/DVD, printed version | Life of Facility10 years |

The preliminary version will be upgraded along the project progress.

# Resources

NCBJ shall provide resources for the management, performance of work, Quality and verification activities in the form and amount adequate for the effective execution of the Project.

NCBJ ensure that adequate resource in terms of time, people, facilities and equipment are provided to implement and maintain the Quality Plan and to meet regulatory and ESS ERIC requirements.

## Materials

All components needed for the construction and assembly of the proposed system are standard high-grade industrial products.

## Human resources

Manufacturing tasks will be performed by suitably qualified NCBJ personnel.

## Infrastructure and work environment

The NCBJ guarantees the availability Infrastructures and special equipment to verify, and maintain the quality.

# Requirements

The 2 GB will be designed:

* One in the A2T section, before the NSW
* One in the Dump Line section, in front of the Tuning Dump

The requirements for the gamma blockers are specified at:

* ESS-0067962 A2T.ID and DMPL.ID L3 Requirements
* ESS-0126537 A2T.ID L4 Requirements
* ESS-0126538 DmpL.ID L4 Requirements
* ESS-0126539 A2T.ID and DmpL.ID L4 interface requirements

# Customer Communication

The person nominated as the Work-Unit Coordinator and responsible for the communication with customer:

* Iñigo Alonso –Work-Unit Coordinator

The communication between the ESS ERIC and NCBJ is done by:

* Monthly reports-every month
* Skype meetings-every 2 weeks
* Communication in case of emergency

# Design and Development Process

Documentation will be upgraded along the project progress.

# Purchasing

Suppliers will be selected on the basis of their ability to satisfy contract requirements including quality conditions. Suppliers will be assessed and classified according to the status of the products, materials or services they provide.

Principle suppliers may be required to prepare and maintain documented quality plans consistent with the requirements of the supplier’s quality system to ensure that specified requirements are met.

Procurement documents will contain a clear description of the product ordered including as applicable:

* Designation of the product
* Product requirements
* Acceptance criteria, quality certifications and records
* Identification markings
* Arrangements for verification at the supplier’s premises.

Upon delivery:

* The number of elements received will be checked against the order.
* Necessary inspections and tests will be performed, resulting in the issuance of a certificate of conformity if compliant, or a non-conformity report if not.

Only products with the certificate of conformity will be accepted for further processing.

# Production and Service Provision

Adequate technical specifications will be the basis for the Call for Tender for GB components. All activities for production and testing will be performed according to verification plan document. The NCBJ shall provide specialized and equipped personnel to install the delivered GB systems components inside A2T tunnel, and Beam dump tunnel.

NCBJ personnel shall be responsible for:

* Transportation of the GB system
* Installation of the GB System components in the ESS tunnels
* Performing tests of the GB system
* Preparing a System Installation Test Report

Prior to the installation, NCBJ in collaboration with ESS ERIC shall prepare the Installation and Test Plan and a detailed Installation instruction that will contain a full sequence of the installation steps and performance test and other verification actions.

# Identification and Traceability

Each module will have its own and unique Identification Number.

# Customer Property

ESS will provide necessary components for FAT. The items will be carefully marked and sent back after this.

# Preservation of Product

Storage and Collecting GB system should take place in Clean Room. Transport requires protective packaging. The GB chambers should be filled with nitrogen-slight overpressure.

# Control of NonConforming Product

Non-conformities will be treated according to their gravity, from rework (e.g. not properly welded components) to rejection of the unit and replacement with a new one. Non-conformities will be notified in writing (English) to the manufacturer.

# Monitoring and Measurement

Besides the in-factory tests and calibrations, additional monitoring actions are possible like:

* Inspection of the factory during production;

Testing and inspection will be carried out by trained personnel. The results of all procurement, manufacturing and assembly tests and inspections will be documented in quality reports.

# Glossary

| Term | Definition |
| --- | --- |
| ESS (ERIC)  | European Spallation Source, a European Research Infrastructure Consortium |
| GB | Gamma Blocker |
| IKC | In-Kind Contribution |
| ISO | International Standard Organization |
| MPS | Machine Protection System |
| NCBJ | National Centre for Nuclear Research, Poland |
| PSS | Personnel Safety System |

# references

All references have been listed as input documents (Chapter 2).

# Document Revision history

| Revision | Reason for and description of change | Author | Date |
| --- | --- | --- | --- |
| 1 | First issue | Karol Szymczyk | 2017-07-20 |
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