

CHARGE DOCUMENT FOR THE ESS PERSONNEL SAFETY SYSTEMS PRELIMINARY DESIGN REVIEW



Preliminary Design Review (PDR)
30 November- 2 December 2022, Lund, Sweden

Charge for the PDR

UNCONTROLLED COPY. ESS-4790216, Rev. 1, Released, 2022-11-23, Internal. 1 file, page (1/5)
<https://chess.esss.lu.se/enovia/link/ESS-4790216.1/21308.51166.9193.32831>

1. PURPOSE OF THIS PDR

The purpose of this PDR is:

- To review the conceptual design for ESS PSS, which includes Accelerator (ACC) PSS, Target Station (TS) PSS, Bunker PSS, DREAM PSS, and Nexus PSS as an interlinking system.
- To confirm that the requirements derived from the relevant hazard and risk assessments, initiating events, required safety functions, and safety integrity requirements are well understood, defined and documented.
- To confirm that preliminary design and concepts of operation for ESS PSS sufficiently cover derived requirements from the relevant hazard and risk assessments.
- To confirm that a system architecture for ESS PSS sufficiently cover required functions and interfaces.

2. SUPPORTING DOCUMENTATION

The expected outputs of conceptual and preliminary design, which should be presented and reviewed in this PDR, will be documented in the following documents:

General

- ESS Handbook for Engineering Management of Personnel Safety Systems (ESS-0469185)
- High Level Requirement Specification for Personnel Safety Systems (ESS-1789447)
- Architecture Specification for Personnel Safety Systems (ESS-3739363)
- Concepts of Operations for ESS Personnel Safety Systems (ESS-2595616)
- Electrical Design Guidelines for PSS and ODHDS (ESS-4077615)
- System Requirements Specification for Nexus Personnel Safety System (ESS-4758307)
- Accelerator, Target and Bunker PSS Key Exchange Requirements Specification (ESS-4787361)



- Preliminary SIL Assessment for ESS Personnel Safety Systems (ESS-4747690)
- Optional: Software Development Plan for Personnel Safety System (ESS-0330956)

ACC PSS

- Risk index for Accelerator (ESS-3878402)
- Concepts of Operations for the Accelerator Personnel Safety System (ESS-1999387)
- Interface Control Document for Personnel Safety System 1 and Ion Source (ESS-0064042)
- Interface Control Document for Accelerator PSS and RFQ and DTL (ESS-4755187)
- Interface Control Document for Personnel Safety System 1 and MEBT RF system (ESS-0076286)
- Interface Control Document for Accelerator PSS and Spokes RF systems (ESS-2767357)
- Interface Control Document for Accelerator PSS and Medium Beta Linac RF Systems (ESS-2767523)
- Interface Control Document for Accelerator PSS and High Beta Linac RF Systems (ESS-2767525)
- Interface Control Document for Accelerator PSS and Gamma Blockers (ESS-3231606)
- Interface Control Document for Accelerator PSS and Proton Beam Drift Room Isolation Valve (ESS-4075576)
- Interface Control Document for PSS and Dipole Bending Magnets Power Converter (ESS-4075580)
- Interface Control Document for Accelerator PSS and Electronic Personal Dosimeter (EPD) (ESS-4755449)
- Interface Control Document for Accelerator PSS and REMS (ESS-4246185)
- Interface Control Document for PSS and ESS Access Control Station (ESS-4787360)

TS PSS

- Risk assessment for Target PSS (ESS-4121077)
- Concepts of Operations for Target Station Personnel Safety System (ESS-4770860)

Bunker PSS

- Conventional and Radiological Hazard Analysis and Risk Assessment of NSS Bunker Area (ESS-3999144)
- Concepts of Operations for Bunker Personnel Safety System (ESS-4470664)
- ICD Light Shutter System - PSS (ESS-3249703)

DREAM PSS

- DREAM - Instrument Hazard Analysis (ESS-0454185)
- Concepts of Operations for DREAM Personnel Safety System (ESS-4790209)
- Instrument PSS Prototype Key Exchange System Requirements Specifications (ESS-4121252)
- Interface Control Document for DREAM Personnel Safety System (ESS-3223622)

3. PDR COMMITTEE AND OBSERVERS

The PDR committee consists of:

- Christian Hilbes (chair), ZHAW
- Kelly Mahoney, SNS
- Michael Dressel, DESY
- Tomasz Ladzinski, CERN
- Enrique Blanco, CERN
- Timo Korhonen, ICS, Chief Engineer
- Helen Boyer, Group Leader for Occupational Health & Safety Group
- Günter Muhrer, Group Leader for Target Physics Group

Observers:

- Morten Rostrup Forup Jensen, Group Leader for RF Sources Group
- Andreas Jansson, Group leader for Beam Physics, Operations & Beam Diagnostics Group
- Atefeh Sadeghzadeh, Control Engineer, Target Control Group
- Pascale Deen, NSS - Instrument Scientist-Cold Neutron Spectroscopy, Instrument Scientists Group
- Sylvain Desert, NSS - In-Kind Collaborator, Neutron instruments Division
- Dawid Patrzalek, EIS - Lead Mechanical Engineer, Mechanical Engineering & Technology Section
- Fredrik Tidholm, ES&H - Radiation Protection Engineer, Radiation Protection Group
- Ari Benderly, ES&H – Chief Information Security Officer, ESH&Q Directorate
- Johan Waldeck, ES&H - Group Leader Licensing Group
- Thomas Hansson, ES&H - Senior Radiation Safety Engineer
- Joanna Weng, ZHAW

4. COMMITTEE CHARGE

Due to the large list of supporting documentation, it will be provided to the committee in 2 sets: first set two weeks in advance, and second set at least 5 days in advance. The agenda and presentations will be available on the following Indico page:

<https://indico.esss.lu.se/event/3144/>

4.1. Agenda

Day 1: 2022-11-30 (Wednesday):

- 08:30: Committee discussion (closed)
- 09:00 Introduction
 - *Presented by: Morteza Mansouri*
- 09:15 PSS Ways of Working
 - *Presented by: Gustav Ljungquist and Denis Paulic*
- 10:10 Coffee break
- 10:30 ESS PSS Overview
 - *Presented by: Morteza Mansouri*
- 11:30 Lunch
- 12:30 ACC PSS Overview and Concepts of Operation

- *Presented by: Vincent August Harahap*
- 13:30 Target PSS Overview and Concepts of Operation
 - *Presented by: Afshin Farshidfar*
- 14:30 Coffee break
- 14:45 Bunker PSS Overview and Concepts of Operation
 - *Presented by: Yaser Takzare*
- 15:45 Q&A

Day 2: 2022-12-01 (Thursday):

- 08:30: Instrument PSS Overview and Concepts of Operations
 - *Presented by: Donya Daryadel*
- 10:00 Coffee break
- 10:15 SIL Assessment for ESS PSS SIFs
 - *Presented by: Fan Ye and Denis Paulic*
- 11:00 ESS PSS Architecture and Nexus PSS Overview
 - *Presented by: Artem Petrushenko and Anton Andersson*
- 12:00 Lunch
- 13:00 Software strategy for ESS PSS
 - *Presented by: Artem Petrushenko and Denis Paulic*
- 13:45 Electrical Design Strategy for ESS PSS
 - *Presented by: Anton Andersson*
- 14:30 Coffee break
- 14:45 Installation and commissioning plan¹
 - *Presented by: Morteza Mansouri*
- 15:30 Q&A

Day 3: 2022-12-02

- 08:15 Site visit: Committee and presenters
- 10:10 Coffee Break
- 10:25 Committee deliberations (closed)
- 13:00 Closeout

¹ Optional, if time allows.

4.2. Questions to the committee

The committee is asked to consider the following questions:

1. Are all or a sufficient coverage of requirements and specifications within the scope of this PDR documented and understood?
2. Are the overall safety functions derived from the risk assessments clear and acceptable?
3. Is the presented SIL assessment sufficient for this stage of systems design?
4. Are the identified Safety Instrumented Functions (SIFs) properly formulated, and fulfil the overall safety functions derived from risk assessments?
5. Are all operating concepts for ESS PSS (i.e., ACC PSS, TS PSS, Bunker PSS and DREAM PSS) and interfaces with other systems understood and properly documented?
6. Are the proposed conceptual designs for ACC PSS, TS PSS, Bunker PSS, DREAM PSS and Nexus PSS acceptable?
7. Are the operating concepts for DREAM PSS and overall concept for ESS PSS good enough to be used as a basis for the other Instrument PSS?
8. Are the presented bypass functions acceptable from facility safety and operations perspectives?
9. Is the system architecture for ESS PSS clear, designed in a scalable fashion and mature enough for this stage of the project?
10. Is data exchange between the Nexus PSS and other interlinked systems clear and acceptable?
11. Is the presented software strategy (e.g., planning, software structure, OPI screens, etc.) acceptable?
12. Is the strategy for electrical design reasonable and acceptable to proceed to detailed design phase?
13. Have the environmental conditions been sufficiently presented in order to select appropriate components in the detailed design phase?
14. Is the verification and validation sequence for ESS PSS well understood?
 - Note: Applicable if the installation & commissioning plan will be presented.
15. Are there any outstanding agreements to be made or other actions necessary to allow the PSS team to proceed with system design and preparation for the critical design review for each of the presented systems?

Note: a few specific questions will be asked in each presentation, and the review committee are requested to provide their comments on those in the PDR report.

The report may also provide findings, comments, and recommended actions. Actions should be clearly categorized as one of the following:

- Shall be addressed before PDR is considered closed
- Shall be addressed prior to the CDR