

## CHARGE DOCUMENT FOR THE ACCELERATOR ODH DETECTION SYSTEM CRITICAL DESIGN REVIEW

Critical Design Review (CDR)

15 September 2022, Lund, Sweden

Charge for the CDR

---

### 1. PURPOSE OF THIS CDR

The purpose of this CDR is:

- To confirm that all applicable recommendations from PDR have been properly addressed for the Accelerator Tunnel (ACC) ODH Detection System (ODHDS);
- To confirm that all updates in high level requirements and technical description for ESS ODHDS are in-line with the ESS gas alarm strategy;
- To review ACC ODHDS electrical and mechanical design against the design specifications.
- To assess the system's software design as captured in the system requirements specification.
- To determine acceptability of system's design, performance, interfaces and preparation for installation and commissioning.
- To ensure that ACC ODHDS can proceed to manufacturing, installation, test and commissioning phase.

### 2. SUPPORTING DOCUMENTATION

The expected outputs of the updated high level requirements and technical description for ESS ODHDS, as well as the ACC ODHDS system requirements, architecture, detailed design, and interfaces, which should be presented and reviewed in this CDR, will be documented in the following documents:

- PDR report (ESS-3946542)
- High Level Requirement Specification for ODH Detection Systems (ESS-3236032)
- Technical Description of ESS ODH Detection Systems (ESS-3137044)
- ESS ODHDS System Architecture (ESS-3739365)
- The layout of ODH monitors sampling points for the accelerator tunnel (ESS-3836683)
- System Requirements Specification for Accelerator ODH Detection System (ESS-4182946)

Document Type	Agenda	Date	Sep 5, 2022
Document Number	ESS-4236011	State	Preliminary
Revision	1 (1)	Confidentiality Level	Internal

- Electrical Design Guidelines for PSS and ODHDS (ESS-4077615)
- Appendix for Electrical Design Guidelines for PSS and ODHDS (ESS-4226262)
- ACC Tunnel ODHDS Electrical Design Specification (ESS-4041812)
- ACC Tunnel ODHDS ePlan Electrical and Mechanical Drawing (ESS-4041290)
- ACC TUNNEL ODHDS EQUIPMENT LAYOUT =ESS.ACC.F05/+ESS (ESS-4096073) (as-built)
- ACC Tunnel ODHDS IO List (ESS-4041788)
- ACC Tunnel ODHDS Electrical Verification Report (ESS-4041790)
- ACC Tunnel ODHDS Label List (ESS-4041789)
- ACC Tunnel ODHDS cable pulling list (ESS-4096074)
- Interface Control Document for ODH detection System and Fire Alarm System (ESS-3211084)

### 3. CDR COMMITTEE AND OBSERVERS

The CDR committee consists of:

- Helen Boyer (chair), Group Leader for Occupational Health & Safety Group, ES&H
- John G Weisend II, Deputy ACCSYS Sub/Project Lead, Accelerator Division (AD)
- Timo Korhonen, Chief Engineer, ICS
- Philipp Arnold, Group Leader for Cryogenic Group, AD
- Rafael Silveira, Test Engineer for Machine Protection Systems, ICS
- Silvia Grau, CERN, Access & Alarms Group, EN/AA/AS
- Ralf Trant, CERN, Technology Department, TE-HDO
- Kelly Mahoney, SNS, Personnel Protection System Group Leader

Observers:

- Joanna Weng ZHAW, Switzerland
- Nicolas Broca, CERN, Switzerland

### 4. COMMITTEE CHARGE

The supporting documentation will be provided to the committee at least 1 week in advance. The agenda and presentations will be available on the following Indico page:

<https://indico.ess.lu.se/event/3092/>

#### 4.1. Agenda

2022-09-15 (Thursday):

- 08:30 Committee introduction (closed session)
- 08:40 Introduction, PDR follow-up, and ESS gas alarm strategy
  - *Presented by: Morteza Mansouri*
- 09:00 Updates on the High Level Requirements and Technical Description for ESS ODHDS
  - *Presented by: Donya Daryadel*
- 10:00 Coffee break
- 10:15 ACC ODHDS architecture, ODH monitors, sampling points and ODH alarms placement
  - *Presented by: Anton Andersson*
- 10:45 ACC ODHDS electrical and mechanical design

Document Type	Agenda	Date	Sep 5, 2022
Document Number	ESS-4236011	State	Preliminary
Revision	1 (1)	Confidentiality Level	Internal

- *Presented by: Anton Andersson*
- 11:30 Installation and commissioning plan/status for the ACC ODHDS
  - *Presented by: Donya Daryadel*
- 12:00 Lunch break
- 13:00 ODHDS activation matrix, software requirements, and SW design
  - *Presented by: Denis Paulic and Dmitrii Plotnikov*
- 14:00 ESS H2 detection system
  - *Presented by: Donya Daryadel and Morteza Mansouri*
- 14:45 Coffee break
- 14:55 Committee deliberations (closed)
- 16:00 Closeout

#### Optional: 2022-09-16 (Friday)

- 08:30 Site visit

#### 4.2. Questions to the committee

The committee is asked to consider the following questions:

1. Are the recommendations from PDR sufficiently addressed?
2. Are all or a sufficient coverage of requirements and specifications within the scope of this CDR documented and understood?
3. Have all interfaces with other systems (e.g. fire alarm system) been resolved?
4. Are the dates for readiness for the ACC ODH detection system consistent with the operation of the cryogenic systems in the Accelerator tunnel?
5. Does the electrical and mechanical design meet the requirements within the scope of this CDR?
6. Is the adopted approach on ODH monitors HFT and the impact of their maintenance on ODHDS appropriate?
7. Are the system requirements and activation matrix appropriate and complete to allow for software implementation?
8. Does the software design for the PLC, HMI and OPIs meet the requirements within the scope of this CDR?
9. Is the presented gas alarm strategy appropriate for the current needs of ESS, and adaptable to the potential future needs of the facility?
10. Do you have any recommendations with respect to the H2 risk assessment methodology and the presented options for realising the H2 Safety Interlock system?
11. Are there any outstanding agreements to be made or other actions necessary to allow the PSS team to transition to software implementation and hardware testing phase?

The report may also provide findings, comments, and recommended actions.

All actions should be clearly categorized as one of the following:

- Shall be addressed before CDR is considered closed
- Shall be addressed prior to the system verification
- Shall be addressed at some time during the project