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| PSS0 Validation and Handover |
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| Meeting Date | Location | |
| 2018-09-11 | ESS Construction Site, Building G01 (Accelerator tunnel) | |
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| Chairman | Secretary | |
| Annika Nordt | Morteza Mansouri | |
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| Attendees |  | |
| Roland Garoby (RG), Peter Jacobsson (PJ), Helen Boyer (HB), Henrik Carling (HK), Mats Lindroos (ML), Lali Tchelidze (LT), Annika Nordt (AN), Stuart Birch (SB), Denis Paulic (DP), Mattias Eriksson (ME), Alberto Toral Diez (ATZ), Dennis de Wit (DdW), Owen Buchan (OB), Øystein Midttun (OM), Saeed Haghtalab (SH), Simone Scolari (SC), Hector Novella (HN), Nour Akel (NA), Ida Bergström (IB), Marcelo Juni Ferreira (MJF), Morteza Mansouri (MM) |  | |
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| Absentees |  | |
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# Introduction

Upon successful completion of PSS0 (Personnel Safety System for **I**on **S**ou**rc**e and **L**ow **E**nergy **B**eam **T**ransport Test Stand) verifications tests, this meeting took place on 2018-09-11 in order to carry out a demonstration of PSS0 procedures and safety functions for ISrc and LEBT test stand stakeholders, and subsequently hand over PSS0 to Accelerator Division (AD) Operations section. The PSS0 verification tests can be found in ESS-0237899, ESS-0237906, ESS-0316777, and ESS-0316778.

The agenda of the meeting was as below:

* Brief description of “PSS0 Preliminary Safety Assessment Report” by ZHAW.
* Demonstration of PSS0 procedures and safety functions.
* Handover of PSS0 to AD Operations section (equipment handover form, PSS0 keys, PSS0 operation manual, etc.)

# Minutes and List of Actions

## **Brief description of “PSS0 Preliminary Safety Assessment Report” by ZHAW**

AN provided a brief description of the “PSS0 Preliminary Safety Assessment Report” (ESS-0401866). This report has been created by the independent and external team from ZHAW (Zurich University of Applied Sciences), and it summarizes the findings of a preliminary safety assessment that has been conducted for the PSS0.

The main topics from the report pointed out by AN during the meeting were as below:

* The PSS0 documentation was provided to ZHAW on 2018-08-14. The assessment effort was not scheduled beforehand, thus ZHAW could not review the full extent of the provided documents.
* The review of documents from the first IEC61508 lifecycle-phases led to a substantial amount of questions about the ESS interpretation of the IEC61508 lifecycle, especially with respect to the hazard and risk analysis activities. Those questions need to be clarified first, before a final safety assessment can be made.
* IEC61508 was used as a basis for the assessment of functional safety considerations. In addition, the EU Machinery Directive was used for the assessment of the consideration of “essential health and safety requirements” and IEC60204, harmonized under the Machinery Directive, was used for the assessment of electrical safety considerations.
* Findings and recommendations:
  + Pre-start recommendation(s):
    - ESS implements the proposed additional hardwired safeguards (point 8 of the table in ESS-0401866) to support PSS0, until verification and validation of PSS0 has been performed to meet the standards requirements. (*Implemented and successfully tested before PSS0 validation and handover on 2018-09-11*).
    - ESS approves an official risk matrix defining the risk acceptance criteria for conventional safety. This risk matrix shall then be used for the risk assessment of the ISrc and LEBT test stand (*implemented on 2018-08-29*).
    - ESS creates a complete ISrc and LEBT test stand hazard register and consequently performs a risk assessment to make sure that all risks have been properly addressed and adequately reduced. If certain risk reduction measures have not been identified to full extent yet or are not implemented yet, this shall be documented in a clear way and the ISrc and LEBT test stand team shall be notified and trained accordingly.
    - ESS limits all activities around the test stand to trained expert personnel only and actively verifies the validity of assumptions made in the hazard and risk analysis during this initial operation phase.
    - ESS limits this initial operation phase in time and moves to a regular test-stand operation only after compliance with all legal requirements has been fully demonstrated.
  + Post-start recommendation(s):
    - ESS reviews the ISrc and LEBT test stand risk assessment in detail to make sure that all risks have been properly addressed and adequately reduced, especially in case of emergency situations. (*This shall be finalised asap; work is on-going by ES&H*). Ensure that all potentially missing risk reduction measures are implemented in a timely manner.
    - There is not enough evidence showing that risks coming from 400V or 230V are adequately managed. Therefore, hazard analysis and risk assessment for “normal”-voltage related hazard sources shall be reviewed. (*Although it is a post-start recommendation, it shall be addressed asap; work is ongoing by ES&H*)
    - The hazard analysis and risk assessment shall be checked for completeness with respect to all operational phases of the test-stand (operation, maintenance …).
    - The hazard analysis and risk assessment shall be checked for completeness with respect to emergency situations and check if the risk mitigation measures are sufficient in such cases.
    - Clarify the use and the scope of the IEC61511 and IEC61508 standards for Personnel Safety System developments.

## **Demonstration of PSS0 procedures and safety functions**

SB briefly described the tests to be conducted during the PSS0 demonstration, and also pointed out that after PSS0 handover, ICS/PSS will not have any padlock on the circuit breaker upstream the High Voltage Power Supply (HV PS). This padlock is not part of PSS0, and is used to ensure safety of personnel conducting PSS0 verification tests.

MM provided a description of PSS0 hardware, procedures and safety functions. It was followed by the demonstration of PSS0 procedures as below:

* Procedures to move from “Access” mode to “HV ON” mode.
  + Search procedure in PSS0 controlled area was conducted.
  + The PSS0 permit for HV PS enabled.
  + The HV PS was ramped up to 75 kV DC through control system.
* Procedures to move from “HV ON” mode to “Access” mode.
  + The HV PS was ramped down from 75 kV DC to 0 V DC through control system.
  + The PSS0 permit for HV PS disabled.
  + Provided access to PSS0 controlled area.
* Test PSS0 reaction in case of intrusion into PSS0 controlled area.
  + Search procedure in PSS0 controlled area was conducted.
  + The PSS0 permit for HV PS enabled.
  + The HV PS was ramped up to 75 kV DC through control system.
  + SB simulated intrusion into PSS0 controlled area by shaking the access door. The PSS0 disables HV PS successfully.
* Test PSS0 reaction in case of pressing ISrc HV OFF button.
  + Since the PSS0 reaction is the same as the test mentioned above, it was agreed by participants not to conduct this test.

## **Handover of PSS0 to AD Operations section**

After successful demonstration of PSS0, the following were handed over to LT by AN:

* PSS0 Preliminary Safety Assessment report from ZHAW (ESS-0401866)
* PSS0 equipment handover and release (template: ESS-0372700)
* PSS0 operation manual (ESS-0367794)
* Hard copy of the PSS0 HMIs user account and password for operators.
* The keys as listed below:
  + Safety key (ID: 1514404) 🡪 this key is unique.
  + Access key (ID: 1321500) 🡪 this key is unique.
  + Override key 🡪 this key is unique.
  + Key for “Access key” box (As agreed with LT, one copy remains in the safe box of ICS/PSS)

ICS Protection Systems Group closed the meeting by expressing gratitude for all stakeholders’ constructive collaboration through the design, construction and commissioning of PSS0, and also thanked all who attended this meeting.