ESS
The European Spallation Source ERIC ESS

Active Cells Work Package
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www.europeanspallationsource.se
22 November 2016
Target Station and Instrument Hall overview
The ESS Target Station Layout

Isometric View

Transport hall
Active cells
Utilities block
Target monolith
Accelerator – Target interface
High bay

130 m
37 m
22 m
Moderator & reflector

- Tungsten slabs in 36 sectors
- Helium coolant
  - Mass flow 3 kg/s
  - Pressure 1.0 MPa
  - Inlet temperature 20 °C
  - Outlet temperature 220 °C
- Rotational speed 25.5 rpm
- Wheel diameter 2.5 m
- Shaft length > 6 m

- Cold moderators
  - Hydrogen at 20 K and 1.5 MPa (super-critical pressure)
  - Vessel in aluminium alloy
  - Expected lifetime in the order of one full power year
  - Vacuum jacket for insulation

**Tungsten cassettes**

- Inner reflector
  - Beryllium
  - Water cooled
- Outer reflector
  - Steel
  - Water cooled
- Cut-outs
  - for the view path to the beam extraction
  - For the target wheel
Monolith Handling

Cask operations

Top of monolith, wheel exposed
• **Process cell** – Introduction of radiated components from the high bay, processing of components and preparation for interim storage and shipment as well as refurbishment in specific cases.

• **Maintenance cell** – Maintenance of equipment and logistical hub for transfer inside the active cells.

• **Storage pits** – Intermediate storage of vessels awaiting off-site shipment.

• **Technical galleries** – Contains the remote handling interfaces for active cell operations, component storage, PIE activities, human logistics around the cells and air locks for entrance into the maintenance cells.

• **Transfer area** – For off-site shipment of casks, control and decontamination of shipment cask surfaces.

Size:
Height 15 m
Length 30 m
Width 12 m
Design Development

Component Transfer Hatch between the Process Cell and Cold side

- Hot Side:
  - Support frame
  - Compensation shielding
  - Shield door
  - Transfer tunnel

- Cold Side:
  - Active ventilation system
  - Support frame
  - Compensation shielding
  - Shield door
  - Glove box
  - Heat sealer on trolley
Design Development

Upper Intrabay Door between the Process Cell and Maintenance Cell
Design Development

Floor Valves between High bay and Process/Maintenance Cells
Waste Logistics
Hot Cell without Windows

Taking into account the moved HMI:
• Optimisation of motorised through wall MSM’s
• Requires control room operation
• Increased operational flexibility

• Operations will have to rely on cameras, sensors, GUI
• Digital Reality including camera/CAD/sensors/heat signal etc. overlays
• Light requirements significantly reduced
• Virtual Reality Mock-up possibilities

[Diagram showing range of manipulator arms]
Current status

Monolith Area

Active Cells Area