

The European Spallation Source ERIC – Active Cells Facility Construction and Design Update

Magnus Göhran¹, James Davies²

¹ European Spallation Source ERIC
P.O Box 176, SE – 221 00 Lund, Sweden

² UKAEA - RACE, Culham Science Centre, Abingdon,
OX14 3DB, United Kingdom

Corresponding author: Magnus Göhran <magnus.gohran@esss.se>

1. Introduction

The Active Cells Facility (ACF) at the European Spallation Source is currently being built in Lund, Sweden. The facility is built as a large hot cell with the purpose to protect workers from the hazardous environment resulting from processing of radioactive systems and components. The systems and components are originating from the ESS facility operation where neutrons are produced for science through a spallation process.

The ACF internal dimensions will be around 30 meters long, 12 meters wide and 15 meters in height. Within this volume there will be space for a process cell, a maintenance cell, an interim storage and airlocks for both workers and transports. The ACF static barrier structures is built with high density concrete of 1.3 meter thickness. On top of the inner parts of the facility, there will also be a control room, rack rooms and worker changing rooms. The technical galleries surrounding the ACF provides logistics and systems to be able to perform the tasks within the ACF.

Currently the civil construction of the ACF is about to be finished and the liner plates covering the interior surfaces of the cell will be fitted during the winter of 2019-2020. All system design, manufacturing and installations are performed as an in-kind contribution from UKAEA - RACE, Culham, United Kingdom within the framework of 17 European countries contributing to the construction of the ESS facility.

This extended abstract will report on the current status of the project, discuss system design solutions as well as specifically the solution to implement a stainless steel liner in the ceiling of the facility.

2. Construction Status

Since the first concrete commenced in 2017, the high density concrete structures of the ACF has steadily been erected and are now on the level of the ceiling. The final casting of the ACF structures will be done in June-July of 2019. The construction program will then allow for access inside the ACF for welding the stainless steel liner plates to the pre-cast in liner beams in October of 2019. The building will then be ready to allow system installation in August of 2020 where the first installations will be focused on the electrical infrastructure. In March of 2022, the ACF should be ready to an extent where radioactive components should be possible to be introduced in the cells.

The systems and layout of the cell is shown in Figure 1. All of the systems displayed are going to be delivered by UKAEA – RACE / Culham Science Center as an in-kind contribution to the ESS project. Many of the systems are currently in procurement or have contracts signed for detailed design, manufacturing and installation. This is true specifically for the large confinement systems (Floor Valves, Intrabay doors) as well as the in-cell crane and the primary remote handling system.

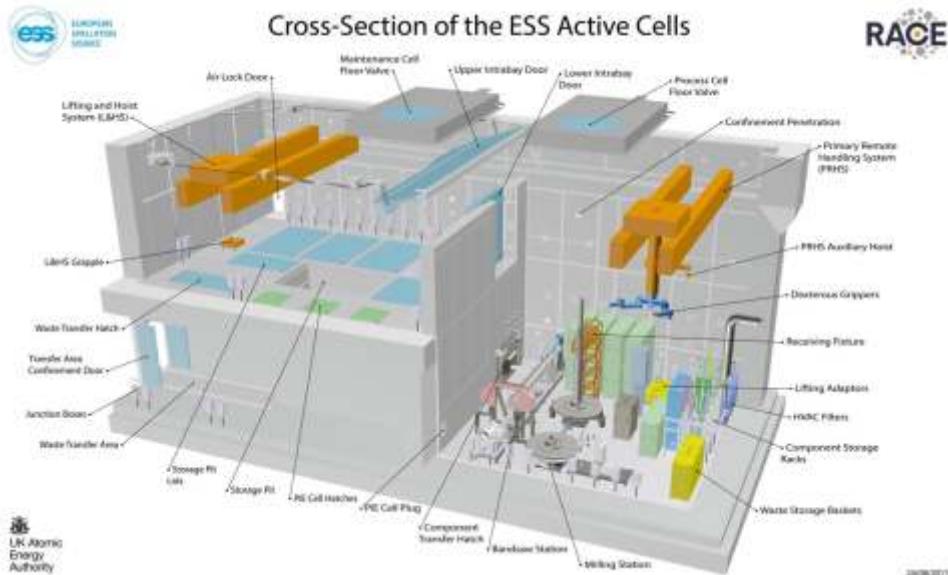


Figure 1 ACF system layout – Courtesy of UKAEA – RACE

3. Design detail on stainless steel liner in the ceiling

The whole interior of the ACF will be covered by stainless steel plates, this is also true for the ceiling. An issue identified early in the project was how these plates would be attached to the ceiling after casting where two main issues was identified. The height from the floor is about 15 meters and the fixtures and systems needed to hold the plates in place to be able to weld seemed to be a bit problematic. The second issue would be the cleaning of casted in liner beams from concrete (see reference [1]).

The solution implemented is to install both stainless steel plates and beams prior to casting. The plates are then spot-welded to the beams. The rebars are then resting on the liner beams to push the stainless steel structures against the form works. Figure 2 show installation of the ceiling liner structures. The large circular structure is the stainless steel clad aperture where irradiated components are introduced to the ACF trough the Floor Valve as depicted in Figure 1.



Figure 2 Ceiling liner beam and plate installation

References

1. Magnus Göhran, Lennart Åström, Paul Erterius, Eldin Mukovic, Srdjan Vareskic. (2018). The European Spallation Source Active Cells Facility – Challenges in Construction – Proceedings of the Hotlab 2018 Conference in Helsinki.