

ESS bilbao

CRITICAL DESIGN REVIEW FOR THE WELDS OF PORT TUBES ON MONOLITH VESSEL

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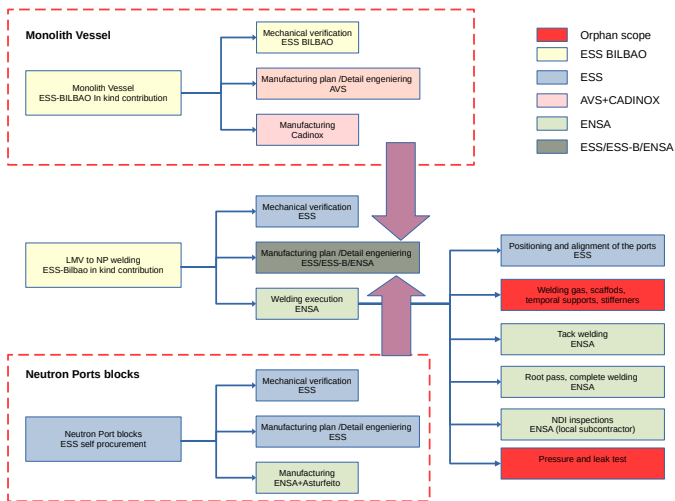


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Overall project plan

Project main actors



Overall project plan

ESS-Bilbao & ENSA contractual conditions (Expediente 288/19)

As in kind responsible of the welding process, ESS Bilbao award a contract with ENSA. The contact includes the “analysis phase” and the execution of the work. The analysis includes the following points:

- Definition of the welding process
- Selection and procurement of filled material
- Definition of the welding assembling and sequence
- Welding tolerances analysis to achieve the final tolerances
- Welding book: PQR, WPS, WPQR
- Backing gas system
- Non destructive inspections (NDI).
- **Representative mock up:** ENSA manufacture a muck up focused on accessibility, NDI and welders training and ESS manufacture a second one focused on deformations.

Overall project plan

Analysis phase: Feasibility study

The output of the initial analysis is the Feasibility study (ESS-2126711). The main modifications are produced between versions 1 and 2 after the review of the boundary conditions according to the neutron port and vessel support configuration.

- Rev.01: Included received comments. See 5EC8CDS0001 (2020/03/27)
- Rev.02: Included new boundary conditions. See ESS-3133587 (5EC8CDS0007) Included welding ESS Mock Up conclusions (5EC8INF001)
- Rev.03: Included received comments (5EC8CDS0009)

Main remarks

Based on this new boundary conditions and according to the lessons learned in the prototype, ENSA has updated his analysis.

Overall project plan

Feasibility study boundary conditions: Geometrical Boundary conditions

- Monolith vessel is not anchored to the ground. Translation of the vessel can be produced due to the forces involved in the welding process. This displacement will be limited by the contact with the support ring thus, in can not be larger than 15 mm.
- Monolith vessel is not a rigid component and deformations during welding could be produced.
- Port Tubes are not a rigid component and deformations during welding could be produced.
- Port Tubes are assembled on a rail system. This system prevents tangential displacement but allows radial one.
- NN-Bar is not a rigid component and deformations during welding could be produced.
- NN-Bar in constrained sideways by shim plates. This system prevents tangential displacement but allows radial one.
- NN-Bar NBEX adapter assembly will be in placed during the welding of the NN-Bar tube.
- The stp model “ESS-3147046 - Information for welding and Installation of PT and NN-Bar - 2021-02-16” describes the conditions of the area that have to be consider for the installation.

Overall project plan

Feasibility study boundary conditions: Conditions for protection gas

It is not needed to complete remove the protection gas system after the welding. Nevertheless, ENSA will design the system in order to remove as much as possible of them. All the materials that will remain enveled after the removed of the protection gas system must be approved by ESS based on activation and radiation damage resistance requirements.

Feasibility study boundary conditions: NDT requirements

According to ESS discussions with the Notified body, the following inspections are mandatory:

- RT inspections of welding to an extent as high as possible, but at least 10% of the welding distance.
- 100% visual inspection from inside the Port
- 100% PT from inside the port
- Visual inspection from outside where accessible

Overall project plan

Execution of the work:

ENSA contract includes the execution of the work. The process starts after the approval of the working plan:

- Qualification of welders according to the welding procedures
- ENSA will send a team to establish 3 simultaneous welding points.
- ENSA will order the filled material according to the specifications and provided the welding equipment.
- Gas protection system will be provided by ENSA
- NDI will be done by ENSA local subcontractors
- The task will be extended along 2 months.

Overall project plan

ENSA & ESS Bilbao contract



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5. Exclusiones

El alcance de esta Oferta No contempla:

Argon

- El suministro de los Gases de respaldo para la realización de las soldaduras

- Los andamiajes necesarios para la ubicación de los soldadores para realizar los trabajos.

Scaffolds

- Iluminación ambiental necesaria.
- Materiales base de los Ports Tubes y Monolith Vessel (Objeto de otros contratos)
- Instalación o ajuste de los Port Tubes y del Monolith Vessel.

- Prueba de Presión.
- Prueba de Fugas He.

Pressure and leak test

- Mediciones realizadas con láser, estación total y cualquier otra medida tridimensional.

Metrology

- Cualquier otro alcance no mencionado explícitamente en el alcance de esta Oferta.

Overall project plan

ESS & ESS Bilbao in kind agreement

Delivery to ESS and participation in installation and integration into the Target Station and cold commissioning

ESS Bilbao will deliver the Monolith Vessel and Covers & Penetrations and associated components, including the PBW Port Block, to the ESS site. Depending on the safest and most efficient mode of transport, final assembly and cold testing of the Monolith Vessel and Covers & Penetrations may take place at the Lund site.

The division of responsibilities and tasks for the installation of the Monolith Vessel (all components included) is the following:

- ESS-Bilbao will be responsible for placing and removing the welded elements designed for handling and alignment of every part of the Monolith Vessel.
- ESS ERIC is responsible for the installation and placement of each part of the Monolith Vessel including the PBW port block, in its final location, meeting the alignment requirements needed for the final welding.
- ESS-Bilbao will be responsible for the final welding of each of the pieces of the Monolith Vessel and the in-situ welding tests, including the Neutron beam port block welds.

Remark

The definition of the scope of work in the TIK is ambiguous. therefore additional discussions are needed.

Conclusions

Main remark

- Clear boundary conditions for the feasibility study has been provided to ENSA.
- There is orphan scope identified. Additional discussions between ESS and ESS-Bilbao are needed previous to the execution of the task.