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Specification of ESS Accelerator Cryoplant

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The European Spallation Source (ESS) is a neutron-scattering facility being built with extensive international collaboration at Lund, Sweden. The ESS accelerator will deliver protons with 5 MW of power to the target at 2.0 GeV, with a nominal current of 62.5 mA. The superconducting part of the accelerator is about 300 meters long and contains 43 cryomodules. The ESS accelerator cryoplant will provide the cooling for the cryomodules and the cryogenic distribution system that delivers the helium to the cryomodules. The cryoplant will cover three cryogenic circuits: bath cooling for the cavities at 2 K, the thermal shields at around 40-50 K and the power couplers thermalization with 4.5 K liquid helium.
This paper describes the cryogenic architecture and reference process solution of the cryoplant. The design basis including the staging, cooling capacity, operation modes, process constraints, availability and interfaces are given. The important design choices comprising one integrated cold box, optimized design parameters, spare part and process control system overview and strategy are presented. The milestones and the selection and award criteria also are presented.

Author: Dr WANG, xilong (European Spallation Source ESS AB)

Co-authors: Mr PISO, Daniel (European Spallation Source ESS AB); Dr WEISEND, J.G (SLAC); Mr ARNOLD, Philipp (European Spallation Source ESS AB); Mr HEES, Wolfgang (European Spallation Source ESS AB)

Presenter: Dr WANG, xilong (European Spallation Source ESS AB)

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