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C2Or2A-02: Performance of the 2K cryogenic refrigerators for SHINE

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The Shanghai High repetition rate XFEL and Extreme light (SHINE) facility is a free electron laser facility that is located at the Zhangjiang High-tech Park of Shanghai Pudong. The major facility is installed in the tunnels at the depth of ~29m underground and with a maximum length of 3.1 km. It is composed of five shafts, one accelerator tunnel and three parallel undulator tunnels and the downstream three beamline tunnels, with each undulator tunnel capable of accommodating two undulator lines. In its initial phase, the SHINE consists of an 8 GeV continuous wave (CW) superconducting radiofrequency (SCRF) linac, three undulator lines, three downstream FEL beamlines, and ten experimental end-stations.

AL-AT (Air Liquide Advanced Technologies) takes part in the project by supplying three cryogenic refrigeration systems located at different places of the tunnel. Each of the three plants has an equivalent power of 13kW at 4.5K. Each plant is composed of a four pressure level Warm Compression Station, a 4K cold box composed of four turbines and a liquid Nitrogen pre-cooling and a departed 2K cold box including the cold compressors. The available power at 2K is 4000W for each plant in addition to other loads such as Thermal Shield, Cold Shield, liquefaction. The performance test of the refrigeration system has been demonstrated and will be presented here.

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