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Characterisation facilities for evaluating superconducting thin films for SRF cavities

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Over recent years four dedicated facilities have been built at Daresbury Laboratory by a team working on thin film SRF cavities. Firstly, a conventional DC resistance facility allows measurements of critical temperature and residual resistance ratio. In addition, three other facilities were designed in house to address superconducting thin film (STF) characterisation specific to cavities. In a magnetic field penetration facility, a DC parallel magnetic field is applied locally from one side of the sample similar to the field within an RF cavity. The STF behaviour under RF conditions is tested with planar samples using a 7.8 GHz choke cavity with the main advantage of a quick turnaround. The final facility uses a novel idea of split single cell 6 GHz cavities. Such a cavity can be deposited with both planar and cylindrical magnetrons allowing for both deposition techniques to be tested in the same cavity. Also, the results can be compared to choke cavity measurements for planar samples. They can also be inspected easily both visually and with surface analysis instrumentation. All facilities are based on liquid helium free cryocoolers to simplify operation, safety and maintenance.

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Footnotes

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Yes

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