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## LHC commissioning reliability

Following 6 years of construction and testing starting in 2002, the LHC commissioning with beam started in the third quarter of 2008 and again in late 2009. On both occasions, first circulating beam was preceded by a major campaign of equipment tests. These included extensive powering tests of the 1620 superconducting electrical circuits during the LHC Hardware Commissioning. Prior to these tests the electrical quality assurance was performed for all circuits. Once the cryogenic system was ready and the magnet strings cooled to 1.9K, an extremely detailed program of more than 10.000 individual powering tests could start to check the integrity of Power Converters, Quench Protection System and the Powering Interlock System. Only once these tests are completed the magnet powering system is operational for injection of the first proton beams. In the following, a full machine checkout of all major accelerator systems was performed. These tests, extending over many months, proved to be essential and undoubtedly made a major contribution to the rapid and successful start to beam commissioning.

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