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Wed-Af-Po3.24-05 [99]: Manufacture and performance test of High Temperature Superconducting Coils for 3.5T Magnetic Separation

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With manufacturing process development of the high temperature superconducting (HTS) tape, the hundreds meters HTS tapes are applied in industry, especially beneficiation. It cannot effectively improve the work efficiency of the material purification and separation, but also solve the problem that some weak magnetic materials are difficult to separate due to the so high magnetic intensity and gradient. A 3.5T HTS magnetic separation facility was manufactured in China. This paper focuses on the manufacturing process and performance test of coils. The method of axial movement across the layer during winding first radial turn was adopted to reduce some mechanical deformation damage; the resistance value of new type coil connected joints was lower than $1\mu\Omega$ and it made the magnet assembly work convenient, reliable and efficient in the non-consideration of the location of coils leads; the degradation of coils critical current did hardly happen by the way of the specific solidified treatment before and after solidification. The installation and shakedown test of coils was carried out in the operation condition. As it turned out, the center magnetic field could reach 3.57T and the center axis uniformity of the magnetic field was more than 95% in the range of $\pm 100\text{mm}$ from the mid-plane. Meanwhile, it meant that the magnet manufacture technology was verified and could be applied on other similar magnet in future.

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