

## ATLAS Barrel Toroid



MAGNETS  
FOR FUSION



MAGNETS FOR HIGH  
ENERGY PHYSICS



MAGNETS FOR  
MEDICAL  
APPLICATIONS



SYSTEMS  
FOR ENERGY



SERVICES & REPAIRS

The ATLAS Barrel Toroid is part of one of the large detectors of LHC and consists in 8 coils, each made of two flat superconducting Double Pancakes in a racetrack configuration, assembled radially and symmetrically around the beam axis, for an energy storage of 1080 MJ. Each DP, overall dimensions 25 m x 5 m, is wound in two layers of 30+30 turns, with a NbTi cable inserted in an Al matrix having cross section 57 mm x 12 mm (nom. current 20500 A at 3.85 T and 4.5 K). After winding the pancakes were staked to form a coil and VPI impregnated in a tailor made impregnation vacuum case of the same size of the coils and built around the coil itself.

The heat necessary for the curing was generated by Joule effect by circulating a current through the windings.

Each DP's required flatness value within 1 mm, thus the geometry of each DP was measured using a laser tracker.

The results achieved in terms of geometric accuracy are reported in the table below:

The ATLAS detector magnet was commissioned in 2006, the coils showed no training whatsoever.

	Nominal [mm]	Measured [mm]	Spread
Inner Length	24149 +0/-14	24141	0.5 ‰
Inner Width	4170 +2/-10	4162	2 ‰
Thickness	384.5 +/-4.5	382.2	5 ‰
Height	118.1 +/-0.6	117.8	3 ‰



**DP winding line and DP translation to the impregnation mould**



**DP positioning (after insulation) on the impregnation mould**



**Impregnation mould during DP impregnation cycle**