

Influence of Inner Demagnetizing Field on Permeability of Iron Compacted Powder

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Abstract. Soft magnetic compacted powder materials represent a specific material class with remarkable application potential, exhibiting excellent magnetic properties as low core losses, high permeability and 3-D isotropic magnetic behavior. They are intensively studied by physicists, chemists and materials scientists with an effort for further improving the magnetic properties of these materials. However, the ferromagnetic particles surfaces of the porous structure of powder compacts are responsible for the arise of inner demagnetizing fields which negatively affect the magnetic permeability. The demagnetizing field reduces the value of the internal magnetic field in compacted material and causes the reduction of the permeability value of the compact. The article describes the calculation of the influence of inner demagnetization factor on the decrease of permeability of the compact in comparison with the permeability of the powder particles. The resulting calculation was verified on two different compacts prepared from iron powder, one of which having particles with surfaces smoothed by an innovative method that removes sharp edges of powder particles and contaminated layers.