Abstract: This work focuses on the study of flow and propagation of magma using rock magnetic analyses along sections across the thick Jurassic dyke of Foum-Zguid (Southern Morocco). Thermomagnetic data show that Ti-poor titanomagnetite is the main magnetic carrier. Petrographic analysis shows that the main Ti phase (ilmenite) occurs either as lamellae within spinel (center of the dyke) or as isolated grains (dyke margin). Bulk magnetic properties display distinct behavior according to the distance to the dyke margin; grain size of the main magnetic carrier decreases towards the center of the dyke, while the natural remanent magnetization and the bulk magnetic susceptibility increase. Only the magnetic susceptibility ellipsoid close to the dyke margin corresponds to that usually found in thin dykes, with the magnetic foliation sub parallel to dyke margins. Maximum principal axis is in most cases either parallel or perpendicular to the intersection between the planes of magnetic foliation and dyke wall. Moreover, when this axis is perpendicular to the intersection it is associated with a more oblate magnetic susceptibility ellipsoid shape, indicating the presence of complex magnetic fabrics. The studied magnetic properties show that, in this 100 m wide thick dyke, flow structures related with dyke propagation are only preserved close to the quickly cooled dyke margins. (C) 2004 Elsevier Ltd. All rights reserved.