

# Physico-Chemical Nanomaterials Science

## Innovative method of polyethylene welding under the effect of strong constant magnetic field

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Currently scientists both in Ukraine and abroad are looking for the ways of welded joints quality and operation properties improving.

Magnetic field effect is a promising method of welded joints structure and thermal properties improvement (for hot tool, ultrasonic welding etc.). This innovative approach – using constant magnetic field effect on the formation of the welded joints of thermoplastic polymers – enables to receive welded joints with better structure and thermal properties due to orientation and higher dense packing of welded joint's elements. Welding technology with magnetic field effect (using neodymium magnets) can be used for joining of thermoplastic parts, for example, small and medium diameters plastic pipes, plates and construction elements.

This document presents structure organization, thermal and operation properties of PE-80 and PE-100 welded joints received under constant magnetic field ( $B \sim 1$  T) effect, and without such effect.

Using WAXS method it is shown that transversal magnetic field effect on the PE melt during the welding process leads to formation of oriented welded joint structure, where the axis of orientation coincides with the direction of magnetic field effect. This gives higher thermal and operation characteristics of the welded joints. Formation of the welded joint under the effect of longitudinal magnetic field leads to degradation of thermal properties; this can be explained with counteraction of force field (applied during the welding) to the magnetic field effect.