

In this paper, the concepts of fracture mechanics are used to determine experimentally the work essential to fracture in high-density polyethylene (HDPE) pipes. The tests were carried out on DENT specimens taken from HDPE pipes intended for the distribution of water. The monotonic mechanical characteristics of this material for two strain rates 0.1 and 0.01 s⁻¹ show that the curves obtained are typical of semicrystalline polymers. Their shape shows that the fracture is ductile for this type of polymeric material with plasticization of the ligament. The evaluation of the toughness under plane stress conditions was carried out by this method. This method has been extensively performed in order to assess the performance of two parameters in fracture, i.e., essential work of fracture and nonessential work (βw_p) ones.