

Mechanical properties study in extruded HDPE-80 pipe wall used for natural gas distribution

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Abstract: Polymers represent a remarkable family of materials because of the variety of products that it is possible to design with and the different implementation processes offered. The use of these materials allowed to achieve substantial gains on associated costs, service times and repair. Despite the acceptance of polyethylene as an economical alternative for pipes networks, safety remains a fundamental issue, and it requires the ability to determine intrinsic properties as a function of the service conditions required by the design and the use. This study deals with the determination of the mechanical behaviour of an HDPE resin through the entire pipe wall thickness. Standard testing specimens have been manufactured under specific conditions in the longitudinal direction according to ISO-527. The mechanical properties are measured in traction using a computer-driven testing machine. The results indicate that there is a clear evolution of the mechanical properties through the pipe wall, which confirms the behaviour observed in other studies of polyethylene filaments tested under the same conditions. These variations are attributed to morphological gradients and the evolution of internal stresses imparted by the extrusion process.

Keywords : Mechanical characterization; polyethylene pipe; elastic modulus; extrusion; traction