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

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Abstract: Polymers represent a remarkable family of materials becauseof the variety of products that it is possible to design with and the different implementationprocesses offered. The use of these materials allowed to acheive substantial gains onassociated costs, service times and repair. Despite the acceptance of polyethylene as an economicalternative for pipes networks, safety remains a fundamental issue, and it requiresthe ability to determine intrinsic properties as a function of the service conditions requiredby the design and the use. This study deals with the determination of the mechanical behaviourof an HDPE resin through the entire pipe wall thickness. Standard testing specimenshave been manufactured under specific conditions in the longitudinal direction accordingto ISO-527. The mechanical properties are measured in traction using a computer-driventesting machine. The results indicate that there is a clear evolution of the mechanical propertiesthrough the pipe wall, which confirms the bahaviour observed in other studies ofpolyethylene filaments tested under the same conditions. These variations are attributed tomorphological gradients and the evolution of internal stresses imparted by the extrusionprocess.

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