Etude des déformations résiduelles dans les anneaux de tubes enpolyéthylène haute densité.

Afefe AZZI

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Abstract : Internal stresses generation within extruded pipe walls is a consequence of the manufacturing process thermo-mechanical. In order to study the evolution of these deformations caused by residual stresses in ring specimens were prepared in the laboratory from the pipe of High Density Polyethylene (HDPE) and sectioned along of generator. The obtained specimens were classified into two types according to the period of rest after machining. The experimental procedure consists in measuring the deformation over time according to the width of the specimen. It was observed that from the value 3.2 mm in width, the deformation remains constant. This corresponds to the state of plane strain. Strain-time curves show a typical creep behavior of viscoelastic materials partially crystalline was mathematically modeled with acceptable tendency coefficient.Standard test specimens were machined in specific conditions according to ISO-527 in both longitudinal and transverse directions. The mechanical properties are measured in tensile tests on an enslaved piloted machine by computer. The results indicate that there is a clear evolution of the mechanical properties, which confirms the behavior observed in studies on polyethylene specimens tested under the same conditions. The technology for the preparation of polyethylene pipes for the transport of natural gas, based on the method of extrusion from a material flow to reach the melting temperature. Cooling pipes is generally by conveying water showers so convective heat and this generates a large internal stress state which redistribute the outer surface to the inner necessarily causing gradients in different properties.

Keywords : Extruded pipe, polyethelene (HDPE), residual deformation, creep behavior, residual stress