Volume 23, Issue 6, 2017, Pages 820-825

## **Reliability Index of HDPE Pipe Based on Fracture Toughness**

## L. Alimi, S. Azzouz, K. Chaoui, A. AMIRAT

**Abstract:** his work presents a contribution to evaluate the reliability of a high density polyethylene (HDPE) pipe using the PHIMECA Software. The critical stress intensity factor (KIC) is adopted as a criterion to the maximum limit of a numerically calculated KI. The reliability index ? is obtained using failure probability and a mechanical model. It is found that at lower KIC, no safe domain for actual service pressures existed while for moderate and higher values of KIC (above 3.5 MPa.?m); the ? design index is reached and even exceeded. In terms of increasing crack length, ? decreased systematically for all toughness cases supporting the idea that reliability and fracture toughness designate similar properties for service life or material resistance to cracking. For a KIC=5 MPa.?m, the pipe is considered safe when crack length is below 370?m. Finally, it is shown that SDR basis is a reasonable and conservative design approach for plastic pipes.

Keywords : HDPE pipe, critical stress intensity factor, crack length, SDR, reliability index, PHIMECA software