KUNSTSTOFF TECHNIK LEOBEN

MATERIALS SCIENCE AND TESTING OF POLYMERS
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The CRB test

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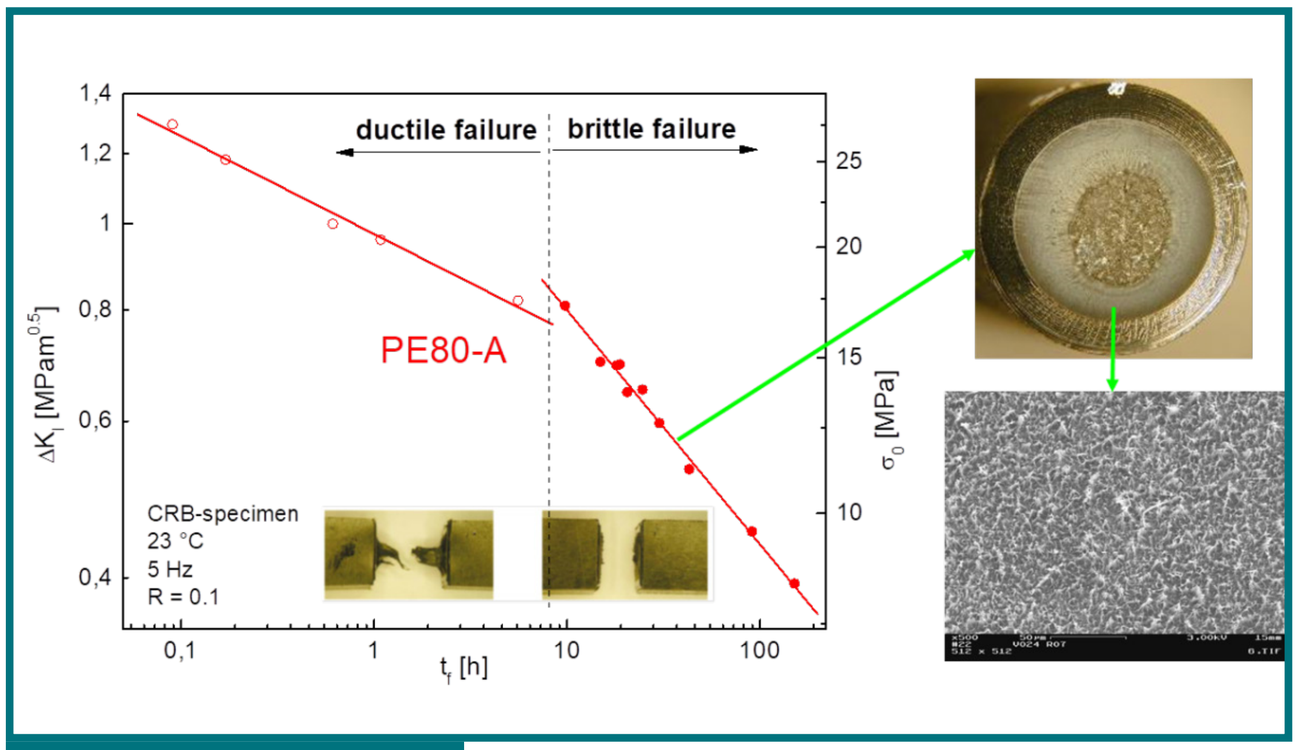
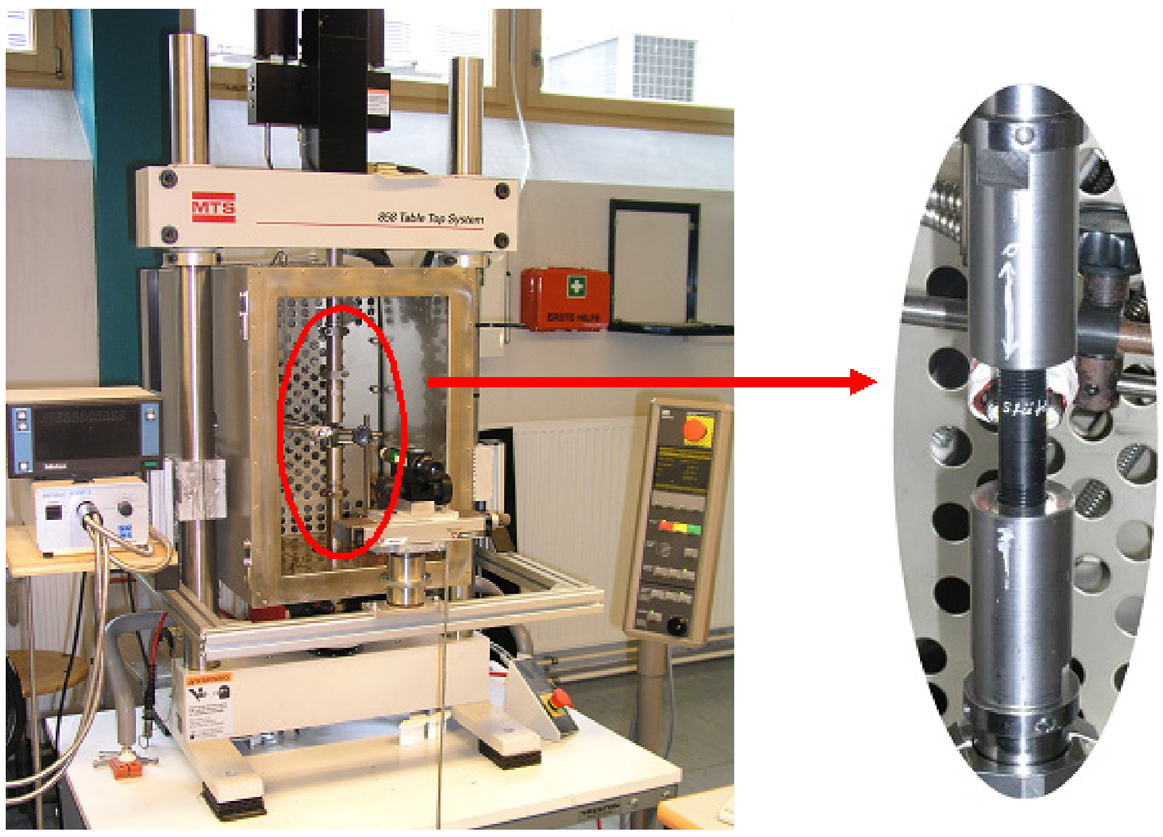
Long-term behaviour of Thermoplastics pipes

Several tests methods are available for the characterization of the slow crack growth (SCG) resistance of polyethylene (PE) for pipe applications. Unfortunately, due to the increase of the SCG resistance of modern PE pipe grades, these test methods are exceeding practical time frames so that new test methods for accelerated and reliable material ranking are required. Therefore, over the last years the Cyclic Cracked Round Bar (CRB) Test has been developed as a promising test method for a quick material ranking of PE pipe grades by their SCG resistance even at ambient temperatures and was successfully transformed to an ISO Standard (ISO 18489).



Typical failure behaviour in a Cyclic CRB Test

Test setup of the Cyclic CRB Test



Based on linear elastic fracture mechanics principles the driving parameter for SCG is the stress intensity factor K_I. In the cyclic CRB test bars with a circumferential notch are loaded at different K_I levels and the cyclic fatigue loading is responsible for a major accelerating effect. Different studies have confirmed that the same failure mechanisms are occur in cyclic tests as well as in static tests. Furthermore, these studies show that results of fatigue tests are in good accordance with internal pipe pressure tests for the purpose of material ranking and lifetime assessment.

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