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Fracture Assessment of Through-Wall and Surface Cracked Pipes by BS7910 and API 579 Assessment Procedures: A Comparative Study

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Fracture assessment procedures such as BS 7910 and API 579 are formulated based on the Fracture Mechanics concept for assessing integrity of structures such as pipelines, pressure vessels, etc. In the current study those procedures are applied to through-wall and surface cracked pipe geometry under four-point bending. The predicted maximum tolerable applied loads are then compared with pipe full-scale fracture testing results published by Miura et al (2002). Other assessment schemes namely, GE/EPRI, Net-section plastic collapse, LBB.NRC and finally LBB.ENG2, as reported in the same publication are also included in the current paper for sake of comparison. The comparative study showed that BS 7910 and API 579 predict similar maximum tolerable load for through-wall pipes but different value for surface-cracked pipes. Difference in predictions for the latter geometry is owing to the use of different stress intensity factor/reference stress solution by BS 7910 than API 579. However, both procedures provided conservative results compared with the experimental data as well as other engineering routes mentioned in Miura et al (2002).