

RAPID CRACK PROPAGATION (RCP) TESTING

Designing Out RCP Assuring Integrity & Safety



Rapid crack propagation (RCP) resistance of polyethylene (PE) and other non-metallic pipes is a critical qualification requirement in the design of pipes for use in sustained pressure applications.

The RCP failure mode is initiated at pre-existing defects, or consequently induced defect when a pressurised pipeline is subjected to sudden mechanical shock such as a high velocity impact from excavation equipment, or a pipeline pressure pulse. Once initiated, ruptures can travel at high speed ($100 - 300\text{ms}^{-1}$) along the length of the pipe. Hence, the criticality of designing out this failure mode.

New applications calling for the use of PE pipes at colder temperatures, higher pressures, larger diameters and future hydrogen use strengthen the importance of understanding the RCP performance.

At DNV's Spadeadam Research and Development facility we are proud to continue to offer our clients the Full-Scale Test in accordance with ISO 13478 which can simulate real world RCP failure.

Our Full-Scale test facility is considered to be the ultimate reference for assessing RCP performance evidencing that the RCP will not occur providing the necessary assurance that the pipe will arrest the failure mode.

This facility is critical for both qualification of commercial pipe product in accordance with various standards and support of materials development programmes for new innovative pipe systems.



Benefits of Testing and Qualification

RCP is not the result of inferior PE or pipe quality, rather a combination of intrinsic material characteristics, impact or damage, pipe size and SDR, temperature and the pressure induced stress in the pipe wall.

DNV advocates full-scale RCP testing of all non-metallic pipeline systems to determine the RCP critical pressure and or critical temperature level and to evidence whether the failure mode poses a threat for the intended application.

DNV believe that with robust verification and certification testing in accordance with the ISO 13478 provides total confidence that the RCP failure mode can be resisted giving the necessary assurance in the integrity and safety of the pipeline asset in the event of third party intervention, damage or poor installation.



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