

Success Story

COMET



FFG



PCCL

Polymer Competence Center Leoben GmbH

Programme: COMET – Competence Centres for Excellent Technologies

Programme line: K1-Centres

COMET subproject, duration and type of project: Fracture mechanics life-time assessment of pressurized polyethylene gas and water systems under application relevant installing conditions , 01/2014 - 12/2016, multi-firm

The Cyclic CRB Test as new international standard

Within the research project about polyethylene pipes, a new test method has been developed at PCCL which allows significant time acceleration in material characterization. During the past years this method has been noticed by industry relevant standardization committees and has recently been published as new ISO standard.



New challenges in material characterization

Polyethylene (PE) belongs to frequently used and most reliable materials for pressurized pipe systems in gas and water distribution. Ongoing research and development of the raw material supplier over the past decades led to continuously improved material behavior. In this context the modern material generation is

characterized by an extraordinary resistance against slow crack growth – the most important material property to reach design lifetimes of 100 years and even longer. However, also new challenges for material testing were generated in order to characterize the new PE types within technical and economical reasonable time frames (less than one year).

Within the research projects at PCCL focusing on fracture mechanics lifetime prediction of PE piping systems, the Cyclic Cracked Round Bar (CRB) Test has been developed which allows a time reduction down to only a couple of days. Beside the significant test acceleration a further advantage compared to traditionally used test methods is, that the material characterization is conducted at ambient temperature and without any stress crack inducing liquid.

International notice of PCCL research activities

Based on several publications in relevant journals as well as on presentations on the world leading plastic pipes conferences, the new test method became well recognized and highly appreciated by the piping industry. Furthermore, invitations to cooperate in national and international standardization committees were received in order to standardize the new test procedure. After several years of support by the responsible PCCL research group, during which also two international round robin tests were successfully organized, finally the ISO 18489 has been published in September 2015 which now provides a worldwide standardized test procedure for the Cyclic CRB Test. For the commendable support and cooperation during the standardization process, PCCL has recently been awarded with the

“Living Standards Award 2016” by the Austrian Standards Institute (ASI).



Fig. 1: The Cyclic CRB Test (PCCL)

Impact and effects

The standardization of the Cyclic CRB Test opens new possibilities in material and product development and classification. In Austria ISO 18489 has already been implemented as alternative option for product standards of gas and sewage pipes. Currently, similar considerations in further national and international requirements are under preparation. The enormous reduction of testing time from more than one year down to 5 to 10 days as well as a significantly improved information output about lifetime relevant material parameters offer not only operative, resource optimized and economic advantages, but also establishes new options for further focused development of new PE pipe grades.

Further information on COMET – Competence Centers for Excellent Technologies: www.ffg.at/comet

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