

Kiwa Technology Fast Tests for Slow Cracks



About Kiwa

Kiwa is one of the world's leading testing, inspection and certification organizations with its roots in water and gas distribution. As a result Kiwa has an extensive array of testing & research facilities, specifically designed for plastics and pipes. Kiwa's services are internationally reputed and we cooperate with a variety of clients such as: resin manufacturers, pipe manufacturers, grid operators, contractors and universities.

**Trust
Quality
Progress**

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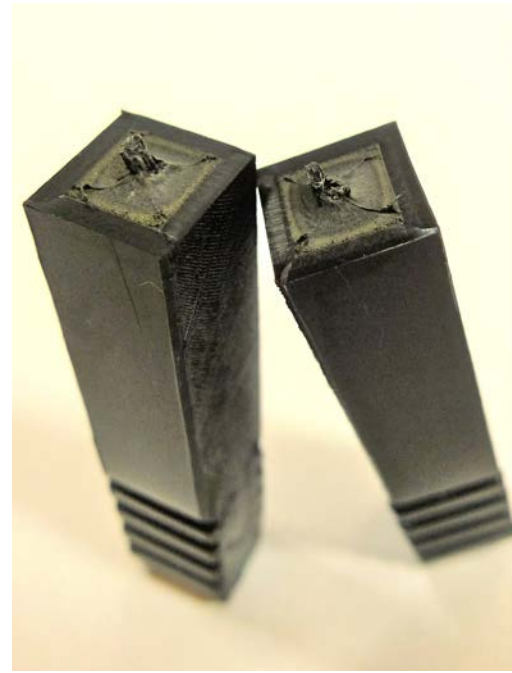
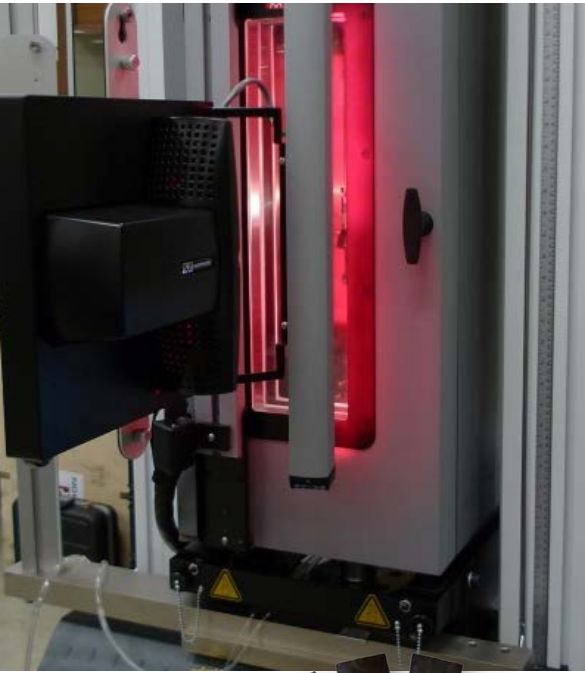
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Fast Tests for Slow Cracks

The resistance to slow crack growth (SCG) is a critical polyethylene (PE) material property, especially for PE used in pressure pipes. As a result several test methods have been developed over time, both for resin and pipes. Kiwa Technology is a world-leading expert in this field and has a well-equipped laboratory and many experts to accurately, reliable and quickly test this property, even for the best-performing grades available such as PE100RC. Here you can find a short overview of our possibilities. Of course adjustments of the presented test methods by using other test parameters or other materials (PA, PEX, PB, etc.) is also possible. So please don't hesitate to contact us if you have any questions.



Strain Hardening Test (SHT)

The SHT in accordance with ISO 18488 is a relatively new, but excellent way to obtain a very fast impression of the SCG resistance of your material. This simple tensile test performed at 80°C has become in just a few years the new standard for Batch Release Testing (BRT). And not without reason. You'll need only a very small amount of material, the results are very reliable with a very low inter-laboratory scatter and the results are available within a few days, regardless of the PE grade. The SHT is usually performed on resin material but it can also be performed on samples taken directly from pipes or sheets. As accredited lab, Kiwa Technology is happy to discuss the possibilities with you, whether it is for BRT, benchmarking, quality control of your (high performing) PE grade or for R&D validation.

Cyclic Cracked Round Bar test (CRB)

The CRB test in accordance with ISO 18489 is also a new test, performed at actual use temperature instead of the increased temperature many other test methods rely on to accelerate the SCG. By dynamically loading a notched cylinder the resistance against fatigue corresponds perfectly with SCG, without the need of detergents. Test bars can be machined from compression moulded plaques from granulate or directly from the pipe wall. CRB results are commonly available within several days, with a slight difference in testing time per grade. This test will give you much more information about the SCG resistance of your material than the intrinsic property obtained by the SHT alone. It is therefore an indispensable addition in the characterization of your PE grade.

Full Notch Creep Test (FNCT)

The FNCT is in accordance with ISO 16770 is one of the most commonly used slow crack growth tests. The test is performed on a notched specimen that is subjected to a detergent solution whilst under a static tensile load at elevated temperature. By selecting the right stress level, temperature and detergent, failures can be obtained in a reasonable amount of time, depending on the quality of your PE grade. Kiwa Technology has a lot of experience with this test and is able to use many different detergents, such as Arkopal N100 and N110, Dehyton, Teepol, Disponil, etc.

Pennsylvania Notch Test (PENT)

The PENT in accordance with ISO 16241 (ASTM F1473) is also a well-established method to determine the SCG resistance of PE. In this case no detergent is used, but air, a notch and an elevated temperature are used to keep the testing times within reasonable limits. Kiwa Technology uses this test on a daily basis to test first generation PE from the Dutch gas distribution grids and it can easily be adjusted for other grades or even other polymers.

Cone test

The cone test in accordance with ISO 13480 is specifically used for smaller diameter pipes, where the all previous mentioned tests will no longer be possible unless you regranulate the pipe, thus losing all the pipe properties. The cone test uses an oversized cone that is placed in a notched pipe. The velocity of crack growth is then a measure of the pipes resistance to SCG. Also in this tests the choice of detergent and temperature is essential to obtain results in reasonable time for the highest performing grades.

Experimental methods

Kiwa Technology is always looking for new and better ways to test the resistance of PE to SCG on a fast, reliable and functional manner. One example is the Point Load Test (PLT), which is developed together with other international partners (ISO/PWI 22102). In this test a pipe is stressed hydrostatically, while a detergent is circulated inside the pipe and a point load presses on the outside of the pipe. Kiwa Technology also participates in other researches to find the optimal test conditions by adjusting conventional methods (e.g. the Notch Pipe Test) or by developing completely new test methods.

Information

For more information or to discuss your ideas or challenges, please contact us by phone or email to: technology@kiwa.nl

