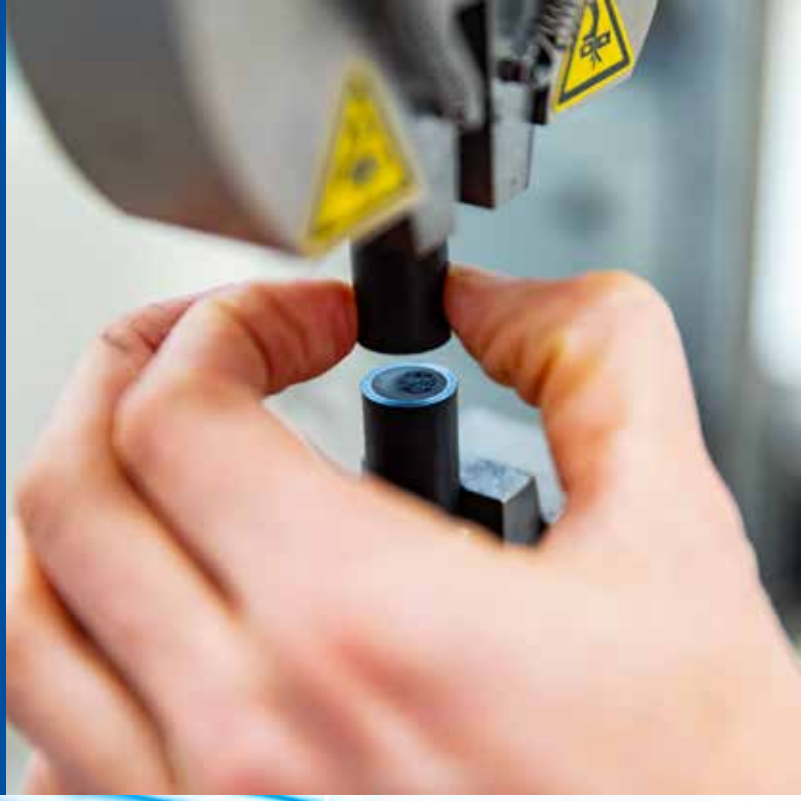
Fast Tests for ***Slow Cracks***



kiwa

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 PE 100-RC. 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 an 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 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.

kiwa

Accelerated Full Notch Creep Test (aFNCT)

The FNCT is 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 levels, temperature and detergent, failures can be obtained in a reasonable amount of time, depending on the quality of your PE grade. Whilst the FNCT is mostly done at 50°C or 80°C in Arkopal N100 or N110, the accelerated version for PE 100-RC grades is performed at a temperature of 90°C in Dehyton. Failure times are typically shorter than 800 hours.

Accelerated Notch Pipe Test (aNPT)

Testing of complete pipes is invaluable next to all the tests on small specimens from the resins. The aNPT is a new test, based on the normal NPT where a pipe is notched on four sides and tested hydrostatically. It is currently being standardized in ISO 13479. The test simulates a scratch in the pipe and the failure time indicates the resistance of the pipe to further crack growth. In the accelerated version an external detergent solution (Arkopal N100) in contact with the notches instead of water is used. Kiwa Technology developed special containers to reduce the amount of detergent needed for the test. Much attention is given to the circulation, to ensure a homogenize mixture of the detergent solution. The minimum required failure time for PE 100-RC is 300 hours.

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 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.

Point Load Test

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. This simulates an object in the ground that stresses the pipe over a long time. In this case the pipes resistance to crack initiation and crack growth is tested.

Why Kiwa

- Independent analysis & high quality results
- Internationally acknowledged experts
- Prominent seats in various standardization committees
- Physical, chemical & mechanical tests
- Flexible & fast whilst accurate
- Metals, plastics, composites, etc.

Kiwa Technology
Kiwa Expert B.V.
Wilmersdorf 50
P.O. Box 137
7300 AC Apeldoorn
+31 (0)88 998 3521
technology@kiwa.com

www.kiwatechnology.com

kiwa