THE CREEP MASTER CURVE CONSTRUCTION FOR THE POLYAMIDE 6 BY THE STEPPED ISOSTRESS METHOD

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Abstract:

The creep test allows the prediction of the viscoelastic materials tendency to deform under constant loading; however, this test requires a very long testing time. The application of the time-stress superposition principle (TSSP) provides the prediction of the material performance extensively beyond the creep test time. A new accelerated creep testing technic, called the stepped isostress method (SSM), was recently proposed. It requires specific processing method of the test data in order to construct the creep master curve. Initially this method was used on geosynthetics yarns. This paper focuses on the effectiveness of this method to predict the long term creep behavior of thick thermoplastic specimen made from polyamide 6. The different processing steps of the SSM technic are illustrated in this paper. A smooth master curve is constructed and the long term material performance is predicted over a very long period. It is found that, the creep master curve based on SSM technic agrees perfectly with that based on the classical TSSP method.

Keywords: Creep, master curve, Stepped isostress, superposition, viscoelastic, polyamide 6

Introduction:

The mechanical behavior of polymeric materials has a pronounced viscoelastic character even at room temperatures and under modest loading levels. The creep test is conducted to predict their tendency to deform under constant loading; however, this test requires a very long test time. The time-temperature superposition principle TTSP [1-3] and the time–stress superposition principle TSSP [4,5] provide the capability to predict the long-term material performance without a lengthy experimentation program. In the TSSP technic, a single specimen is subjected to a constant load at a certain temperature and a plot of