Correctly Predicting Creep

Tips and Hints on the Campus Material Database

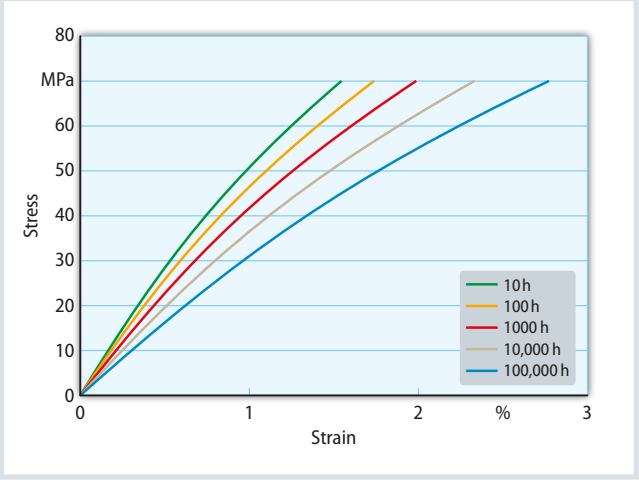

Fig. 1. Isochronous stress-strain diagram

Source: Campus; graphic: © Hanser

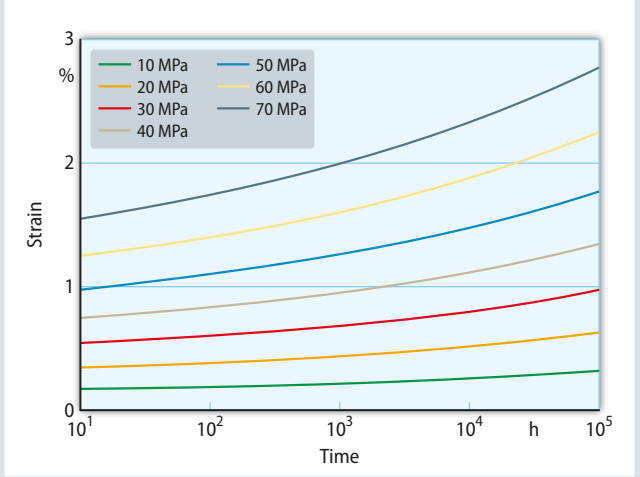

Fig. 2. The creep curve from the Material Data Center

Source: Campus; graphic: © Hanser

An important phenomenon that deserves attention in the use of plastics is the materials' viscoelasticity. It has the consequence that plastics first deform spontaneously under constant load and then continue to deform over time. Spontaneous deformation can be predicted using the modulus of elasticity (single point value acc. to ISO 527-1/-2 in Campus). The subsequent creep requires more complex material data. For this, Campus provides the customary representation in the isochronous stress-strain diagram. The original experimental data, i. e. curves for strain over time, which are in each case measured for different loads, are not presented in Campus. From these diagrams, the strains at constant time are picked off for all stresses, and then plotted as time-constant (isochronous) lines in a stress-strain diagram. The resulting curves are confusingly similar to the stress-strain diagram from the short-term test. In addition, Campus calculates the respective secant modulus for all curve points and then displays them as a creep modulus over time for different stresses. Both forms of presentation are used in design to calculate the creep of a material. It is important to note that both representations only apply at a single temperature. It is not possible to superimpose curves for different temperatures.

Representations as Strain over Time

Users who prefer the original form of representation of strain against time are referred to the Material Data Center database, where this can be found back-calculated from the isochronous curves. This is particularly interesting for determining parameters for creep models, which usually fit the creep curves and not the isochronous.

As with all mechanical data in Campus, it should also be taken into account here that the tests are measured on type A standard test specimens per ISO 3167. The standardization ensures that the data from different manufacturers are comparable; however they cannot be readily transferred to the properties in any arbitrary parts. A designer must adjust the information by making appropriate corrections and reductions.

The Campus material database has been a source of comparative material data for industry decision-makers for 30 years.

The *www.campusplastics.com* homepage offers online access to data from all the participating manufacturers. The portal also provides a comprehensive range of features. This series gives background information and focuses on specific useful system functions.