



THERMOPLASTIC PROPERTY DETERMINATION OF CREEP PROPERTIES FOR CAE ANALYSIS

WSS-M99D68-A3

1. SCOPE

This specification defines the requirements for measuring creep properties used in CAE simulation or equivalent modeling of automotive components made from thermoplastic production materials.

2. APPLICATION

This specification was released originally to communicate test methods and test parameters for creep property data collection to the thermoplastic material suppliers. The data can then be combined with other material property data to model automotive components made from the material.

3. REQUIREMENTS

3.1 APPROVED SOURCES

This specification does not use approved sources.

3.2 CONDITIONING AND TEST CONDITIONS

All test values are based on material conditioned for not less than 24 h prior to testing in a controlled environment of 23 +/- 2 °C and 50 +/- 5% relative humidity. Testing of the material should occur in the conditioning environment or soon after removal.

3.3 SAMPLE PREPARATION

Specimen A 150 minimum x 10 x 4.0 +/- 0.2 mm (ISO 527-2, Type 1A)

Test specimens must be milled (high speed milling) out of injection molded plaques with film gate injection on the short side. Plaque size should be approximately 250 mm x 150 mm x 2.5 mm (+/- 0.6 mm). Other dimensions are possible but must be discussed beforehand with the Ford Materials Engineering and/or Ford CAE experts. The specimens must not be taken from the edges or in the film gate area of the plaque to avoid skin effects of the injection molding process.

For fiber reinforced thermoplastics it is important that the plaques show a strong fiber orientation and fiber alignment in the extraction area. Other plaque dimensions and extraction areas must be mutually agreed upon by Ford Materials Engineering and Ford CAE. Injection molding simulations can be used to prove the suitability of other plaque geometries and extraction areas.

3.3.1 Number of Test Specimens

The number of samples will be determined by Ford Materials Engineering, Ford CAE, and the material supplier based on the number of optional conditions selected. Supplement A is to be used to communicate the number of optional test parameters included in the material testing. Laboratories capable of running the test methods are listed in the General Information section.

Date	Action	Revisions	Rev. 01
2018 07 19	Editorial	See Summary of Revisions	C. Lewis, NA
2018 07 02	Released		C. Lewis, NA





3.4 DETERMINATION OF CREEP BEHAVIOR

(ISO 899-1, Specimen A)

Required Test Specimen Orientation: 0°

As mutually agreed upon by Ford D&R Engineering, Functional CAE SME and Ford Materials Engineering: 45°, 90° or other orientations.

Required Stress Levels: 10%, 30%, and 60% of yield stress at each temperature.

Other Stress Levels allowed as mutually agreed upon by Ford D&R Engineering, Functional CAE SME and Ford Materials Engineering.

Required Temperature: 23 °C

As mutually agreed upon by Ford D&R Engineering, Functional CAE SME and Ford Materials Engineering: -30 °C, 65 °C, 90 °C and 110 °C or other temperatures.

Required Times: 250 hours, 1000 hours

Other times allowed as mutually agreed upon by Ford D&R Engineering, Functional CAE SME and Ford Materials Engineering.

Provide data creep plots (% Strain vs. Time in hours), individual data points at each stress level and Isochronous Stress-Strain Plot.

Table 1: Minimum Sample Size

Para.	Test	Minimum Lots	Specimens per Condition (minimum)	Total Test Specimens all Required Conditions (minimum)
3.4	Determination of Creep Behavior	1	2	12

4. GENERAL INFORMATION

This information given below is provided for clarification and assistance in meeting the requirements of this specification. Contact gmfs@ford.com for questions concerning Engineering Material Specifications. This specification is intended to compliment existing Ford Engineering Material Specifications for thermoplastics and the data collected and stored in the Ford Materials Database.

Test laboratories with known test capability. This list is only an extraction from a list of suitable test laboratories. Other test laboratories can be chosen as mutually agreed with Ford Materials Engineering and/or Ford CAE experts:

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