

Standard Method of Test for

PHYSICAL STATE OF CURE OF VULCANIZED RUBBER (T-50 TEST)¹



ASTM Designation: D 599 - 61

ADOPTED, 1955; REVISED, 1961.²

This Standard of the American Society for Testing Materials is issued under the fixed designation D 599; the final number indicates the year of original adoption as standard or, in the case of revision, the year of last revision.

Scope

1. This method of test, known as the "T-50 test," is designed as a means of determining the extent or physical state of cure of a rubber compound by measuring the temperature at which it recovers its elasticity when it is stretched at room temperature, frozen at a sufficiently low temperature to cause it to lose its elastic properties, and then gradually warmed. When the test is carried out under properly controlled conditions, the "T-50 value" shows a good correlation with combined sulfur in a stock of given composition, and a qualitative correlation with combined sulfur in stocks of varying compositions. Its advantages over a combined sulfur determination are its greater speed and simplicity, and its applicability in certain cases where sulfur determinations are difficult or impossible. Its use is limited primarily to natural rubber com-

pounds with a relatively high elongation at break (generally 300 per cent or over). It is mainly useful in controlling and checking uniformity of cure in production, and as a tool in experimental work where knowledge of the state of cure is important. It is not suitable for use in purchase specifications.

Nature of Test

2. A test specimen 1 to 2 in. in length and having a uniform cross-section, is immersed in a liquid bath at 20 C; stretched to an elongation of 75 per cent or more of the breaking elongation, and held for 5 min. It is then plunged into a bath of acetone at -50 to -70 C.; held until cool, and released. The rubber will show practically no elastic retraction. The temperature is then raised slowly and the sample is found to contract, taking a definite length at a given temperature. The temperature on the Centigrade scale at which the elongation of the sample becomes equal to one half the initial elongation is the "T-50 value."

¹ Under the standardization procedure of the Society, this method is under the jurisdiction of the A.S.T.M. Committee D-11 on Rubber and Rubber-Like Materials, and is the direct responsibility of Subcommittee XXV on Low Temperature Tests.

² Prior to adoption as standard, this method was published as tentative from 1940 to 1955.