U. S. Department of Commerce
Frederick B. Dent
Secretary

National Bureau of Standards
Richard W. Roberts, Director

National Bureau of Standards Certificate

Standard Reference Material 386h

Styrene Butadiene Rubber
Type 1500

Standard Reference Material 386h has the following characteristics when tested by procedures described in the appendix. The uncertainty limits for the values reflect both variation within the lot of rubber and error of test, and are based on a confidence coefficient of 95 percent.

Characteristics	Value (Conventional Units)	Value (SI Units)
Mooney Viscosity at 100 °C		
Rubber*	56.0 ± 1.0 ML1 + 4	
Compound	85.0 ± 1.0 ML1 + 4	
Viscometer Cure at 150 °C		
Incipient Cure, t_s	8.05 ± 0.15 minute	483 ± 9 seconds
Cure Index, Δt	2.75 ± 0.15 minute	165 ± 9 seconds
Stress at 300% Elongation		
Cure: 25 min at 145 °C	1585 ± 50 lb/in^2	10.9 ± 0.34 MPa
35 min at 145 °C	2500 ± 50 lb/in^2	17.2 ± 0.34 MPa
50 min at 145 °C	2955 ± 50 lb/in^2	20.4 ± 0.34 MPa
Stress at Failure		
Cure: 25 min at 145 °C	3760 ± 150 lb/in^2	25.9 ± 1.0 MPa
35 min at 145 °C	4280 ± 150 lb/in^2	29.5 ± 1.0 MPa
50 min at 145 °C	4280 ± 250 lb/in^2	29.5 ± 1.7 MPa
Elongation at Failure		
Cure: 25 min at 145 °C	570 ± 20%	
35 min at 145 °C	460 ± 20%	
50 min at 145 °C	405 ± 20%	
Strain at 2MN/m^2 (290 lb/in^2)		
25 min at 145 °C	112 ± 3%	
35 min at 145 °C	77 ± 1%	
50 min at 145 °C	65 ± 1%	
Oscillating Disk**		
Curemeter at 160 °C		
Minimum Torque	9.4 ± 0.1 lbf·in	1.06 ± 0.01 N·m
Maximum Torque	47.1 ± 0.2 lbf·in	5.32 ± 0.02 N·m
Incipient cure (1 unit rise)	4.0 ± 0.1 minute	240 ± 6 seconds
Cure Time (50%)	10.0 ± 0.2 minute	600 ± 12 seconds
Cure Time (90%)	16.7 ± 0.3 minute	1002 ± 18 seconds

* Mooney viscosity value reported here is the value obtained when rubber was produced. This value will increase with storage time. Therefore this material is not recommended for use in verifying Mooney Viscosity.

** ASTM D2084

This lot of rubber was evaluated in the National Bureau of Standards, Institute for Applied Technology, by George W. Bullman, Albert M. Brown and George E. Decker.

Washington, D. C. 20234
March 10, 1975

J. Paul Cali, Chief
Office of Standard Reference Materials

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APPENDIX TO CERTIFICATE FOR
STANDARD REFERENCE MATERIAL 386h

MATERIAL: Standard Reference Material 386h was selected from the central portion of a carefully prepared lot of SBR 1500. The latex was blended and dried and compressed into bales weighing approximately 34 kg. wrapped in polyethylene and packaged in multiwall paper bags.

TESTS: A portion was taken from every 25th bale as the lot was produced. Two determinations of Mooney viscosity were made on each portion according to the procedure described in ASTM Designation D 1646-68 using integral dies in the viscometer and mechanical closure.

PROCEDURE: Four compounds were mixed with each 75th bale according to the formulation and mixing procedure described in ASTM Designation D 3185-73 for Standard Formula 1A; the black was dried for one hour at 125 °C before weighing. The room conditions prevailing during mixing of the compound were 23 ° ± 1 °C and 35 ± 5 percent relative humidity. After mixing and before testing, the compound was stored in a desiccator containing calcium chloride. The Mooney viscosity of the compound and the viscometer cure characteristics were determined at 150 °C according to ASTM Designation D 1646-68. The cure index was selected as the time required to increase from 5 to 35 points above the minimum. The vulcanization characteristics were determined with an oscillating disk curemeter at 160 °C according to ASTM Designation D 2084.

The remaining compound was remilled, and vulcanized at 145 °C, as described in ASTM Designation D 3182-73 using a four-cavity mold machined directly in the hot plates of the press. After remilling and before curing, the compound was stored in a desiccator containing calcium chloride. The period of vulcanization was 25, 35, and 50 minutes.

The following NBS Standard Reference Materials were used to prepare the compounds: Zinc Oxide-370b, Sulfur-371f, Stearic Acid-372h, N-tertiary-butyl-2-benzothiazylsulfenamide-384b, and Oil Furnace Black-378a.

Stress 300 percent elongation, stress at failure, and elongation at failure were measured as described in ASTM Designation D 412-68 using Die C. Strain at 2MPa (290 lb/in^2) was measured as described in ASTM Designation D 1456-61.