

UNITED STATES DEPARTMENT OF COMMERCE
NATIONAL BUREAU OF STANDARDS
WASHINGTON 25, D. C.

National Bureau of Standards
Certificate

*Approved by 386f
10-10-69*

FOR
STANDARD SAMPLE 386f
STYRENE BUTADIENE RUBBER
TYPE 1500

Standard Sample 386f has the following characteristics when tested by procedures described in the appendix overleaf. 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%.

CHARACTERISTICS	UNITS	PROCEDURE I	PROCEDURE II
Mooney Viscosity at 100° C			
Rubber	ML1 + 4	51.8 ± 0.8	
Compound	ML1 + 4	62.3 ± 0.3	63.0 ± 0.3
Viscometer Cure			
Incipient Cure, t ₅	minute	12.45 ± 0.20	8.80 ± 0.20
Cure Index, Δt	minute	5.20 ± 0.15	3.35 ± 0.20
Rheometer Cure			
Incipient Cure, t ₂	minute	14.60 ± 0.15	10.10 ± 0.15
Cure A	in.-lb.	19.3 ± 0.5	17.7 ± 0.7
Cure B	in.-lb.	60.0 ± 2.0	66.3 ± 1.0
Stress at 300% Elongation			
Cure A	lb./in ²	465 ± 20	505 ± 30
Cure B	lb./in ²	1100 ± 35	1205 ± 30
Cure C	lb./in ²	1650 ± 65	1730 ± 30
Stress at Failure			
Cure A	lb./in ²	3220 ± 150	3220 ± 150
Cure B	lb./in ²	4450 ± 150	4450 ± 150
Cure C	lb./in ²	4210 ± 150	4200 ± 150
Elongation at Failure			
Cure A	%	895 ± 25	890 ± 15
Cure B	%	655 ± 25	640 ± 10
Cure C	%	525 ± 25	515 ± 10
Strain at 400 lb./in ²			
Cure A	%	319 ± 8	310 ± 12
Cure B	%	183 ± 2	172 ± 2
Cure C	%	139 ± 2	134 ± 1
Electrical Resistivity			
Cure C	megohm-cm	14 ± 2	9.5 ± 1.5

Note: See appendix overleaf for time and temperature of cure.

For the Director
By *Robert D. Stiehler*
Robert D. Stiehler, Chief
Evaluation Criteria Section
Materials Evaluation Laboratory

October 15, 1965

APPENDIX TO CERTIFICATE FOR STANDARD SAMPLE 386f

MATERIAL: Standard Sample 386f was selected from the central portion of a carefully prepared lot of SBR 1500. The latex was blended and coagulated on one finishing line. The coagulated rubber was thoroughly dried and compressed into bales weighing approximately 34 kg, and packaged in multiwall polyethylene lined paper bags.

TESTS: Procedure I - 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 1646-63 using integral dies in the viscometer and mechanical closure. Four compounds were mixed from each of 4 bales according to the formulation and mixing procedure described in ASTM Designation D 15-62T for Standard Formula 2B; the black was conditioned for about 26 hours at $23^{\circ} \pm 1^{\circ} \text{C}$ and $35 \pm 2\%$ relative humidity before weighing. The same conditions prevailed during mixing of the compound. 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 145°C according to ASTM Designation D 1646-63. The cure index was selected as the time required to increase from 5 to 35 points above the minimum. Rheometer cure was determined as described in Rubber Chem. and Technol. 36, 451 (1963). The time for the torque to increase two units above the minimum, and the torque at the times noted below for cures A and B were measured.

The remaining compound was remilled, and vulcanized at 145°C , as described in ASTM Designation D 15-62T using a four-cavity mold machined directly in the hot plates of the press. The period of vulcanization was 25, 50 and 100 minutes for cures A, B, and C, respectively. After remilling and before curing, the compound was stored in a desiccator containing calcium chloride.

Procedure II - Four compounds were mixed from each 75th bale in the manner described above for Procedure I except for the following changes: (1) the black was dried for one hour at $100^{\circ} \pm 2^{\circ} \text{C}$, (2) a temperature of 150°C was used for vulcanization and for determination of viscometer cure characteristics, and (3) the periods of vulcanization were 15, 30, and 60 minutes for cures A, B, and C, respectively.

The following NBS Standard Samples were used to prepare compounds by Procedures I and II: ZnO-370b, S-371e, Stearic acid-372e, Benzothiazyl disulfide-373e, and Channel black-375e.

Stress at 300% elongation, stress at failure, and elongation at failure were measured as described in ASTM Designation D 412-62T using Die C. Strain at 400 lb./in² was measured as described in ASTM Designation D 1456-61. Electrical resistivity was measured as described in Ind. Eng. Chem. 44, 159 (1952).