DEPARTMENT OF COMMERCE

CIRCULAR

OF THE

BUREAU OF STANDARDS

S. W. STRATTON, DIRECTOR

No. 115

RECOMMENDED SPECIFICATIONS FOR PNEUMATIC TIRES, SOLID TIRES, AND INNER TUBES

OCTOBER 27, 1921

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ABSTRACT

These specifications cover the requirements for pneumatic tires, solid tires, and inner tubes. Recommended by the Interdepartmental Committee on Specification Standardization June 8, 1921.

These specifications are a revision of those prepared by the Bureau and now used by the War Department, Navy Department, General Supply Committee, Post Office Department, Panama Canal, and Treasury Department.

The physical and chemical tests required are such that the material purchased under these specifications will be satisfactory. Thus not only are requirements placed on the materials entering into the manufacture of tires and tubes, but also on the finished articles.

A tentative draft of the specifications was submitted to a large number of representatives of the tire industry, including the Rubber Association of America, and in the revision careful consideration was given to their recommendations.

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PART 1.—PNEUMATIC TIRES

PART 2.—SOLID RUBBER TIRES

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Part 1.—PNEUMATIC TIRES

I. CARCASS

The carcass shall consist of superimposed layers of fabric or cord fabric applied on a bias.

1. MATERIAL.—(*a*) *Fabric.*—The fabric shall be standard cotton tire fabric, square woven, 23 ± 1 threads per inch warp and filling, staple not less than 1¼ inches long, as commercially determined.

(*b*) *Cord Fabric.*—This shall be a standard cotton cord tire fabric, staple, as commercially determined, to be not less than 1¼ inches

long, in sizes up to and including 5-inch tires, and not less than 1½ inches long in 6-inch tires and larger sizes.

2. Weight of Fabric.—Seventeen and one-fourth ounces per square yard, tolerance ±3 per cent based on a moisture content of 6 per cent.

3. Tensile Strength of Fabric.—Minimum 185 pounds per inch of width (23 threads) in both warp and filling directions, computed on a 6 per cent moisture regain basis if test is made on sample of unfrictioned fabric. Sample may be taken from tire, in which case no correction for moisture is made.

4. Strength Factor (for Cord Tires).—In the case of cord tires the strength factor is taken as the product of the number of cords per inch measured at the tread at right angles to the direction of the cords, multiplied by the number of plies, multiplied by the average tensile strength of the rubberized cords taken from the casing. The strength factor shall be in accordance with the requirements stated in Table 1, no correction being made for moisture.

TABLE 1.—Strength Factor for Cord-Fabric Tires

Size of tire in inches	Strength factor, minimum	Size of tire in inches	Strength factor, minimum
	Pounds		Pounds
3½	1800	6	3000
4	2000	7	3500
4½	2300	8	4000
5	2500		

5. Construction.—Fabric strips shall be cut on a 45° bias and lapped. Splices on the first ply shall be "gum stripped" and carefully rolled. Cord fabric shall be applied on a bias.

6. Number of Plies.—See Table 2.

TABLE 2.—Minimum Number of Plies Required

Size of tire in inches	Minimum number of plies		Size of tire in inches	Minimum number of plies	
	Fabric	Cord fabric		Fabric	Cord fabric
3	4	.....	5	7	6
3½	4	4	6	.....	8
4	5	6	7	.....	10
4½	6	6	8	.....	10

7. Friction (Adhesion Between Plies).—Minimum 15 pounds for fabric tires. Minimum 18 pounds for cord tires.

8. Thickness of Ply.—The average thickness of one ply of coated fabric, measured on the finished tire at the side wall, shall be: Fabric tires, at least 0.040 inch; cord tires, at least 0.045 inch.

9. Number of Laps.—Not more than two in any one ply.

10. Distance Between Laps.—Not less than 6 inches in any one ply and not less than 6 inches in the casing, measurements being taken in each case around the circumference of the casing.

II. FRICTION AND SKIM COAT COMPOUND

The stock for frictioning the fabric used in the carcass and for skim coating, in both cord and fabric tires, shall be made from and have the characteristics of a compound containing at least 85 per cent by volume of the best new wild or plantation rubber. No oil substitutes shall be used.

III. CUSHION

1. Material.—The cushion stock shall conform to the specification for friction compound given above.

2. Width.—Shall be not less than that of the breaker strip. See Table 4.

3. Thickness.—See Table 3.

TABLE 3.—Thickness of Cushion

Size of tire in inches	Minimum thickness[a]	Size of tire in inches	Minimum thickness[a]
	Inch		Inch
3	.....	5	0.05
3	0.02	6	.06
3½	.03	7	.07
4	.04	8	.09
4½	.04		

[a] Measured between outside of carcass and inside of breaker strip.

If more than one breaker strip is used, the distance between the outside breaker and the carcass is taken as the thickness of the cushion.

4. Friction.—1. Adhesion between cushion and breaker strip: Minimum 35 pounds for all sizes (fabric and cord fabric).

2. Adhesion between cushion and carcass: Minimum 20 pounds for all sizes (fabric and cord fabric).

IV. BREAKER STRIP

1. Material.—Cotton fabric, open weave, staple not less than 1⅛ inches long, as commercially determined, coated on both sides with rubber compound.

2. Width.—See Table 4.

3. Weight.—See Table 4

TABLE 4.—Width and Weight of Breaker Strip

Size of tire in inches	Width, minimum	Weight, minimum	Size of tire in inches	Width, minimum	Weight, minimum
	Inches	Oz./yd.²		Inches	Oz./yd.²
3	1¾	8	5	4	8
3½	2¼	8	6	5	[a] 15
4	3	8	7	6	[a] 15
4½	3½	8	8	7	[a] 15

[a] If more than one breaker strip is used, the fabric must weigh not less than 8 ounces per square yard.

4. Form.—Strips cut straight or on the bias for fabric tires. Must be on bias for cord tires. There shall be no gaps at the splices in the finished tire.

5. Number of Splices.—Not more than three in one breaker strip.

6. Distance Between Splices.—Not less than 6 inches measured around the tire.

V. TREAD

1. Material.—The tread shall be made from and have the characteristics of a compound containing at least 70 per cent by volume of the best quality new wild or plantation rubber. If reclaimed rubber is used, it shall be in addition to the required amount of new rubber.

The organic acetone extract shall not exceed 10.0 per cent, and the total sulphur 9 per cent of the weight of rubber as compounded, as determined by the analysis. No oil substitutes shall be used.

2. Form.—Rib or nonskid, as ordered.

3. Thickness.—See Table 5.

4. Tensile Strength.—Minimum 2400 pounds per square inch.

5. Ultimate Elongation.—Minimum 500 per cent (2 to 12 inches).

6. Set.—Maximum 25 per cent (stretch 400 per cent, 2 to 10 inches).

7. Friction.—Adhesion between tread and breaker strip, minimum 35 pounds.

TABLE 5.—Thickness of Tread

Size of tire in inches	Total thickness in center of casing, minimum	Thickness of tread exclusive of nonskid portion, minimum	Size of tire in inches	Total thickness in center of casing, minimum	Thickness of tread exclusive of nonskid portion, minimum
	Inch	Inch		Inch	Inch
3	0.30	0.11	5	0.46	0.16
3½	.34	.12	6	.53	.19
4	.38	.13	7	.62	.22
4½	.43	.15	8	.70	.25

VI. SIDE WALL

1. Material.—The side wall shall be made from and have the characteristics of a compound containing at least 65 per cent by volume of the best quality new wild or plantation rubber. If reclaimed rubber is used, it shall be in addition to the required amount of new rubber.

The organic acetone extract shall not exceed 11 per cent and the total sulphur 9 per cent of the weight of rubber as compounded, as determined by the analysis. No oil substitutes shall be used.

2. Thickness.—See Table 6.

TABLE 6.—Minimum Thickness of Side Wall

Size of tire in inches	Thickness	Size of tire in inches	Thickness
	Inch		Inch
3	0.04	5	0.06
3½	.05	6	.08
4	.06	7	.08
4½	.06	8	.10

3. Tensile Strength.—Minimum 1600 pounds per square inch for sizes up to and including 5-inch. Minimum 2000 pounds per square inch for 6-inch and larger sizes.

4. Ultimate Elongation.—Minimum 500 per cent (2 to 12 inches).

5. Set.—Maximum 25 per cent (stretch 400 per cent 2 to 10 inches).

6. Friction.—Adhesion between side wall and carcass, minimum 14 pounds for fabric tires and 18 pounds for cord tires.

VII. BEAD

1. Type.—Bead shall be of the clincher type for 30 by 3, 30 by 3½, and 31 by 4 inch tires, and of the straight side type for larger sizes.

2. MATERIAL.—The core shall be of hard rubber or a combination of rubber and cotton cord or fabric in clincher tires. For straight side tires the bead shall be reinforced with steel wires or cables.

3. CONSTRUCTION.—All beads shall be reinforced with chafing strips and reinforcing strips as specified in Table 7. Chafing and reinforcing strips shall be of square woven cotton duck weighing at least 8 ounces per square yard, extending not less than one-half inch above flange of rim and stepped not less than one-fourth inch apart. The strips in straight side fabric tires may be either reinforcing or chafing strips. Separate reinforcing strips may be omitted in 5-inch tires and small sizes if one or more plies of the fabric or cord fabric are carried around the bead and turned up into the side wall.

TABLE 7.—Number of Chafing and Reinforcing Strips

Kind of tire	Minimum number of strips	
	Chafing	Reinforcing
Cord, sizes 5 inches and smaller	1	2
Cord, sizes 6 inches and larger	2	2
Fabric, straight side	2	or 2
Fabric, clincher	1	.....

VIII. FLAP

1. MATERIAL.—Frictioned cotton fabric.

2. CONSTRUCTION.—Flaps of automobile tires shall be of the floating type with thin edges and skived ends or endless as specified. Plies of different widths shall be frictioned together, the flap being thickest at the center and tapering symmetrically toward the edges. Flaps shall be formed to a shape approximating the contour formed by the beads of the tire when mounted on its rim. The flaps of motor cycle tires shall be cemented inside of casing.

IX. FABRICATION OF TIRE

Each ply shall be frictioned on both sides with a skim coat on one or both sides, so as to provide a distinct layer of rubber compound between the plies. All plies, including breaker, shall be smoothly and evenly laid and after vulcanization shall be smooth and free from mold pinches, buckles, air pockets, or other imperfections.

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In cord tires the individual strands shall maintain their parallelism.

The cushion stock and breaker strip shall be laid evenly and symmetrically with respect to the center line of the carcass.

One or more breaker strips coated on both sides with a rubber compound shall be used between cushion and tread.

There shall be no lack of symmetry in the tire. Each ply of cord or fabric shall extend at least to the bottom of the bead core.

All casings shall receive on the inside a coating of soapstone, mica, or graphite.

The finished tire shall show no evidence of an incompletely filled mold. No filling patches or surface imperfections will be permitted.

X. TYPES AND SIZES OF TIRES AND RIMS

The tire sizes, except as noted, shall conform to the standards established by the tire division of the Rubber Association of America.

Tires shall fit rims made according to the Tire and Rim Association standards. See Table 8.

TABLE 8.—Standard Tire and Rim Sizes

Nominal tire and rim sizes		Oversize tire		Tire seat diameter (rim)		Type of rim
Inches	mm	Inches	mm	Inches	mm	
26 by 3	.....	27 by 3½	.....	20	.....	Clincher motor cycle
28 by 3	.....	29 by 3½	.....	22	.....	Do.
30 by 3[a]	75/610	.....	.....	24	610	Clincher
30 by 3½	90/585	31 by 4	105/585	23	585	Do.
32 by 3½	90/635	33 by 4	105/635	25	635	Straight side
32 by 4	105/610	33 by 4½	120/610	24	610	Do.
33 by 4	105/635	34 by 4½	120/635	25	635	Do.
32 by 4½	120/585	33 by 5	135/585	23	585	Do.
34 by 4½	120/635	35 by 5	135/635	25	635	Do.
34 by 5	135/610	.....	.....	24	610	Do.
36 by 6	150/610	.....	.....	24	610	Do.
38 by 7	175/610	.....	.....	24	610	Do.
40 by 8	200/610	.....	.....	24	610	Do.

[a] Not standard.

Inch Nomenclature.—In inch nomenclature, nominal tire diameter = tire seat diameter + twice the cross-section diameter. Sizes are designated by giving the outside diameter of tire and tire section diameter as (30 by 3½).

2. METRIC NOMENCLATURE.—In metric nomenclature, the nominal diameter = tire-seat diameter. Sizes are designated by giving the cross-section diameter and tire-seat diameter. When spoken the size is referred to as "90 for 585," but is branded as 90/585.

XI. CROSS-SECTIONAL DIAMETER OF INFLATED TIRE

Table 9 shows the minimum cross-sectional diameter of tires when inflated.

TABLE 9.—Cross-Sectional Diameter of Inflated Tire

Size of tire in inches	Inflation pressure		Minimum cross-sectional diameter	
	Fabric	Cord fabric	Fabric	Cord fabric
	Lbs./in.²	Lbs./in.²	Inches	Inches
3	45	.....	3.0	.....
3½	55	50	3.5	3.7
4	65	60	4.0	4.2
4½	75	70	4.5	4.7
5	85	80	5.0	5.5
6	.....	90	.....	6.3
7	.....	100	.....	7.4
8	.....	110	.....	8.4

XII. HYDRAULIC TEST PRESSURE

Tires shall withstand test pressures as follows: 300 lbs./ in.² for 3 and 3½ inches, 350 lbs./ in.² for larger sizes.

XIII. SAMPLING

On orders for 100 tires or less, the manufacturer may submit 1 tire for test and analysis, if so requested by the purchaser. On orders for more than 100 tires, the purchaser or his authorized representative shall select at random 1 tire from each 500 or fraction thereof, which shall be tested. If the tire fulfills all the requirements of the specification, the lot of tires represented by it will be accepted, including the tire on which tests have been made. Failing to conform to the specification, the lot of tires represented by it, including the tire on which tests have been made, will be rejected. If, however, the maker of the tires demands a further test, 3 more tires from the lot rejected will be selected by the inspector, and if all the tires are found satisfactory, the lot of tires represented by the tires subjected to test will be accepted, the manufacturer to bear the cost of the 4 tires upon which the tests

have been conducted. If any tire fails in the latter tests, the whole lot will be rejected.

In addition the following samples of fabric and rubber shall be submitted as representative of the materials used:

Untreated tire fabric or cord fabric	square yard	1
Vulcanized cushion stock	ounces	4
Vulcanized friction stock	do	4

XIV. MILEAGE

Under normal conditions of wear and stated S. A. E. loads, a mileage of 6000 for fabric tires and 8000 for cord tires will be expected when used on the rear wheels. Failure to meet the mileage in average performance will be sufficient cause for rejection of future bids.

XV. PHYSICAL AND CHEMICAL TEST METHODS

The purchaser reserves the right to make any inspection, test, or analysis necessary to insure that the product meets all requirements of the specifications.

All tests and analyses shall be conducted in accordance with the standard procedure of the Bureau of Standards, which will be furnished by the Bureau on request.

XVI. INTERPRETATION OF SPECIFICATIONS

Units, standards, and methods of measurement, unless otherwise prearranged, shall be in accordance with those accepted or recognized by the Bureau of Standards.

PART 2.—SOLID RUBBER TIRES

I. TYPE

Unless otherwise specified, tires shall be of the pressed-on type with channel base band conforming to the Tire and Rim Association standards adopted by the S. A. E.

II. DIMENSIONS

All dimensions and tolerances relating to metal or rubber parts shall conform to the latest recommendations of the Tire and Rim Association adopted by the S. A. E. for the size and type of tire specified. A full-size drawing showing the exact cross section of tire and base band shall be submitted with bid.

III. BASE BAND

1. MATERIAL.—Open-hearth steel which shall conform to the following chemical requirements:

TABLE 10.—Composition of Base Band

	Carbon	Manganese	Phosphorus	Sulphur
	Per cent	Per cent	Per cent	Per cent
Minimum	0.10	0.30	.....	.....
Maximum	.20	.60	0.045	0.050
Desired	.15	.45	.....	.....

2. WELD.—Base bands are to be electrically welded. They shall be truly circular and free from appreciable warp. To determine the effectiveness of the welding process used, pieces of base-band metal not less than 8 inches long shall be welded end to end, and three such samples pulled in a testing machine. The ultimate tensile strength of these specimens shall be not less than 45 000 lbs./in.^{2} of cross section.

In order to determine if the base bands are being properly welded in production, the inspector may from time to time require a weld on the finished steel base to be tested in the manner described above. The strength of the welds in production shall be not less than 45 000 lbs./in.^{2}

IV. HARD RUBBER BASE

The manufacturer shall guarantee that the hard rubber base will not separate from the base band or from the rubber tread stock in service when operated under standard Tire and Rim Association and S. A. E. ratings.

V. RUBBER TREAD STOCK

1. RUBBER COMPOUND.—The rubber compound shall contain not less than 65 per cent by volume of best new rubber. If reclaimed rubber or mineral rubber is used, it must be in addition to the 65 per cent of new rubber required. The use of "refined" or ground vulcanized rubber in the compound will not be permitted. Compound shall be free from saponifiable oils or anything made therefrom. The total sulphur must not exceed 8 per cent and the organic acetone extract 10 per cent of the weight of new rubber.

2. TESTS.—(1) Tensile strength: Minimum 2000 lbs./in.^{2} (2) Ultimate elongation: Minimum 450 per cent (2 to 11 inches). (3) Set: Maximum 40 per cent, two minutes after break.

3. REBOUND.—The rebound shall be not less than 50 as measured on a Whitney Rebound instrument. The tire under test shall be held at 70° F for a period of 24 hours before testing and the instrument shall be mounted rigidly in a vertical position. Tires shall be hung on a solid anvil below the instrument.

4. AREA OF CROSS SECTION.—The minimum cross section of tire, including tread stock and hard rubber base, shall be as follows:

Table 11.—Minimum Cross Section of Tire

Width of tire in inches	Minimum cross section	Width of tire in inches	Minimum cross section
	Inches^2		Inches^2
3½	6.75	8	19.75
4	7.75	10	25.75
5	10.75	12	31.75
6	13.75	14	37.75
7	16.75		

VI. SAMPLING

On orders for 200 tires or less, the manufacturer may submit 1 tire for test and analysis, if so requested by the purchaser. On orders for more than 200 tires, the purchaser or his authorized representative shall select at random 1 tire from each 1000 or fraction thereof, which shall be tested. If the tire fulfills all the requirements of the specification, the lot of tires represented by it will be accepted, including the tire on which tests have been made. Failing to conform to the specification in any particular, the lot of tires represented by it, including the tire on which tests have been made, will be rejected. If, however, the maker of the tires demands a further test, 3 more tires from the lot rejected will be selected by the inspector, and if all the tires are found satisfactory, the lot of tires represented by the tires subjected to test will be accepted, the manufacturer to bear the cost of the 4 tires upon which the tests have been conducted. If any tire fails in the latter tests, the whole lot will be rejected.

7. PHYSICAL AND CHEMICAL TEST METHODS.—The purchaser reserves the right to make any inspection, tests, or analyses necessary to insure that the product meets all the requirements of the specification.

All tests and analyses shall be conducted in accordance with the standard procedure of the Bureau of Standards, which will be furnished by the Bureau on request.

8. MILEAGE.—Under normal conditions of wear and stated S. A. E. loads, a mileage of 10 000 will be expected when used on the rear wheels. Failure to meet the mileage in average performance will be sufficient cause for rejection of future bids.

9. INTERPRETATION OF SPECIFICATIONS.—Units, standards, and methods of measurement, unless otherwise prearranged, shall be in accordance with those accepted or recognized by the Bureau of Standards.

Part 3.—INNER TUBES

I. STANDARD SPECIFICATIONS

The following specification refers to the materials used in the construction of inner tubes for pneumatic tires, and includes standards of measure, quality, and performance under stated conditions of laboratory tests.

1. MATERIAL.—Tubes shall contain no reclaimed rubber or oil substitute, and shall conform to the requirements given in Table 12.

Class A represents what are commonly known as pure gum tubes; class B, antimony tubes; and class C, compound tubes.

TABLE 12.—Analytical and Physical Requirements

Class	Rubber by volume, minimum	Organic acetone extract, maximum [a]	Total sulphur, maximum [a]	(Gypsum) $CaSO_4 2H_2O$ maximum	Tensile strength, minimum	Ultimate elongation, minimum	Set stretch 1 to 6 inches, maximum
	Per cent	Per cent	Per cent	Per cent	Lbs./in.^{2}	Per cent	Per cent
A	93	5.0	7.0	.....	1800	750	8
B[b]	85	5.0	7.0	7.0	2000	725	10
C[c]	80	5.0	7.0	.....	2500	600	15

[a] Based on the weight of rubber as compounded.
[b] This class of tubes shall be compounded only of rubber and antimony sulphide.
[c] This class of tubes to be furnished only in 6-inch and larger sizes.

2. TYPE.—Tubes shall be of the endless type, except motor cycle tubes which shall be butt end, lap end, or endless as ordered. Tubes of 6-inch diameter and larger sizes shall be cured to a ring shape.

3. POLE (INSIDE) DIAMETER.—See Table 13.

4. LENGTH.—The length of the tube is considered to be its finished length which in the case of a tube vulcanized to ring shape is its mean circumference. See Table 13.

5. THICKNESS.—Tubes shall be of uniform thickness, except at the lap and splice. See Table 13.

6. DIMENSIONS.—See Table 13.

TABLE 13.—Diameter, Length, Thickness, and Volume of Tubes

Nominal size in inches	Pole (inside) diameter, minimum	Thickness, minimum	Length		Volume of rubber, minimum
			Minimum	Maximum	
	Inches	Inch	Inches	Inches	Inches³
28 by 1½	1	0.035	79.0	81.0	~~3.2~~ 8.8
26 by 3	1⅞	.060	[a] 71.0	[a] 73.0	25.4
28 by 3	1⅞	.060	[a] 76.0	[a] 78.0	27.3
30 by 3	1⅞	.060	83.0	85.0	29.7
27 by 3½	2¼	.070	[a] 71.0	[a] 73.0	35.6
29 by 3½	2¼	.070	[a] 77.5	[a] 79.5	38.9
30 by 3½	2¼	.070	81.0	83.0	40.5
32 by 3½	2¼	.070	87.0	89.0	43.6
31 by 4	2½	.080	83.0	85.0	52.8
32 by 4	2½	.080	86.0	88.0	54.6
33 by 4	2½	.080	89.0	91.0	56.5
33 by 4½	2¾	.090	87.5	89.5	68.8
34 by 4½	2¾	.090	90.5	92.5	71.0
34 by 5	3¼	.105	88.0	90.0	95.0
35 by 5	3¼	.105	93.0	95.0	101.0
36 by 6	[b] 3¾	[b] .120	92.0	94.0	[c] 132.0
38 by 7	[b] 4⅜	[b] .140	97.0	99.0	[c] 188.0
40 by 8	[b] 5	[b] .160	100.0	102.0	[c] 254.0

[a] For butt end tubes add 8 inches to this figure.
[b] For tubes of class C, add 10 per cent to this figure.
[c] For tubes of class C, add 21 per cent to this figure.

7. SPLICE.—The splice shall be as strong as the body of the tube. The spliced ends shall be properly skived so as to avoid an abrupt or unnecessary increase in the thickness of the tube at the splice, which shall be made in a neat and thoroughly workmanlike manner. The splice shall not fail when longitudinal strips one-half inch in width are gripped one-half inch from the splice edge, on either side thereof and elongated to failure of the tube wall.

8. TENSILE STRENGTH.—See Table 12.

9. ULTIMATE ELONGATION.—See Table 12.

10. SET.—See Table 12.

11. VALVE.—Each tube shall be equipped with a complete Schrader or other air valve approved by the purchaser. Each valve shall be fitted with lock nut, rim nut, and valve cap. A spreader or bridge washer shall be furnished for all sizes up to and including 35 by 5 inches, according to the standard practice of the manufacturer supplying the tubes.

II. TECHNICAL TESTS

1. Inflation Test at Factory.—Each tube with valve attached shall be subjected to an air inflation test by the manufacturer to disclose any defects of materials or workmanship. No tube showing any leakage after being inflated with air shall be offered for sale under this specification.

2. Sampling.—On orders for 100 tubes or less, the manufacturer may submit 1 tube for test and analysis, if so requested by the purchaser. On orders for more than 100 tubes the purchaser or his authorized representative shall select at random 1 tube from each 1000 or fraction thereof, which shall be tested. If the tube fulfills all the requirements of the specification, the lot of tubes represented by it will be accepted, including the tube on which tests have been made. Failing to conform to the specification the lot of tubes represented by it, including the tube on which tests have been made, will be rejected. If, however, the maker of the tubes demands a further test, 3 more tubes from the lot rejected will be selected by the inspector and if all the tubes are found satisfactory, the lot of tubes represented by the tubes subjected to test will be accepted, the manufacturer to bear the cost of the 4 tubes upon which the tests have been conducted. If any tube fails in the latter tests, the whole lot will be rejected.

3. Inflation Test by Purchaser.—The tube shall be laid on a horizontal surface and inflated with air as indicated in Table 14. The tube shall expand uniformly at all points except at the splice, and shall show no leakage after 24 hours.

TABLE 14.—Diameters of Tubes When Inflated

Nominal tube diameter in inches	Diameter of inflated tube	Nominal tube diameter in inches	Diameter of inflated tube
	Inches		Inches
1½	1⅜	5	4¼
3	2⅜	6	4¾
3½	2¾	7	5¾
4	3¼	8	6½
4½	3½		

4. Physical and Chemical Tests of Rubber.—The purchaser reserves the right to make any inspection, tests, or analyses necessary to insure that the product meets the requirements of the specification.

All tests and analyses shall be made in accordance with the standard methods adopted by the Bureau of Standards, which will be furnished by the Bureau on request.

III. INTERPRETATION OF SPECIFICATIONS

Units, standards, and methods of measurement, unless otherwise prearranged, shall be in accordance with those accepted or recognized by the Bureau of Standards.