of the Estate Tax Regulations (26 CFR Part 20) and the Gift Tax Regulations (26 CFR Part 25) to provide new tables of actuarial values was published in the FEDERAL REGISTER (35 F.R. 18461). In order to conform certain cross-references in the Gift Tax Regulations to T.D. 7077, such regulations are amended to read as follows:

PARAGRAPH 1. Section 25.2511–1 is amended by revising subparagraphs (6) and (7) of paragraph (h) to read as follows:

§ 25.2511–1 Transfers in general.

* * * * * * *

(h) * * *

(6) If A is possessed of a vested remainder interest in property, subject to being divested only in the event he should fail to survive one or more individuals or the happening of some other event, an irrevocable assignment of all or any part of his interest would result in a transfer includible for Federal gift tax purposes. See especially paragraph (e) of § 25.2512–5 or paragraph (e) of § 25.2512–9, whichever is applicable, for the valuation of an interest of this type.

(7) If A, without retaining a power to revoke the trust or to change the beneficial interests therein, transfers property in trust whereby B is to receive the income for life and at his death the trust is to terminate and the corpus is to be returned to A, provided A survives, but if A predeceases B the corpus is to pass to C, A has made a gift equal to the total value of the property less the value of his retained interest. See paragraph (e) of § 25.2512–5 or paragraph (e) of § 25.2512–9, whichever is applicable, for the valuation of the donor's retained interest.

* * * * *

PAR. 2. Section 25.2515–2 is amended by revising paragraph (c) to read as follows:

§ 25.2515–2 Tenancies by the entirety; transfer treated as gifts; manner of election and valuation.

* * * * *

(c) Factors representing the respective interests of the spouses, under a tenancy by the entirety, at their attained ages at the time of the transaction may be found in, or readily computed with the use of, the tables contained in the actuarial pamphlet (including any supplement thereto) referred to in paragraph (e) of § 25.2512–5 (in the case of gifts made before January 1, 1971) or paragraph (e) of § 25.2512–9 (in the case of gifts made after December 31, 1970). State law may provide that the husband only is entitled to all of the income or other enjoyment of the real property held as tenants by the entirety, and the wife's interest consists only of the right of survivorship with no right of severance. In such a case, a special factor may be needed to determine the value of the interests of the respective spouses. See paragraph (e) of § 25.2512–5 or paragraph (e) of § 25.2512–9, whichever is appropriate, for the procedure for obtaining special factors from the Commissioner in cases requiring their use.

* * * * *

Because the amendments made by this Treasury decision make only those changes in the Gift Tax Regulations which are necessary to conform certain cross-references to the amendments made by Treasury Decision 7077, it is hereby found that it is unnecessary to issue this Treasury decision with notice and public procedure thereon under subsection (b) of section 553 of title 5 of the United States Code or subject to the effective date limitation of subsection (d) of that section.

(This Treasury decision is issued under the authority contained in section 7805 of the Internal Revenue Code of 1954 (68A Stat. 917; 26 U.S.C. 7805))

[SEAL] JOHNNIE M. WALTERS,
*Commissioner of Internal Revenue.*

Approved: November 26, 1971.

EDWIN S. COHEN,
*Assistant Secretary of the Treasury.*

[FR Doc.71–17582 Filed 12–1–71;8:47 am]

# Title 21—FOOD AND DRUGS

## Chapter I—Food and Drug Administration, Department of Health, Education, and Welfare

SUBCHAPTER B—FOOD AND FOOD PRODUCTS

## PART 121—FOOD ADDITIVES

### Subpart C—Food Additives Permitted in Feed and Drinking Water of Animals or for the Treatment of Food-Producing Animals

FORMETANATE HYDROCHLORIDE

A pesticide petition (PP 1F1141) was filed with the Environmental Protection Agency by Nor-Am Agricultural Products, Inc., 11710 Lake Avenue, Woodstock, IL 60098, in accordance with provisions of the Federal Food, Drug, and Cosmetic Act (21 U.S.C. 346a), proposing establishment of tolerances (21 CFR Part 420) for residues of the insecticide formetanate hydrochloride (*m*-[[(dimethylamino)methylene] amino]phenyl methylcarbamate hydrochloride) in or on the raw agricultural commodities grapefruit and tangerine at 4 parts per million.

The Reorganization Plan No. 3 of 1970, published in the FEDERAL REGISTER of October 6, 1970 (35 F.R. 15623), transferred (effective December 2, 1970) to the Administrator of the Environmental Protection Agency the functions vested in the Secretary of Health, Education, and Welfare for establishing tolerances for pesticide chemicals under sections 406, 408, and 409 of the Federal Food, Drug, and Cosmetic Act, as amended (21 U.S.C. 346, 346a, and 348).

Having evaluated the data in the pesticide petition and other relevant material, it is concluded that a tolerance should be established for the residues which occur in citrus molasses as a result of application of the insecticide to the growing citrus fruits.

Therefore, pursuant to provisions of the act (sec. 409(c)(1), (4), 72 Stat. 1786; 21 U.S.C. 348(c)(1), (4)), the authority transferred to the Administrator (35 F.R. 15623), and the authority delegated by the Administrator to the Deputy Assistant Administrator for Pesticides Programs of the Environmental Protection Agency (36 F.R. 9038), Part 121 is amended by adding the following new section to Subpart C:

§ 121.337 Formetanate hydrochloride.

A tolerance of 10 parts per million is established for residues of the insecticide formetanate hydrochloride (*m*-[[(dimethylamino)methylene] amino] phenyl methylcarbamate hydrochloride) in citrus molasses resulting from application of the insecticide to the growing raw agricultural commodities grapefruit, lemons, limes, oranges, and tangerines.

Any person who will be adversely affected by the foregoing order may at any time within 30 days after its date of publication in the FEDERAL REGISTER file with the Objections Clerk, Environmental Protection Agency, Room 3175, South Agriculture Building, 12th Street and Independence Avenue SW., Washington, D.C. 20460, written objections thereto in quintuplicate. Objections shall show wherein the person filing will be adversely affected by the order and specify with particularity the provisions of the order deemed objectionable and the grounds for the objections. If a hearing is requested, the objections must state the issues for the hearing. A hearing will be granted if the objections are supported by grounds legally sufficient to justify the relief sought. Objections may be accompanied by a memorandum or brief in support thereof.

*Effective date.* This order shall become effective on its date of publication in the FEDERAL REGISTER (12–2–71).

(Sec. 409(c)(1), (4), 72 Stat. 1786; 21 U.S.C. 348(c)(1), (4))

Dated: November 16, 1971.

WILLIAM M. UPHOLT,
*Deputy Assistant Administrator for Pesticides Programs.*

[FR Doc.71–17577 Filed 12–1–71;8:46 am]

# Title 17—COMMODITIES AND SECURITIES EXCHANGES

## Chapter II—Securities and Exchange Commission

[Release No. IC–6834]

## PART 270—GENERAL RULES AND REGULATIONS, INVESTMENT COMPANY ACT OF 1940

### Limitation of Frequency of Distributions of Capital Gains

On October 1, 1971, in Investment Company Act Release No. 6735, and in the FEDERAL REGISTER of October 7, 1971 (36 F.R. 19516), the Securities and Exchange Commission published notice that

it had under consideration the adoption of Rule 19b–1 (17 CFR 270.19b–1) under section 19(b) of the Investment Company Act of 1940 (Act) to limit the frequency of distributions of capital gains by registered investment companies. In that notice the Commission invited all interested persons to submit views and comments on the proposed rule. The Commission has considered the written comments received and has determined to adopt the proposed rule, with certain modifications, in the form set forth herein.

Section 19(b) was added to the Act by the Investment Company Amendments Act of 1970, Public Law 91–547 (84 Stat. 1422), and will become effective December 14, 1971. It reads as follows:

(b) It shall be unlawful in contravention of such rules, regulations, or orders as the Commission may prescribe as necessary or appropriate in the public interest or for the protection of investors for any registered investment company to distribute long-term capital gains, as defined in the Internal Revenue Code of 1954, more often than once every twelve months.

The Report of the Committee on Banking and Currency, U.S. Senate, 91st Congress, first session (S. Rept. No. 91–184, May 21, 1969), stated that the section would incorporate the views expressed in the Investment Company Institute's "Guide to Business Standards". The guide suggested that no member should make a distribution of realized capital gains to shareholders in a manner that would indicate that they are part of regular dividends from investment income and that distributions of capital gains other than at fiscal year ends, or soon thereafter, could have such an effect. The Committee report stated that section 19(b) would minimize any confusion on the part of investors which might arise from their failure to differentiate regular distributions of capital gains from distributions of investment income.

The Commission had previously recommended in its report to the Congress on the "Public Policy Implications of Investment Company Growth" (H. Rept. No. 2337, 89th Congress, second session, December 2, 1966, pages 194–195), that a limitation on capital gains distributions to not more than once a year be extended to all investment companies by an amendment to the Act. The Commission said that such a prohibition would relieve managers from pressure to realize such gains on a frequent and regular basis, mitigate improper sales practices related to the distribution of such gains, and eliminate the administrative expenses attending quarterly or semiannual capital gains distributions.

Paragraph (a) of Rule 19b–1, as adopted, limits a registered investment company, which is a "regulated investment company" as defined in the Internal Revenue Code (Code), to a single distribution with respect to the long-term capital gains realized by the company during any one taxable year, except for a supplemental distribution under section 855 of the Code which does not exceed 10 percent of the company's prior capital gains distribution. This limited exception in the rule to the requirement for a single distribution in a taxable year permits a regulated investment company to take advantage of the "spillover" provisions of the Code under which certain distributions made after the close of a taxable year are considered as made during such year. This enables such companies to distribute such realized gains so that they are not taxable to the company.

Paragraph (b) of Rule 19b–1 limits a registered investment company which is not a "regulated investment company" to one distribution of long-term capital gains in any one taxable year. As adopted, it includes a clarifying provision which permits a unit investment trust to distribute capital gain dividends received from a "regulated investment company" within a reasonable time after receipt.

Paragraph (c) has been included in Rule 19b–1 to provide a means by which a registered investment company may, in unforeseen circumstances, request timely authorization to make a distribution which would not otherwise be permitted by the rule. The Commission contemplates that relief would be granted under this provision to a "regulated investment company" only where the initial distribution with respect to a taxable year was made late in such year and the likelihood of a "spillover" distribution exceeding 10 percent of the initial distribution could not reasonably have been foreseen. It may be noted in this connection that under the Code a "regulated investment company" may avoid a "spillover" distribution by making a single distribution with respect to a taxable year after the close of such year.

The text of the Rule (17 CFR 270.-19b–1) as adopted by the Commission pursuant to the authority granted to it in sections 19(b) and 38(a) of the Act, is as follows:

Commission action:

I. Part 270 of Chapter II of Title 17 of the Code of Federal Regulations is amended by redesignating the present § 270.19–1 as § 270.19a–1.

II. Part 270 of Chapter II of Title 17 of the Code of Federal Regulations is amended by adding thereunder a new § 270.19b–1 reading as follows:

**§ 270.19b–1 Frequency of distribution of capital gains.**

(a) No registered investment company which is a "regulated investment company" as defined in section 851 of the Internal Revenue Code of 1954 (Code) shall distribute more than one capital gain dividend (distribution), as defined in section 852(b)(3)(C) of the Code, with respect to any 1 taxable year of the company, other than a distribution pursuant to section 855 of the Code which is supplemental to the prior distribution with respect to the same taxable year of the company and which does not exceed 10 percent of the amount of such prior distribution.

(b) No registered investment company which is not a "regulated investment company" as defined in section 851 of the Code shall make more than one distribution of long-term capital gains, as defined in the Code, in any one taxable year of the company; provided that a unit investment trust may distribute capital gain dividends received from a "regulated investment company" within a reasonable time after receipt.

(c) If a registered investment company because of unforeseen circumstances in a particular taxable year proposes to make a distribution which would be prohibited by the provisions of this section, it may file a request with the Commission for authorization to make such a distribution. Such request shall comply with the requirements of § 270.0–2 of this chapter and shall set forth the pertinent facts and explain the circumstances which the company believes justify such distribution. The request shall be deemed granted unless the Commission within 15 days after receipt thereof shall deny such request as not being necessary or appropriate in the public interest or for the protection of investors and notify the company in writing of such denial.

(Sec. 19, 38(a), 54 Stat. 821, 841; sec. 11, 84 Stat. 1422; 15 U.S.C. 80a–19(b), 80a–37(a))

Section 270.19b–1 is declared effective with respect to distributions made in taxable years beginning on or after January 1, 1972, other than a distribution pursuant to section 855 of the Code of gains realized prior to that date.

By the Commission, November 19, 1971.

[SEAL] RONALD F. HUNT,
*Secretary.*

[FR Doc.71–17583 Filed 12–1–71;8:47 am]

# Title 18—CONSERVATION OF POWER AND WATER RESOURCES

## Chapter II—Tennessee Valley Authority

## PART 304—APPROVAL OF CONSTRUCTION IN THE TENNESSEE RIVER SYSTEM AND REGULATION OF STRUCTURES

### Floating Boathouses and Nonnavigable Houseboats; Correction

In F.R. Doc. 71–15380, appearing at page 20423 in the issue of Friday, October 22, 1971, the third word from the end of the first sentence in paragraph (d) of § 304.204 at 36 F.R. 20427 now reading "unusuable" should read "unusable"; and the heading identifying the contents of § 304.205 at 36 F.R. 20427 now reading "Approval of floating boathouses and nonnavigable houseboats" should read "Approval of plans for floating boathouses and nonnavigable houseboats."

Dated: November 23, 1971.

LYNN SEEBER,
*General Manager.*

[FR Doc.71–17594 Filed 12–1–71;8:49 am]

# Title 49—TRANSPORTATION

## Chapter V—National Highway Traffic Safety Administration, Department of Transportation

## PART 571—FEDERAL MOTOR VEHICLE SAFETY STANDARDS

### Recodification

The Motor Vehicle Safety Standards formerly contained in § 571.21 of Title 49 are being recodified and reissued as Subpart B of Part 571 (§§ 571.101 through 571.302). The recodification is for convenience and ease in incorporating future amendments, particularly those amendments with future effective dates.

These sections are keyed to the numbers of the existing standards. Regulations for concurrent standards bearing the same standard number and becoming effective at a future date involving a time period of a year or more, are identified with the suffix "a", "b", etc. The suffix will be dropped from the new standard when the effective date is reached. This in effect denotes a supersedure of the former standard. Amendments published in the FEDERAL REGISTER to these standards are reflected in the recodification and have been incorporated in these regulations through November 11, 1971.

DOUGLAS W. TOMS,
*Administrator.*

### Subpart B—Federal Motor Vehicle Safety Standards


Sec.

571.101 Standard No. 101; Control location and identification.
571.101a Standard No. 101a; Control location, identification, and illumination. (Effective Jan. 1, 1972, with amendments effective Sept. 1, 1972, and Mar. 1, 1973)
571.102 Standard No. 102; Transmission shift lever sequence, starter interlock, and transmission braking effect.
571.103 Standard No. 103; Windshield defrosting and defogging systems.
571.104 Standard No. 104; Windshield wiping and washing systems.
571.105 Standard No. 105; Hydraulic service brake, emergency brake and parking brake systems.
571.106 Standard No. 106; Hydraulic brake hoses.
571.107 Standard No. 107; Reflecting surfaces.
571.108 Standard No. 108; Lamps, reflective devices, and associated equipment. (Effective Jan. 1, 1972)
571.108 Standard No. 108; Lamps, reflective devices, and associated equipment. (Reflecting amendments effective Jan. 1, 1973)
571.109 Standard No. 109; New pneumatic tires.
571.110 Standard No. 110; Tire selection and rims.
571.111 Standard No. 111; Rearview mirrors.
571.112 Standard No. 112; Headlamp concealment devices.
571.113 Standard No. 113; Hood latch system.
571.114 Standard No. 114; Theft protection.
571.115 Standard No. 115; Vehicle identification number.
571.116 Standard No. 116; Motor vehicle hydraulic brake fluids.
571.116a Standard No. 116a; Motor vehicle brake fluids. (Effective Mar. 1, 1972)
571.117 Standard No. 117; Retreaded pneumatic tires.
571.118 Standard No. 118; Power-operated window systems.
571.121 Standard No. 121; Air brake systems. (Effective Jan. 1, 1973)
571.201 Standard No. 201; Occupant protection in interior impact.
571.202 Standard No. 202; Head restraints.
571.203 Standard No. 203; Impact protection for the driver from the steering control system.
571.204 Standard No. 204; Steering control rearward displacement.
571.205 Standard No. 205; Glazing materials.
571.206 Standard No. 206; Door locks and door retention components.
571.207 Standard No. 207; Seating systems. (Effective Jan. 1, 1972)
571.208 Standard No. 208; Occupant crash protection. (Effective Jan. 1, 1972)
571.209 Standard No. 209; Seat belt assemblies.
571.210 Standard No. 210; Seat belt assembly anchorages.
571.211 Standard No. 211; Wheel nuts, wheel discs, and hub caps.
571.212 Standard No. 212; Windshield mounting.
571.213 Standard No. 213; Child seating systems.
571.214 Standard No. 214; Side door strength. (Effective Jan. 1, 1973)
571.215 Standard No. 215; Exterior protection. (Effective Sept. 1, 1972, with amendments effective Sept. 1, 1973, Sept. 1, 1974, and Sept. 1, 1975)
571.301 Standard No. 301; Fuel tanks, fuel tank filler pipes, and fuel tank connections.
571.302 Standard No. 302; Flammability of interior materials. (Effective Sept. 1, 1972)


AUTHORITY: The provisions of this Subpart B issued under secs. 103, 119, 80 Stat. 719, 728; 15 U.S.C. 1392, 1407.

### Subpart B—Federal Motor Vehicle Safety Standards

#### § 571.101 Standard No. 101; Control location and identification.

S1. *Purpose and scope.* This standard specifies the requirements for location and identification of certain controls to facilitate their selection and ensure their accessibility.

S2. *Application.* This standard applies to passenger cars.

S3. *Requirements.*

S3.1 *Location.* Control of the following shall be provided within operational reach of a person seated at the controls, restrained by a Type 2 seat belt system with a reasonable degree of slack in the upper torso portion of the belt assembly:

(a) Steering;
(b) Horn;
(c) Transmission, except transfer case;
(d) Ignition;
(e) Headlamps;
(f) Turn signal;
(g) Windshield wiping system;
(h) Windshield washing system;
(i) Choke (if manual); and,
(j) Driver's sun visor.

S3.2 *Identification.* The following controls, when mounted on the instrument panel, shall be identified to permit recognition, by words or symbols, under daylight lighting conditions:

(a) Headlamps;
(b) Windshield wiping system;
(c) Windshield washing system;
(d) Windshield defrosting and defogging system; and,
(e) Choke (if manual).

#### § 571.101a Standard No. 101a; Control location, identification, and illumination. (Effective Jan. 1, 1972, with amendments effective Sept. 1, 1972, and Mar. 1, 1973)

S1. *Scope.* This standard specifies requirements for the location, identification, and illumination of motor vehicle controls.

S2. *Purpose.* The purpose of this standard is to insure the accessibliity of motor vehicle controls and to facilitate their selection under daylight and nighttime conditions, in order to reduce the hazards caused by the diversion of the driver's attention from the motoring environment.

S3. *Application.* This standard applies to passenger cars, multipurpose passenger vehicles, trucks, and buses.

S4. *Requirements.* Each passenger car, multipurpose passenger vehicle, truck, and bus manufactured with any control listed in S4.1 or Column 1 of Table 1, shall meet the requirements of this standard for the location, identification, and illumination of such control.

S4.1 *Control location.* This section applies to each passenger car manufactured on or after January 1, 1972, and to each multipurpose passenger vehicle, truck, and bus manufactured on or after September 1, 1972. Each of the following controls shall be operable, under the conditions of S5, by a person seated at the controls:

(a) Steering wheel.
(b) Horn control.
(c) Transmission shift lever, except transfer case.
(d) Ignition switch.
(e) Headlamp switch.
(f) Turn signal control.
(g) Illumination intensity control.
(h) Windshield wiper control.
(i) Windshield washer control.
(j) Manual choke.
(k) Driver's sun visor.

S4.2 *Control identification.* This section applies to each passenger car manufactured on or after January 1, 1972, and to each multipurpose passenger vehicle, truck, and bus manufactured on or after September 1, 1972. If any control listed in Column 1 of Table 1 is manually operated, the control shall be identified by the word or abbreviation specified in Column 2. Each position of an automatic vehicle speed control and a heating and air conditioning system control, other than an intermediate position of a rocker-type or push-pull type control, shall be identified. A control may, in addition, be identified by a symbol, but

only a symbol shown in Column 3 shall be used.

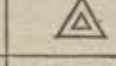
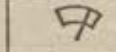
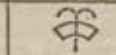
S4.3 *Control illumination.* This section applies to each passenger car, and to each multipurpose passenger vehicle, truck, and bus with a GVWR of 10,000 pounds or less manufactured on or after September 1, 1972, and to each multipurpose passenger vehicle, truck, and bus with a GVWR of more than 10,000 pounds manufactured on or after March 1, 1973. Except for foot-operated controls or manually operated controls mounted upon the steering column, the identification of any control listed in Column 1 of Table 1 and accompanied by the word 'yes' in the corresponding space in Column 4 shall be illuminated whenever the headlamps are activated. Control identification need not be illuminated when the headlamps are being flashed. Control identification for a heating and air-conditioning system need not be illuminated if the system does not direct air directly upon the windshield. A control shall be provided to adjust the intensity of control illumination, continuously variable from an 'off' position to a position providing illumination sufficient for the vehicle operator to readily identify controls under conditions of reduced visibility.

S5 *Conditions.*

S5.1 Except as specified in S5.2, the person seated at the controls is restrained by nonextending upper torso and pelvic restraints fastened so that the upper torso restraint can be moved 4 inches away from the sternum and there is no slack between the lap belt and the pelvis.

S5.2 The person seated at the controls of a multipurpose passenger vehicle or truck with a gross vehicle weight rating of more than 10,000 pounds, convertible, open-body type vehicle, walk-in van-type truck, or bus is restrained by a nonextending pelvic restraint fastened so that there is no slack between the lap belt and the pelvis.

TABLE 1 - Control Identification and Illumination

| COLUMN 1 | COLUMN 2 | COLUMN 3 | COLUMN 4 |
|---|---|---|---|
| Motor Vehicle Equipment Control | Word or Abbreviation | Permissible Symbol | Illumination |
| Engine Start | ENGINE START [1] | None | |
| Engine Stop | ENGINE STOP [1] | None | Yes [1] |
| Manual Choke | CHOKE | None | |
| Hand Throttle | THROTTLE | None | |
| Automatic Vehicle Speed Control | | None | Yes |
| Headlamps and Taillamps | LIGHTS [2] |  | |
| Vehicular Hazard Warning Signal | HAZARD |  | Yes |
| Clearance Lamps | CLEARANCE LAMPS [3] or CL LPS |  | Yes |
| Identification Lamps | IDENTIFICATION LAMPS or ID LPS | None | Yes |
| Windshield Wiping System | WIPER or WIPE |  | Yes |
| Windshield Washing System | WASHER or WASH |  | Yes |
| Windshield Defrosting and Defogging System | DEFROST or DEF | None | Yes |
| Heating and Air Conditioning System | | None | Yes |

[1] Use when engine control is separate from the key locking system.

[2] Use also when clearance, identification lamps and/or side marker lamps are controlled with the headlamp switch.

[3] Use also when clearance lamps, identification lamps and/or side marker lamps are controlled with one switch other than the headlamp switch.

### § 571.102 Standard No. 102; Transmission shift lever sequence, starter interlock, and transmission braking effect.

S1. *Purpose and scope.* This standard specifies the requirements for the transmission shift lever sequence, a starter interlock, and for a braking effect of automatic transmissions, to reduce the likelihood of shifting errors, starter engagement with vehicle in drive position, and to provide supplemental braking at speeds below 25 miles per hour.

S2. *Application.* This standard applies to passenger cars, multipurpose passenger vehicles, trucks, and buses.

S3. *Requirements.*

S3.1 *Automatic transmissions.*

S3.1.1 *Location of transmission shift lever positions on passenger cars.* A neutral position shall be located between forward drive and reverse drive positions. If a steering-column-mounted transmission shift lever is used, movement from neutral position to forward drive position shall be clockwise. If the transmission shift lever sequence includes a park position, it shall be located at the end, adjacent to the reverse drive position.

S3.1.2 *Transmission braking effect.* In vehicles having more than one forward transmission gear ratio, one forward drive position shall provide a greater degree of engine braking than the highest speed transmission ratio at vehicle speeds below 25 miles per hour.

S3.1.3 *Starter interlock.* The engine starter shall be inoperative when the transmission shift lever is in a forward or reverse drive position.

S3.2 *Automatic and manual transmissions.* Identification of shift lever positions of automatic transmissions and of the shift lever pattern of manual transmissions, except three forward speed manual transmissions having the standard "H" pattern, shall be permanently displayed in view of the driver.

### § 571.103 Standard No. 103; Windshield defrosting and defogging systems.

S1. *Scope.* This standard specifies requirements for windshield defrosting and defogging systems.

S2. *Application.* This standard applies to passenger cars, multipurpose passenger vehicles, trucks, and buses, manufactured for sale in the continental United States.

S3. *Definitions.* "Road load" means the power output required to move a given motor vehicle at curb weight plus 400 pounds on level, clean, dry, smooth portland cement concrete pavement (or other surface with equivalent coefficient of surface friction) at a specified speed through still air at 68° F. and standard barometric pressure (29.92" of Hg.) and includes driveline friction, rolling friction, and air resistance.

S4. *Requirements.*

S4.1 Each vehicle shall have a windshield defrosting and defogging system.

S4.2 Each passenger car windshield defrosting and defogging system shall meet the requirements of section 3 of SAE Recommended Practice J902, "Passenger Car Windshield Defrosting Systems," August 1964, when tested in accordance with S4.3, except that "the critical area" specified in paragraph 3.1 of SAE Recommended Practice J902 shall be that established as Area C in accordance with Motor Vehicle Safety Standard No. 104, "Windshield Wiping and Washing Systems," and "the entire windshield" specified in paragraph 3.3 of SAE Recommended Practice J902 shall be that established as Area A in accordance with § 571.104.

S4.3 *Demonstration procedure.* The passenger car windshield defrosting and

defogging system shall be tested in accordance with the portions of paragraphs 4.1 through 4.4.7 of SAE Recommended Practice J902, August 1964, or SAE Recommended Practice J902a, March 1967, applicable to that system, except that—

(a) During the first 5 minutes of the test, the engine speed or speeds may be those which the manufacturer recommends as the warmup procedure for cold weather starting;

(b) During the last 35 minutes of the test period (or the entire test period if the 5-minute warmup procedure is not used), either—

(i) The engine speed shall not exceed 1,500 r.p.m. in neutral gear; or

(ii) The engine speed and load shall not exceed the speed and load at 25 m.p.h. in the manufacturer's recommended gear with road load;

(c) A room air change of 90 times per hour is not required;

(d) The windshield wipers may be used during the test if they are operated without manual assist;

(e) One or two windows may be open a total of 1 inch;

(f) The defroster blower may be turned on at any time; and

(g) The wind velocity may not exceed 5 m.p.h.

**§ 571.104 Standard No. 104; Windshield wiping and washing systems.**

S1. *Scope.* This standard specifies requirements for windshield wiping and washing systems.

S2. *Application.* This standard applies to passenger cars, multipurpose passenger vehicles, trucks, and buses.

S3. *Definitions.*

The term "seating reference point" is substituted for the terms "manikin H point" and "H point" wherever either of those terms appears in any SAE Standard or SAE Recommended Practice referred to in this standard.

"Daylight opening" means the maximum unobstructed opening through the glazing surface, as defined in paragraph 2.3.12 of section E, Ground Vehicle Practice, SAE Aerospace-Automotive Drawing Standards, September 1963.

"Glazing surface reference line" means the line resulting from the intersection of the glazing surface and a horizontal plane 25 inches above the seating reference point, as shown in Figure 1 of SAE Recommended Practice J903a, "Passenger Car Windshield Wiper Systems," May 1966.

"Overall width" means the maximum overall body width dimension "W116", as defined in section E, Ground Vehicle Practice, SAE Aerospace-Automotive Drawing Standards, September 1963.

"Plan view reference line" means—

(a) For vehicles with bench-type seats, a line parallel to the vehicle longitudinal centerline outboard of the steering wheel centerline 0.15 times the difference between one-half of the shoulder room dimension and the steering wheel centerline-to-car-centerline dimension as shown in Figure 2 of SAE Recommended Practice J903a, May 1966; or

(b) For vehicles with individual-type seats, either—

(i) A line parallel to the vehicle longitudinal centerline which passes through the center of the driver's designated seating position; or

(ii) A line parallel to the vehicle longitudinal centerline located so that the geometric center of the 95 percent eye range contour is positioned on the longitudinal centerline of the driver's designated seating position.

"Shoulder room dimension" means the front shoulder room dimension "W3" as defined in section E, Ground Vehicle Practice, SAE Aerospace-Automotive Drawing Standards, September 1963.

"95 percent eye range contour" means the 95th percentile tangential cutoff specified in SAE Recommended Practice J941, "Passenger Car Driver's Eye Range," November 1965.

S4. *Requirements.*

S4.1 *Windshield wiping system.* Each vehicle shall have a power-driven windshield wiping system that meets the requirements of S4.1.1.

S4.1.1 *Frequency.*

S4.1.1.1 Each windshield wiping system shall have at least two frequencies or speeds.

S4.1.1.2 One frequency or speed shall be at least 45 cycles per minute regardless of engine load and engine speed.

S4.1.1.3 Regardless of engine speed and engine load, the highest and one lower frequency or speed shall differ by at least 15 cycles per minute. Such lower frequency or speed shall be at least 20 cycles per minute regardless of engine speed and engine load.

S4.1.1.4 Compliance with subparagraphs S4.1.1.2 and S4.1.1.3 may be demonstrated by testing under the conditions specified in sections 4.1.1 and 4.1.2 of SAE Recommended Practice J903a, May 1966.

S4.1.2 *Wiped area.* When tested wet in accordance with SAE Recommended Practice J903a, May 1966, each passenger car windshield wiping system shall wipe the percentage of Areas A, B, and C of the windshield (established in accordance with S4.1.2.1) that (1) is specified in column 2 of the applicable table following subparagraph S4.1.2.1; and (2) is within the area bounded by a perimeter line on the glazing surface 1 inch from the edge of the daylight opening.

S4.1.2.1 Areas A, B, and C shall be established as shown in Figures 1 and 2 of SAE Recommended Practice J903a, May 1966, using the angles specified in Columns 3 through 6 of Table I, II, III, or IV, as applicable.

S4.2 *Windshield washing system.*

S.4.2.1 Each passenger car shall have a windshield washing system that meets the requirements of SAE Recommended Practice J942, "Passenger Car Windshield Washer Systems," November 1965, except that the reference to "the effective wipe pattern defined in SAE J903, paragraph 3.1.2" in paragraph 3.1 of SAE Recommended Practice J942 shall be deleted and "the areas established in accordance with subparagraph S4.1.2.1 of Motor Vehicle Safety Standard No. 104" shall be inserted in lieu thereof.

S4.2.2. Each multipurpose passenger vehicle truck, and bus shall have a windshield washing system that meets the requirements of SAE Recommended Practice J942, November 1965, except that the reference to "the effective wipe pattern defined in SAE J903, paragraph 3.1.2" in paragraph 3.1 of SAE Recommended Practice J942 shall be deleted and "the pattern designed by the manufacturer for the windshield wiping system on the exterior surface of the windshield glazing" shall be inserted in lieu thereof.

TABLE I—PASSENGER CARS OF LESS THAN 60 INCHES IN OVERALL WIDTH

| Column 1 | Column 2 | Column 3 | Column 4 | Column 5 | Column 6 |
|---|---|---|---|---|---|
| Area | Minimum percent to be wiped | Angles in degrees | | | |
| | | Left | Right | Up | Down |
| A | 80 | 16 | 49 | 7 | 5 |
| B | 94 | 13 | 46 | 4 | 3 |
| C | 99 | 7 | 15 | 3 | 1 |

TABLE II—PASSENGER CARS OF 60 OR MORE BUT LESS THAN 64 INCHES IN OVERALL WIDTH

| Column 1 | Column 2 | Column 3 | Column 4 | Column 5 | Column 6 |
|---|---|---|---|---|---|
| Area | Minimum percent to be wiped | Angles in degrees | | | |
| | | Left | Right | Up | Down |
| A | 80 | 17 | 51 | 8 | 5 |
| B | 94 | 13 | 49 | 4 | 3 |
| C | 99 | 7 | 15 | 3 | 1 |

TABLE III.—PASSENGER CARS OF 64 OR MORE BUT LESS THAN 68 INCHES IN OVERALL WIDTH

| Column 1 | Column 2 | Column 3 | Column 4 | Column 5 | Column 6 |
|---|---|---|---|---|---|
| Area | Minimum percent to be wiped | Angles in degrees | | | |
| | | Left | Right | Up | Down |
| A | 80 | 17 | 53 | 9 | 5 |
| B | 94 | 14 | 51 | 5 | 3 |
| C | 99 | 8 | 15 | 4 | 1 |

TABLE IV.—PASSENGER CARS OF 68 OR MORE INCHES IN OVERALL WIDTH

| Column 1 | Column 2 | Column 3 | Column 4 | Column 5 | Column 6 |
|---|---|---|---|---|---|
| Area | Minimum percent to be wiped | Angles in degrees | | | |
| | | Left | Right | Up | Down |
| A | 80 | 18 | 56 | 10 | 3 |
| B | 94 | 14 | 53 | 5 | 3 |
| C | 99 | 10 | 15 | 5 | 1 |

**§ 571.105 Standard No. 105; Hydraulic service brake, emergency brake and parking brake systems.**

S1. *Purpose and scope.* This standard specifies requirements for hydraulic service brake, emergency brake, and parking brake systems intended to ensure adequate braking performance under normal and emergency conditions.

S2. *Application.* This standard applies to passenger cars.

S3. *Definitions.* "Pressure component" means any internal component of the brake master cylinder or master control unit, wheel brake cylinder, brake line, brake hose, or equivalent, except vacuum assist components.

S4. *Requirements.*

S4.1 *Service brake system.* The performance ability of the fully operational service brake system for passenger cars shall be not less than that described in Section D of Society of Automotive Engineers Recommended Practice J937,

"Service Brake System Performance Requirements—Passenger Cars", June 1966, and tested in accordance with SAE Recommended Practice J843a, "Brake System Road Test Code—Passenger Cars", June 1966, except that the following is substituted for section (D)(7)(a) of SAE Recommended Practice J937:

"Brakes to recover within +20%, −40% of check stop pedal force by stop 15 or within +20 lbs., −40% of check stop pedal force by stop 10. (Based on the average of initial pedal force of the three check stops)."

S4.2 *Emergency brake system.* Rupture or leakage-type failure of any single pressure component of the service brake system, except structural failures of the brake master cylinder body or effectiveness indicator body, shall not result in complete loss of function of the vehicle brakes when force on the brake pedal is continued.

S4.2.1 *Emergency System Performance.* If failure of a pressure component or insufficient hydraulic fluid in the system causes loss of pressure in any part of the brake system, the remaining portion of the brake system shall provide a stop of the vehicle loaded in accordance with SAE Recommended Practice J843a, June 1966, from a speed of 60 m.p.h., in not more than 646 feet, without pulling or swerving to the extent that would cause the vehicle to leave a level, 12-foot wide lane on a clean, dry, smooth, portland cement concrete pavement (or other surface with equivalent coefficient of surface friction).

S4.2.2 *Emergency brake system effectiveness indication.* An electrically operated red light, mounted on the instrument panel in view of the driver, shall illuminate before or upon application of the brakes in the event of a hydraulic-type complete failure of a partial system. The indicator light shall have sufficient luminous intensity to be plainly visible in daylight and shall include a means for testing by the vehicle operator to ensure that the bulb is operable. No single failure in the internal components of the system effectiveness indicator, except the body of the device, shall permit the total loss of effectiveness of the braking system.

S4.3 *Parking brake system.* A parking brake system of a friction type with a solely mechanical means to retain engagement shall be provided that will hold the vehicle loaded in accordance with SAE Recommended Practice J843a, June 1966, to the limit of traction of the braked wheels in both forward and reverse directions on clean, dry, smooth, portland cement concrete pavement (or other surface with equivalent coefficient of surface friction) of a 30 percent grade.

NOTE: (1) The definition of the term "emergency brake" contained in § 571.3(b) does not refer to a system that would provide a means of bringing a vehicle to a stop after a total failure of the entire hydraulic service brake system, since paragraph S4.2 of the Standard provides that rupture or leakage-type failure of any single pressure component of the service brake system, except structural failures of the brake master cylinder body or effectiveness indicator body shall not result in complete loss of function of the vehicle brakes when force on the brake pedal is continued.

(2) Paragraph S4.2.1 applies to loss of pressure in a part of the brake system resulting from failure of a pressure component or insufficient hydraulic fluid in that part of the system.

(3) The requirement of paragraph S4.2.2 that an indicator light illuminate before or upon application of the brakes in the event of a hydraulic-type complete failure of a partial system may be met with a master cylinder reservoir level indicator light or system pressure indicator light. The indicator light need not illuminate during that application of brake pressure that contributed to the failure.

### § 571.106 Standard No. 106; Hydraulic brake hoses.

S1. *Purpose and scope.* This standard specifies requirements for hydraulic brake hoses that will reduce brake failures due to fluid leakage.

S2. *Application.* This standard applies to hydraulic brake hoses for use in passenger cars and multipurpose passenger vehicles.

S3. *Requirements.* Hydraulic brake hoses shall meet the requirements of Society of Automotive Engineers Standard J40b, "Automotive Brake Hoses," July 1966, except as follows:

(a) Delete "Water Absorption Test."

(b) Add "viscose" and "polyester" to acceptable braid materials.

(c) Specify the following dates for referenced ASTM tests:

(1) ASTM D 571—1955; and

(2) ASTM B 117—1964.

(d) Revise "End Connections" paragraph to read: "Exposed steel or brass end connections of the hose assembly shall be protected against rust or corrosion."

### § 571.107 Standard No. 107; Reflecting surfaces.

S1. *Purpose and scope.* This standard specifies reflecting surface requirements for certain vehicle components in the driver's field of view.

S2. *Application.* This standard applies to passenger cars, multipurpose passenger vehicles, trucks, and buses.

S3. *Definitions.*

"Field of view" means the area forward of a lateral vertical plane which is located tangent to the rearmost boundary of the SAE 99th percentile eye range contour of SAE Recommended Practice J941, November 1965. "Specular gloss" means the luminous fractional reflectance of a specimen at the specular direction.

S4. *Requirements.* The specular gloss of the surface of the materials used for the following bright metal components in the driver's field of view shall not exceed 40 units when measured by the 20° method of ASTM Standard D523–62T, June 1962—

(a) Windshield wiper arms and blades;

(b) Inside windshield mouldings;

(c) Horn ring and hub of steering wheel assembly; and

(d) Inside rearview mirror frame and mounting bracket.

### § 571.108 Standard No. 108; Lamps, reflective devices, and associated equipment. (Effective Jan. 1, 1972)

Note: The standard that appears below is a revision that is effective with respect to vehicles manufactured on or after January 1, 1972. The standard that is effective before that date appears at 32 F.R. 18033, Dec. 16, 1967, 33 F.R. 2994, Feb. 15, 1968, 34 F.R. 14691, Sept. 23, 1969, and 35 F.R. 2409, Feb. 3, 1970.

S1. *Purpose and scope.* This standard specifies requirements for original and replacement lamps, reflective devices, and associated equipment necessary for signaling and for the safe operation of motor vehicles during darkness and other conditions of reduced visibility.

S2. *Application.* This standard applies to passenger cars, multipurpose passenger vehicles, trucks, buses, trailers (except pole trailers and trailer converter dollies), and motorcycles, and to lamps, reflective devices, and associated equipment for replacement of like equipment on vehicles to which this standard applies.

S3. *Definitions.* "Flash" means a cycle of activation and deactivation of a lamp by automatic means continuing until stopped either automatically or manually.

S4. *Requirements.*

S4.1 *Required motor vehicle lighting equipment.*

S4.1.1 Except as provided in S4.1.1.1 through S4.1.1.15, each vehicle shall be equipped with at least the number of lamps, reflective devices, and associated equipment specified in Tables I and III, as applicable. Required equipment shall be designed to conform to the SAE Standards or Recommended Practices referenced in those tables. Table I applies to multipurpose passenger vehicles, trucks, trailers, and buses, 80 or more inches in overall width. Table III applies to passenger cars and motorcycles and to multipurpose passenger vehicles, trucks, trailers, and buses, less than 80 inches in overall width.

S4.1.1.1. A truck tractor need not be equipped with turn signal lamps mounted on the rear if the turn signal lamps at or near the front are so constructed (double-faced) and so located that they meet the requirements for double-faced turn signals specified in SAE Standard J588d, "Turn Signal Lamps", June 1966.

S4.1.1.2 A truck tractor need not be equipped with any rear side marker devices, rear clearance lamps, and rear identification lamps.

S4.1.1.3 Intermediate side marker devices are not required on vehicles less than 30 feet in overall length.

S4.1.1.4 Reflective material conforming to Federal Specification L–S–300, "Sheeting and Tape, Reflective; Nonexposed Lens, Adhesive Backing," September 7, 1965, may be used for side reflex reflectors if this material, as used on the vehicle, meets the performance standards in Table I of SAE Standard J594d, "Reflex Reflectors," March 1967.

S4.1.1.5 The turn signal operating unit on each passenger car, and multipurpose passenger vehicle, truck, and bus less than 80 inches in overall width manufactured on or after January 1, 1973, shall be self-canceling by steering wheel rotation and capable of cancellation by a manually operated control.

S4.1.1.6 A stop lamp on any vehicle manufactured on or after January 1, 1973, shall meet the photometric minimum candlepower requirements for Class A red turn signal lamps specified in SAE Standard J575d, "Test for Motor Vehicle Lighting Devices and Components," August 1967.

S4.1.1.7 Stop lamps on each passenger car manufactured on or after January 1, 1973, and turn signal lamps on each passenger car shall meet the photometric minimum candlepower requirements for Class A turn-signal lamps, and shall have effective projected illuminated areas not less than those of Class B lamps as specified in SAE Standard J588d, 'Turn Signal Lamps,' June 1966. If multiple compartment lamps or multiple lamps are used, the effective projected illuminated area of each compartment or lamp shall be not less than that of a Class B lamp; however, Class A photometric requirements may be met by a combination of compartments or lamps.

S4.1.1.8 For each passenger car, and each multipurpose passenger vehicle, truck, trailer, and bus of less than 80 inches in overall width the photometric minimum candlepower requirements for side marker lamps specified in SAE Standard J592c, "Clearance, Side Marker, Identification, and Parking Lamps," November 1968, may be met for all inboard test points at a distance of 15 feet from the vehicle and on a vertical plane that is perpendicular to the longtitudinal axis of the vehicle and located midway between the front and rear side marker lamps.

S4.1.1.9 Boat trailers need not be equipped with both front and rear clearance lamps provided an amber (to front) and red (to rear) clearance lamp is located at or near the midpoint on each side of the trailer so as to indicate its extreme width.

S4.1.1.10 Multiple license plate lamps and backup lamps may be used to fulfill the requirements of the SAE Standards applicable to such lamps referenced in Tables I and III.

S4.1.1.11 The minimum and maximum candlepower for parking lamps shall be:

| Test point (degrees) | | Minimum candlepower | Maximum candlepower |
|---|---|---|---|
| 10U | 10L | 0.8 | 125 |
| | V | .8 | 125 |
| | 10R | .8 | 125 |
| 5U | 20L | .4 | 125 |
| | 10L | .8 | 125 |
| | 5L | 1.4 | 125 |
| | V | 2.8 | 125 |
| | 5R | 1.4 | 125 |
| | 10R | .8 | 125 |
| | 20R | .4 | 125 |
| H | 20L | .4 | 125 |
| | 10L | 1.4 | 125 |
| | 5L | 3.6 | 125 |
| | V | 4.0 | 125 |
| | 5R | 3.6 | 125 |
| | 10R | 1.4 | 125 |
| | 20R | .4 | 125 |
| 5D | 20L | .4 | 250 |
| | 10L | .8 | 250 |
| | 5L | 1.4 | 250 |
| | V | 2.8 | 250 |
| | 5R | 1.4 | 250 |
| | 10R | .8 | 250 |
| | 20R | .4 | 250 |
| 10D | 10L | .8 | 250 |
| | V | .8 | 250 |
| | 10 | .8 | 250 |

U=up L=left R=right H=horizontal V=vertical D=down.

S4.1.1.12 A motorcycle manufactured before January 1, 1973, need not be equipped with turn signal lamps, flashers, and switches.

S4.1.1.13 In lieu of conformance with SAE Standard J593c, February 1968, a vehicle manufactured before January 1, 1973, may be equipped with backup lamps conforming to SAE Standard J593b, May 1966, and the installation requirements of SAE Standard J593c, February 1968.

S4.1.1.14 A vehicle manufactured before January 1, 1973, may be equipped with license plate lamps conforming to SAE Standard J587b, April 1964, instead of SAE Standard J587d, March 1969, and the lamps need not illuminate the plate from the top or sides.

S4.1.1.15 All passenger cars, and multipurpose passenger vehicles, trucks, and buses of less than 80 inches overall width manufactured before January 1, 1973, may be equipped with Class B turn signal operating units. Such vehicles manufactured on or after January 1, 1973, shall be equipped with turn signal operating units designed to complete a durability test of 100,000 cycles.

S4.1.2. Plastic materials used for optical parts such as lenses and reflectors shall conform to SAE Recommended Practice J576b, "Platic Materials for Use in Optical Parts, such as Lenses and Reflectors, of Motor Vehicle Lighting Devices," August 1966. Plastic materials used as inner lenses or those covered by another material and not exposed directly to sunlight shall meet the requirements of paragraphs 3.4 and 4.2 of SAE J576b when covered by the outer lens or other material. Except for a stop lamp lens or a backup lamp lens, each plastic lens shall conform to section L, 'Warpage Test Devices with Plastic Lenses', of SAE Standard J575d, 'Test for Motor Vehicle Lighting Devices and Components', August 1967. A plastic lens for a stop lamp or a backup lamp manufactured on or after January 1, 1973, shall conform to section L of SAE Standard J575d and shall be tested with the lamp cycled on for 10 minutes and off for 10 minutes through the 1-hour warpage test.

S4.1.3 No additional lamp, reflective device, or other motor vehicle equipment shall be installed that impairs the effectiveness of lighting equipment required by this standard.

S4.1.4 Each school bus shall be equipped with a system of either:

(a) Four red signal lamps designed to conform to SAE Standard J887, "School Bus Red Signal Lamps," July 1964, and installed in accordance with that standard; or

(b) Four red signal lamps designed to conform to SAE Standard J887, "School Bus Red Signal Lamps," July 1964, and four amber signal lamps designed to conform to that standard, except for their color, and except that their candlepower shall be at least 2½ times that specified for red signal lamps. Both red and amber lamps shall be installed in accordance with SAE Standard J887, except that:

(i) Each amber signal lamp shall be located near each red signal lamp, at the same level, but closer to the vertical centerline of the bus; and

(ii) The system shall be wired so that the amber signal lamps are activated only by manual or foot operation, and if activated, are automatically deactivated and the red signal lamps automatically activated when the bus entrance door is opened.

S4.1.5 The color in all lighting equipment covered by this standard shall be in accordance with SAE Standard J578a, April 1965, "Color Specification for Electric Signal Lighting Devices".

S4.2 *Other requirements.*

S4.2.1 The words "it is recommended that," "recommendations," or "should be" appearing in any SAE Standard or Recommended Practice referenced or subreferenced in this standard shall be read as setting forth mandatory requirements, except that the aiming pads on the lens face and the black area surrounding the signal lamp, recommended in SAE Standard J887, "School Bus Red Signal Lamps," July 1964, are not required.

S4.3 *Location of required equipment.*

S4.3.1 Except as provided in S4.3.1.1 through S4.3.1.8, each lamp, reflective device, and item of associated equipment shall be securely mounted on a rigid part of the vehicle other than glazing that is not designed to be removed except for repair, in accordance with the requirements of Table I or III and in locations specified in Table II (multipurpose passenger vehicles, trucks, trailers, and buses 80 or more inches in overall width) or Table IV (all passenger cars, and motorcycles, and multipurpose passenger vehicles, trucks, trailers, and buses less than 80 inches in overall width), as applicable.

S4.3.1.1 Each lamp and reflective device shall be located so that it meets the visibility requirements specified in any applicable SAE Standard or Recommended Practice. In addition, no part of the vehicle shall prevent the device from meeting the photometric output at any test point specified in any applicable SAE Standard or Recommended Practice. However, if motor vehicle equipment (e.g., mirrors, snow plows, wrecker booms, backhoes, and winches) prevents compliance with this paragraph by any required lamp or reflective device, an auxiliary lamp or device meeting the requirements of this paragraph shall be provided.

S4.3.1.2 When testing the photometric minimum candlepower specified in SAE Standard J594d, "Reflex Reflectors," March 1967, the axis of the side reflex reflectors shall be perpendicular to a vertical plane through the longitudinal axis of the vehicle.

S4.3.1.3 On a truck tractor, the red rear reflex reflectors may be mounted on the back of the cab, at a minimum height not less than 4 inches above the height of the rear tires.

S4.3.1.4 On a trailer, the amber front side reflex reflectors and amber front side marker lamps may be located as far

forward as practicable exclusive of the trailer tongue.

S4.3.1.5 When the rear identification lamps are mounted at the extreme height of a vehicle, rear clearance lamps need not meet the requirement of Table II that they be located as close as practicable to the top of the vehicle.

S4.3.1.6 The center of the lens referred to in SAE Standard J593c, "Back-up Lamps," February 1968, is the optical center.

S4.3.1.7 On a truck tractor, clearance lamps mounted on the cab may be located to indicate the width of the cab, rather than the overall width of the vehicle.

S4.4 *Equipment combinations.*

S4.4.1 Two or more lamps, reflective devices, or items of associated equipment may be combined if the requirements for each lamp, reflective device, and item of associated equipment are met, except that no clearance lamp may be combined optically with any taillamp or identification lamp.

S4.4.2. Each combination turn signal and hazard warning signal flasher shall, when tested consecutively in accordance with SAE Standard J590b, "Automotive Turn Signal Flasher", October 1965, and then SAE Standard J945, "Vehicular Hazard Warning Signal Flasher", February 1966, meet the requirements of both these standards.

S4.5 *Special wiring requirements.*

S4.5.1 Each vehicle shall have a means of switching between lower and upper headlamp beams that conforms to SAE Recommended Practice J564a, "Headlamp Beam Switching," April 1964, or to SAE Recommended Practice J565b, "Semi-Automatic Headlamp Beam Switching Devices," February 1969.

S4.5.2 Each vehicle shall have a means for indicating to the driver when the upper beams of the headlamps are on that conforms to SAE Recommended Practice J564a, April 1964, except that the signal color need not be red.

S4.5.3 The taillamps on each vehicle shall be activated when the headlamps are activated in a steady-burning state.

S4.5.4 The stoplamps on each vehicle shall be activated upon application of the service brakes.

S4.5.5 The vehicular hazard warning signal operating unit on each vehicle shall operate independently of the ignition or equivalent switch, and when activated, shall cause to flash simultaneously sufficient turn signal lamps to meet the turn signal lamp photometric requirements of S4.1.1.7 (for passenger cars), or Class A photometric values as specified in SAE Standard J588d, "Turn Signal Lamps," June 1966 (for all other vehicles).

S4.5.6 Each vehicle equipped with a turn signal operating unit shall also have an illuminated pilot indicator. Except on a truck, bus, or multipurpose passenger vehicle 80 or more inches in overall width and on any other vehicle equipped to tow trailers, failure of one or more turn signal lamps to operate shall be indicated in accordance with SAE Standard J588d, "Turn Signal Lamps," June 1966.

S4.5.7 On all passenger cars, and motorcycles, and multipurpose passenger vehicles, trucks, and buses of less than 80 inches overall width:

(a) When the parking lamps are activated, the taillamps, license plate lamps, and side marker lamps shall also be activated; and

(b) When the headlamps are activated in a steady-burning state, the taillamps, parking lamps, license plate lamps and side marker lamps shall also be activated.

S4.6 When activated:

(a) Turn signal lamps, hazard warning signal lamps, and school bus warning lamps shall flash; and

(b) All other lamps shall be steady-burning, except that means may be provided to flash headlamps and side marker lamps for signaling purposes.

S4.7 *Replacement equipment.* Each lamp, reflective device, or item of associated equipment manufactured to replace any lamp, reflective device, or item of associated equipment on any vehicle to which this standard applies, shall be designed to conform with this standard.

S5. *Subreferenced SAE Standards and Recommended Practices.*

S5.1 SAE Standards and Recommended Practices subreferenced by the SAE Standards and Recommended Practices included in Tables I and III and paragraphs S4.1.4 and S4.5.1 are those published in the 1970 edition of the SAE Handbook.

S5.2 In subreferenced SAE Standard J575d, "Tests of Motor Vehicle Lighting Devices and Components," August 1967, the maximum photometric candlepower values for one-compartment and two-compartment stop lamps shall be 300 candlepower.

TABLE I.—REQUIRED MOTOR VEHICLE LIGHTING EQUIPMENT

MULTIPURPOSE PASSENGER VEHICLES, TRUCKS, TRAILERS, AND BUSES, OF 80 OR MORE INCHES OVERALL WIDTH

| Item | Multipurpose passenger vehicles, trucks, and buses | Trailers | Applicable SAE standard or recommended practice |
|---|---|---|---|
| Headlamps | 2 white, 7-inch, Type 2 headlamp units; or 2 white, 5¾-inch, Type 1 headlamp units and 2 white 5¾-inch, Type 2 headlamp units. | None | J580a, June 1966; J579a, August 1965; and J566, January 1960. |
| Taillamps | 2 red | 2 red | J585c, June 1966. |
| Stoplamps | 2 red [1] | 2 red [1] | J586b, June 1966. |
| License plate lamp | 1 white [2] [3] | 1 white [2] [4] | J587d, March 1969. |
| Reflex reflectors | 4 red; 2 amber [5] | 4 red; 2 amber | J594d, March 1967. |
| Side marker lamps | 2 red; 2 amber [5] | 2 red; 2 amber | J592c, November 1968. |
| Backup lamp | 1 white [2] [6] | None | J593c, February 1968. |
| Turn signal lamps | 2 Class A red or amber; 2 Class A amber. [3] | 2 Class A red or amber. | J588d, June 1966. |
| Turn signal operating unit. | 1 | None | J589, April 1964. |
| Turn signal flasher | 1 [7] | None | J590b, October 1965. |
| Vehicular hazard warning signal operating unit. | 1 | None | J910, January 1966. |
| Vehicular hazard warning signal flasher. | 1 [7] | None | J945, February 1966. |
| Identification lamps | 3 amber; 3 red [8] | 3 red | J592c, November 1968. |
| Clearance lamps | 2 amber; 2 red [8] | 2 amber, 2 red | J592c, November 1968. |
| Intermediate side marker lamps. | 2 amber [9] | 2 amber [9] | J592c, November 1968. |
| Intermediate reflex reflectors. | 2 amber [9] | 2 amber [9] | J594d, March 1967. |

[1] See S4.1.1.6. [2] See S4.1.1.10. [3] See S4.5.6. [4] See S4.1.1.3.
[5] See S4.1.1.15. [6] See S4.1.1.14. [7] See S4.4.2. [8] See S4.1.1.2.

TABLE II.—LOCATION OF REQUIRED EQUIPMENT

MULTIPURPOSE PASSENGER VEHICLES, TRUCKS, TRAILERS, AND BUSES, OF 80 OR MORE INCHES OVERALL WIDTH

| Item | Location on— Multipurpose passenger vehicles, trucks, and buses | Location on— Trailers | Height above road surface measured from center of item on vehicle at curb weight |
|---|---|---|---|
| Headlamps | Type 1 headlamps at the same height, 1 on each side of the vertical centerline; Type 2 headlamps at the same height, 1 on each side of the vertical centerline; as far apart as practicable. | Not required | Not less than 24 inches, nor more than 54 inches. |
| Taillamps | On the rear, 1 on each side of the vertical centerline, at the same height, and as far apart as practicable. | On the rear, 1 on each side of the vertical centerline, at the same height, and as far apart as practicable. | Not less than 15 inches, nor more than 72 inches. |
| Stoplamps | On the rear, 1 on each side of the vertical centerline, at the same height, and as far apart as practicable. | On the rear, 1 on each side of the vertical centerline, at the same height, and as far apart as practicable. | Not less than 15 inches, nor more than 72 inches. |
| License plate lamp. | At rear license plate, to illuminate the plate from the top or sides. | At rear license plate, to illuminate the plate from the top or sides. | No requirement. |
| Backup lamp | On the rear | Not required | No requirement. |
| Turn signal lamps. | At or near the front—1 amber on each side of the vertical centerline, at the same height, and as far apart as practicable.<br>On the rear—1 red or amber on each side of the vertical centerline, at the same height, and as far apart as practicable. | On the rear—1 red or amber on each side of the vertical centerline, at the same height, and as far apart as practicable. | Not less than 15 inches, nor more than 83 inches. |
| Identification lamps. | On the front and rear—3 lamps, amber in front, red in rear, as close as practicable to the top of the vehicle, at the same height, one on the vertical centerline, and one on each side of the vertical centerline with lamp centers spaced not less than 6 inches or more than 12 inches apart. | On the rear—3 red lamps as close as practicable to the top of the vehicle, at the same height, one on the vertical centerline, and one on each side of the vertical centerline with lamp centers spaced not less than 6 inches or more than 12 inches apart. | On the front only—No part of the lamps or mountings shall extend below the top of the vehicle's windshield. |
| Clearance lamps. | On the front and rear—2 amber lamps on front, 2 red lamps on rear, to indicate the overall width of the vehicle, one on each side of the vertical centerline, at the same height, and as near the top as practicable.[2] | On the front and rear—2 amber lamps on front, 2 red lamps on rear, to indicate the overall width of the vehicle, one on each side of the vertical centerline, at the same height, and as near the top thereof as practicable.[2 4] | No requirement. |
| Intermediate side marker lamps. | On each side—1 amber lamp located at or near the midpoint between the front and rear side marker lamps. | On each side—1 amber lamp located at or near the midpoint between the front and rear side marker lamps. | Not less than 15 inches |
| Intermediate side reflex reflectors. | On each side—1 amber located at or near the midpoint between the front and rear side reflex reflectors. | On each side—1 amber located at or near the midpoint between the front and rear side reflex reflectors. | Not less than 15 inches nor more than 60 inches. |
| Reflex reflectors. | On the rear—1 red on each side of the vertical centerline, as far apart as practicable, and at the same height.[2]<br>On each side—1 red as far to the rear as practicable, and 1 amber as far to the front as practicable. | On the rear—1 red on each side of the vertical centerline, as far apart as practicable, and at the same height.<br>On each side—1 red as far to the rear as practicable, and 1 amber as far to the front as practicable. | Not less than 15 inches nor more than 60 inches. |

TABLE II.—LOCATION OF REQUIRED EQUIPMENT—Continued

MULTIPURPOSE PASSENGER VEHICLES, TRUCKS, TRAILERS, AND BUSES, OF 80 OR MORE INCHES OVERALL WIDTH

| Item | Location on— Multipurpose passenger vehicles, trucks, and buses | Location on— Trailers | Height above road surface measured from center of item on vehicle at curb weight |
|---|---|---|---|
| Side marker lamps. | On each side—1 red as far to the rear as practicable, and 1 amber as far to the front as practicable. | On each side—1 red as far to the rear as practicable, and 1 amber as far to the front as practicable. | Not less than 15 inches. |

[2] See S4.3.1.7. [3] See S4.3.1.3. [4] See S4.3.1.5. [5] See S4.1.1.9.

TABLE III.—REQUIRED MOTOR VEHICLE LIGHTING EQUIPMENT

ALL PASSENGER CARS AND MOTORCYCLES, AND MULTIPURPOSE PASSENGER VEHICLES, TRUCKS, TRAILERS, AND BUSES, OF LESS THAN 80 INCHES OVERALL WIDTH

| Item | Passenger cars, multipurpose passenger vehicles, trucks, and buses | Trailers | Motorcycles | Applicable SAE standard or recommended practice |
|---|---|---|---|---|
| Headlamps | 2 white, 7-inch, Type 2 headlamp units; or 2 white, 5¾-inch, Type 1 headlamp units and 2 white, 5¾-inch, Type 2 headlamp units. | | | J580a, June 1966, J579a, August 1965, and J566, January 1960. |
| | | | 1 white | J584, April 1964 and J566, January 1960 |
| Taillamps | 2 red | 2 red | 1 red | J585c, June 1966. |
| Stoplamps | 2 red [1 2] | 2 red [1] | 1 red [1] | J586b, June 1966. |
| License plate lamp | 1 white [2 11] | 1 white [2 11] | 1 white [2 11] | J587d, March 1969. |
| Parking lamps | 2 amber or white [6] | None | None | J592c, November 1968. |
| Reflex reflectors | 4 red; 2 amber [1] | 4 red; 2 amber | 3 red; 2 amber | J594d, March 1967. |
| Intermediate side reflex reflectors. | 2 amber [10] | 2 amber [10] | None | J594d, March 1967. |
| Intermediate side marker lamps. | 2 amber [10] | 2 amber [10] | None | J592c, November 1968. |
| Side marker lamps | 2 red; 2 amber [1] | 2 red; 2 amber | None | J592c, November 1968. |
| Backup lamp | 1 white [2 11] | None | None | J593c, February 1968. |
| Turn signal lamps | 2 Class A red or amber; 2 Class A amber. [2 7] | 2 Class A red or amber. | 2 Class B amber; 2 Class B red or amber. [7 12] | J588d, June 1966. |
| Turn signal operating unit. | 1 [8 13] | None | 1 [12 14] | J589, April 1964. |
| Turn signal flasher | 1 [8] | None | 1 [12] | J590b, October 1965. |
| Vehicular hazard warning signal operating unit. | 1 | None | None | J910, January 1966. |
| Vehicular hazard warning signal flasher. | 1 [8] | None | None | J945, February 1966. |

[1] See S4.1.1.6. [2] See S4.1.1.7. [3] See S4.1.1.10. [4] See S4.1.1.12. [5] See S4.1.1.2.
[6] See S4.4.2. [7] See S4.5.6. [8] See S4.1.1.11. [9] See S4.1.1.5. [10] See S4.1.1.3.
[11] See S4.1.1.15. [12] See S4.1.1.14. [13] See S4.1.1.13. [14] See S4.1.1.16.

TABLE IV.—LOCATION OF REQUIRED EQUIPMENT

ALL PASSENGER CARS AND MOTORCYCLES, AND MULTIPURPOSE PASSENGER VEHICLES, TRUCKS, TRAILERS, AND BUSES, OF LESS THAN 80 INCHES OVERALL WIDTH

| Item | Location on | | Height above road surface measured from center of item on vehicle at curb weight |
|---|---|---|---|
| | Passenger cars, multipurpose passenger vehicles, trucks, trailers, and buses | Motorcycles | |
| Column 1 | Column 2 | Column 3 | Column 4 |
| Headlamps | Type 1 headlamps at the same height, 1 on each side of the vertical centerline; Type 2 headlamps at the same height 1 on each side of the vertical centerline; as far apart as practicable. | On the vertical centerline, except that if two are used, they shall be symmetrically disposed about the vertical centerline. | Not less than 24 inches, nor more than 54 inches. |
| Taillamps | On the rear—1 on each side of the vertical centerline, at the same height, and as far apart as practicable. | On the rear—on the vertical centerline except that if two are used, they shall be symmetrically disposed about the vertical centerline. | Not less than 15 inches, nor more than 72 inches. |
| Stoplamps | On the rear—1 on each side of the vertical centerline, at the same height, and as far apart as practicable. | On the rear—on the vertical centerline except that if two are used, they shall be symmetrically disposed about the vertical centerline. | Not less than 15 inches, nor more than 72 inches. |
| License plate lamp. | At rear license plate, to illuminate the plate from the top or sides. | At rear license plate | No requirement. |
| Parking lamps. | On the front—1 on each side of the vertical centerline, at the same height, and as far apart as practicable. | Not required | Not less than 15 inches, nor more than 72 inches. |
| Reflex reflectors. | On the rear—1 red on each side of the vertical centerline, at the same height, and as far apart as practicable.<br>On each side—1 red as far to the rear as practicable, and 1 amber as far to the front as practicable. | On the rear—1 red on the vertical centerline except that, if two are used on the rear, they shall be symmetrically disposed about the vertical centerline.<br>On each side—1 red as far to the rear as practicable, and 1 amber as far to the front as practicable. | Not less than 15 inches nor more than 60 inches. |
| Backup lamp | On the rear | Not required | No requirement. |
| Turn signal lamps.[1] | At or near the front—1 amber on each side of the vertical centerline, at the same height, and as far apart as practicable.<br>On the rear—1 red or amber on each side of the vertical centerline, at the same height, and as far apart as practicable. | At or near the front—1 amber on each side of the vertical centerline at the same height, and having a minimum horizontal separation distance (centerline of lamps) of 16 inches. Minimum edge to edge separation distance between lamp and headlamp is 4 inches.<br>At or near the rear—1 red or amber on each side of the vertical centerline, at the same height and having a minimum horizontal separation distance (centerline to centerline of lamps) of 9 inches. Minimum edge to edge separation distance between lamp and tail or stop lamp is 4 inches. | Not less than 15 inches, nor more than 83 inches. |
| Side marker lamps. | On each side—1 red as far to the rear as practicable; and 1 amber as far to the front as practicable. | Not required | Not less than 15 inches. |
| Intermediate side marker lamps. | On each side—1 amber located at or near the midpoint between the front and rear side marker lamps. | Not required | Not less than 15 inches. |
| Intermediate side marker reflectors. | On each side—1 amber located at or near the midpoint between the front and rear side marker reflectors. | Not required | Not less than 15 inches, nor more than 60 inches. |

[1] Front turn signal lamps not required for trailers.

NOTE: (1) The term "overall width" refers to the nominal design dimension of the widest part of the vehicle, exclusive of signal lamps, marker lamps, outside rearview mirrors, flexible fender extensions, and mud flaps, determine with doors and windows closed, and the wheels in the straight-ahead position.

This supersedes the interpretation of the term "overall width" appearing in the FEDERAL REGISTER of March 1, 1967 (32 F.R. 3390).

(2) Paragraph S3.1 and Tables I and III of § 571.108 as amended (32 F.R. 18033, Dec. 16, 1967), specify that certain lamp assemblies shall conform to applicable SAE Standards. Each of these basically referenced standards subreferences both SAE Standard J575 (tests for motor vehicle lighting devices and components) which in turn references SAE Standard J573 on bulbs, and SAE Standard J567 on bulb sockets.

(3) Paragraph C of SAE Standard J575 states in part: "Where special bulbs are specified, they should be submitted with the devices and the same or similar bulbs used in the tests and operated at their rated mean spherical candlepower." The Administrator has determined that this provision of SAE Standard J575 permits the use of special bulbs, including tubular-type bulbs, which do not conform to the detailed requirements of Table I of SAE Standard J573. It follows that the sockets for special bulbs need not conform to the detailed requirements of SAE Standard J567. These provisions for special bulbs in no way except the lamp assemblies from meeting all performance requirements specified in Federal Standard No. 108, including those specified in the basically referenced SAE Standards, and in the subreferenced SAE Standard J575.

## § 571.108 Standard No. 108; Lamps, reflective devices, and associated equipment.

S1. *Purpose and scope.* This standard specifies requirements for original and replacement lamps, reflective devices, and associated equipment necessary for signaling and for the safe operation of motor vehicles during darkness and other conditions of reduced visibility.

S2. *Application.* This standard applies to passenger cars, multipurpose passenger vehicles, trucks, buses, trailers (except pole trailers and trailer converter dollies), and motorcycles, and to lamps, reflective devices, and associated equipment for replacement of like equipment on vehicles to which this standard applies.

S3. *Definitions.* "Flash" means a cycle of activation and deactivation of a lamp by automatic means continuing until stopped either automatically or manually.

S4. *Requirements.*

S4.1 *Required motor vehicle lighting equipment.*

S4.1.1 Except as provided in S4.1.1.1 through S4.1.1.16, each vehicle shall be equipped with at least the number of lamps, reflective devices, and associated equipment specified in Tables I and III, as applicable. Required equipment shall be designed to conform to the SAE Standards or Recommended Practices referenced in those tables. Table I applies to multipurpose passenger vehicles, trucks, trailers, and buses, 80 or more inches in overall width. Table III applies to passenger cars and motorcycles and to multipurpose passenger vehicles, trucks, trailers, and buses, less than 80 inches in overall width.

S4.1.1.1. A truck tractor need not be equipped with turn signal lamps mounted on the rear if the turn signal lamps at or near the front are so constructed (double-faced) and so located that they meet the requirements for double-faced turn signals specified in SAE Standard J588d, "Turn Signal Lamps", June 1966.

S4.1.1.2 A truck tractor need not be equipped with any rear side marker devices, rear clearance lamps, and rear identification lamps.

S4.1.1.3 Intermediate side marker devices are not required on vehicles less than 30 feet in overall length.

S4.1.1.4 Reflective material conforming to Federal Specification L–S–300, "Sheeting and Tape, Reflective; Nonexposed Lens, Adhesive Backing," September 7, 1965, may be used for side reflex reflectors if this material, as used on the vehicle, meets the performance standards in Table I of SAE Standard J594d, "Reflex Reflectors," March 1967.

S4.1.1.5 The turn signal operating unit on each passenger car, and multipurpose passenger vehicle, truck, and bus less than 80 inches in overall width manufactured on or after January 1, 1973, shall be self-canceling by steering wheel rotation and capable of cancellation by a manually operated control.

S4.1.1.6 A stop lamp on any vehicle manufactured on or after January 1, 1973, shall meet the photometric minimum candlepower requirements for Class A red turn signal lamps specified in SAE Standard J575d, "Test for Motor Vehicle Lighting Devices and Components," August 1967.

S4.1.1.7 Stop lamps on each passenger car manufactured on or after January 1, 1973, and turn signal lamps on each passenger car shall meet the photometric minimum candlepower requirements for Class A turn signal lamps, and shall have effective projected illuminated areas not less than those of Class B lamps as specified in SAE Standard J588d, 'Turn Signal Lamps,' June 1966. If multiple compartment lamps or multiple lamps are used, the effective projected illuminated area of each compartment or lamp shall be not less than that of a Class B lamp; however, Class A photometric requirements may be met by a combination of compartments or lamps.

S4.1.1.8 For each passenger car, and each multipurpose passenger vehicle, truck, trailer, and bus of less than 80 inches in overall width the photometric minimum candlepower requirements for side marker lamps specified in SAE Standard J592c, "Clearance, Side Marker, Identification, and Parking Lamps," November 1968, may be met for all inboard test points at a distance of 15 feet from the vehicle and on a vertical plane that is perpendicular to the longitudinal axis of the vehicle and located midway between the front and rear side marker lamps.

S4.1.1.9 Boat trailers need not be equipped with both front and rear clearance lamps provided an amber (to front) and red (to rear) clearance lamp is located at or near the midpoint on each side of the trailer so as to indicate its extreme width.

S4.1.1.10 Multiple license plate lamps and backup lamps may be used to fulfill the requirements of the SAE Standards applicable to such lamps referenced in Tables I and III.

S4.1.1.11 The minimum and maximum candlepower for parking lamps shall be:

| Test point (degrees) | | Minimum candlepower | Maximum candlepower |
|---|---|---|---|
| 10U | 10L | 0.8 | 125 |
| | V | .8 | 125 |
| | 10R | .8 | 125 |
| 5U | 20L | .4 | 125 |
| | 10L | .8 | 125 |
| | 5L | 1.4 | 125 |
| | V | 2.8 | 125 |
| | 5R | 1.4 | 125 |
| | 10R | .8 | 125 |
| | 20R | .4 | 125 |
| H | 20L | .4 | 125 |
| | 10L | 1.4 | 125 |
| | 5L | 3.6 | 125 |
| | V | 4.0 | 125 |
| | 5R | 3.6 | 125 |
| | 10R | 1.4 | 125 |
| | 20R | .4 | 125 |
| 5D | 20L | .4 | 250 |
| | 10L | .8 | 250 |
| | 5L | 1.4 | 250 |
| | V | 2.8 | 250 |
| | 5R | 1.4 | 250 |
| | 10R | .8 | 250 |
| | 20R | .4 | 250 |
| 10D | 10L | .8 | 250 |
| | V | .8 | 250 |
| | 10 | .8 | 250 |

U=up L=left R=right H=horizontal V=vertical D=down.

S4.1.1.12 A motorcycle manufactured before January 1, 1973, need not be equipped with turn signal lamps, flashers, and switches.

S4.1.1.13 In lieu of conformance with SAE Standard J593c, February 1968, a vehicle manufactured before January 1, 1973, may be equipped with backup lamps conforming to SAE Standard J593b, May 1966, and the installation requirements of SAE Standard J593c, February 1968.

S4.1.1.14 A vehicle manufactured before January 1, 1973, may be equipped with license plate lamps conforming to SAE Standard J587b, April 1964, instead of SAE Standard J587d, March 1969, and the lamps need not illuminate the plate from the top or sides.

S4.1.1.15 All passenger cars, and multipurpose passenger vehicles, trucks, and buses of less than 80 inches overall width manufactured before January 1, 1973, may be equipped with Class B turn signal operating units. Such vehicles manufactured on or after January 1, 1973, shall be equipped with turn signal operating units designed to complete a durability test of 100,000 cycles.

S4.1.1.16 In addition to the equipment required by Table I or Table III, each passenger car, multipurpose passenger vehicle, truck, and bus shall be equipped with a turn signal flasher and a hazard warning signal flasher, and each motorcycle shall be equipped with a turn signal flasher, that meets the requirements of paragraph S4.6 of this standard.

S4.1.2 Plastic materials used for optical parts such as lenses and reflectors shall conform to SAE Recommended Practice J576b, "Plastic Materials for Use in Optical Parts, such as Lenses and Reflectors, of Motor Vehicle Lighting Devices," August 1966. Plastic materials used as inner lenses or those covered by another material and not exposed directly to sunlight shall meet the requirements of paragraphs 3.4 and 4.2 of SAE J576b when covered by the outer lens or other material. Except for a stop lamp lens or a backup lamp lens, each plastic lens shall conform to section L, "Warpage Test Devices with Plastic Lenses", of SAE Standard J575d, "Test for Motor Vehicle Lighting Devices and Components", August 1967. A plastic lens for a stop lamp or a backup lamp manufactured on or after January 1, 1973, shall conform to section L of SAE Standard J575d and shall be tested with the lamp cycled on for 10 minutes and off for 10 minutes through the 1-hour warpage test.

S4.1.3 No additional lamp, reflective device, or other motor vehicle equipment shall be installed that impairs the effectiveness of lighting equipment required by this standard.

S4.1.4 Each school bus shall be equipped with a system of either:

(a) Four red signal lamps designed to conform to SAE Standard J887, "School Bus Red Signal Lamps," July 1964, and installed in accordance with that standard; or

(b) Four red signal lamps designed to conform to SAE Standard J887, "School Bus Red Signal Lamps," July 1964, and four amber signal lamps designed to conform to that standard, except for their color, and except that their candlepower shall be at least 2½ times that specified for red signal lamps. Both red and amber lamps shall be installed in accordance with SAE Standard J887, except that:

(i) Each amber signal lamp shall be located near each red signal lamp, at the same level, but closer to the vertical centerline of the bus; and

(ii) The system shall be wired so that the amber signal lamps are activated only by manual or foot operation, and if activated, are automatically deactivated and the red signal lamps automatically activated when the bus entrance door is opened.

S4.1.5 The color in all lighting equipment covered by this standard shall be in accordance with SAE Standard J578a, April 1965, "Color Specification for Electric Signal Lighting Devices".

S4.2 *Other requirements.*

S4.2.1 The words "it is recommended that," "recommendations," or "should be" appearing in any SAE Standard or Recommended Practice referenced or subreferenced in this standard shall be read as setting forth mandatory requirements, except that the aiming pads on the lens face and the black area surrounding the signal lamp, recommended in SAE Standard J887, "School Bus Red Signal Lamps," July 1964, are not required.

S4.3 *Location of required equipment.*

S4.3.1 Except as provided in S4.3.1.1 through S4.3.1.8, each lamp, reflective device, and item of associated equipment shall be securely mounted on a rigid part of the vehicle other than glazing that is not designed to be removed except for repair, in accordance with the requirements of Table I or III and in locations specified in Table II (multipurpose passenger vehicles, trucks, trailers, and buses 80 or more inches in overall width) or Table IV (all passenger cars, and motorcycles, and multipurpose passenger vehicles, trucks, trailers, and buses less than 80 inches in overall width), as applicable.

S4.3.1.1 Each lamp and reflective device shall be located so that it meets the visibility requirements specified in any applicable SAE Standard or Recommended Practice. In addition, no part of the vehicle shall prevent the device from meeting the photometric output at any test point specified in any applicable SAE Standard or Recommended Practice. However, if motor vehicle equipment (e.g., mirrors, snow plows, wrecker booms, backhoes, and winches) prevents compliance with this paragraph by any required lamp or reflective device, an auxiliary lamp or device meeting the requirements of this paragraph shall be provided.

S4.3.1.2 When testing the photometric minimum candlepower specified

in SAE Standard J594d, "Reflex Reflectors," March 1967, the axis of the side reflex reflectors shall be perpendicular to a vertical plane through the longitudinal axis of the vehicle.

S4.3.1.3 On a truck tractor, the red rear reflex reflectors may be mounted on the back of the cab, at a minimum height not less than 4 inches above the height of the rear tires.

S4.3.1.4 On a trailer, the amber front side reflex reflectors and amber front side marker lamps may be located as far forward as practicable exclusive of the trailer tongue.

S4.3.1.5 When the rear identification lamps are mounted at the extreme height of a vehicle, rear clearance lamps need not meet the requirement of Table II that they be located as close as practicable to the top of the vehicle.

S4.3.1.6 The center of the lens referred to in SAE Standard J593c, "Back-up Lamps," February 1968, is the optical center.

S4.3.1.7 On a truck tractor, clearance lamps mounted on the cab may be located to indicate the width of the cab, rather than the overall width of the vehicle.

S4.4 *Equipment combinations.*

S4.4.1 Two or more lamps, reflective devices, or items of associated equipment may be combined if the requirements for each lamp, reflective device, and item of associated equipment are met, except that no clearance lamp may be combined optically with any taillamp or identification lamp.

S4.5 *Special wiring requirements.*

S4.5.1 Each vehicle shall have a means of switching between lower and upper headlamp beams that conforms to SAE Recommended Practice J564a, "Headlamp Beam Switching," April 1964, or to SAE Recommended Practice J565b, "Semi-Automatic Headlamp Beam Switching Devices," February 1969.

S4.5.2 Each vehicle shall have a means for indicating to the driver when the upper beams of the headlamps are on that conforms to SAE Recommended Practice J564a, April 1964, except that the signal color need not be red.

S4.5.3 The taillamps on each vehicle shall be activated when the headlamps are activated in a steady-burning state.

S4.5.4 The stoplamps on each vehicle shall be activated upon application of the service brakes.

S4.5.5 The vehicular hazard warning signal operating unit on each vehicle shall operate independently of the ignition or equivalent switch, and when activated, shall cause to flash simultaneously sufficient turn signal lamps to meet the turn signal lamp photometric requirements of S.4.1.1.7 (for passenger cars), or Class A photometric values as specified in SAE Standard J588d, "Turn Signal Lamps," June 1966 (for all other vehicles).

S4.5.6 Each vehicle equipped with a turn signal operating unit shall also have an illuminated pilot indicator. Except on a truck, bus, or multipurpose passenger vehicle 80 or more inches in overall width and on any other vehicle equipped to tow trailers, failure of one or more turn signal lamps to operate shall be indicated in accordance with SAE Standard J588d, "Turn Signal Lamps," June 1966.

S4.5.7 On all passenger cars, and motorcycles, and multipurpose passenger vehicles, trucks, and buses of less than 80 inches overall width:

(a) When the parking lamps are activated, the taillamps, license plate lamps, and side marker lamps shall also be activated; and

(b) When the headlamps are activated in a steady-burning state, the taillamps, parking lamps, license plate lamps and side marker lamps shall also be activated.

S4.5.8 When activated:

(a) Turn signal lamps, hazard warning signal lamps, and school bus warning lamps shall flash; and

(b) All other lamps shall be steady-burning, except that means may be provided to flash headlamps and side marker lamps for signaling purposes.

S4.6 *Turn signal flashers; hazard warning signal flashers.* Each turn signal flasher and hazard warning signal flasher shall meet the following performance and durability requirements when tested in accordance with SAE Standard J823b, "Flasher Test Equipment," April 1968. The design load used in testing each flasher used as original motor vehicle equipment shall be the design current of the motor vehicle on which the flasher is installed. The design load used in testing each fixed-load flasher used as replacement motor vehicle equipment shall be stated by the flasher manufacturer as a single design load. The design load used in testing each variable-load flasher used as replacement motor vehicle equipment shall be stated by the flasher manufacturer as minimum and maximum design loads. The maximum design load shall be used to determine voltage drop (S4.6.1.2) and conformance to durability requirements (S4.6.2). The minimum and maximum design loads shall both be used to determine starting time (S4.6.1.1) and percent current "on" time (S4.6.1.3).

S4.6.1 *Performance requirements.*

S4.6.1.1 *Starting time.* When tested under the following conditions, the time required for closed contacts to open (on a flasher with normally closed contacts) or for open contacts to close and open again (on a flasher with normally open contacts) shall not exceed 2 seconds for a turn signal flasher, and 3 seconds for a hazard warning signal flasher.

(a) Ambient temperature is 75° F.

(b) Measurement of time starts when the voltage is initially applied.

(c) The design load is connected in the standard test circuit with the power source adjusted as specified in SAE Standard J823b.

(d) The test is run three times, each of which is separated by a cooling interval of 5 minutes, and the results are averaged to determine starting time.

S4.6.1.2 *Voltage drop.* When tested under the following conditions, the lowest voltage drop across a flasher shall not exceed 0.8 volt.

(a) Ambient temperature is 75° F.

(b) The design load is connected in the standard test circuit with the power source adjusted as specified in SAE Standard J823b.

(c) The voltage drop is measured between the input and the load terminals at the flasher and during the "on" period after the flasher has completed at least five consecutive cycles.

S4.6.1.3 *Flash rate and percent current "on" time.* The flash rate and the percent current "on" time of normally closed type flashers shall be within the unshaded portion of Figure 1 and those for normally open type flashers shall be within the entire rectangle of Figure 1, including the shaded areas.

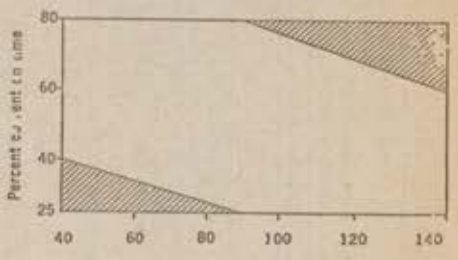



Figure 1

Each flasher shall meet these requirements under the following conditions:

(a) The flash rate and percent current "on" time are measured after the flasher has been operating for five consecutive cycles, and is calculated upon an average of not less than three consecutive cycles.

(b) For turn signal flashers, the operating tolerances apply over the combinations of bulb voltages and temperatures listed below as applicable:

(i) 12.8 or 6.4 volts; 75° F.
(ii) 12.0 or 6.0 volts; 0° F.
(iii) 15.0 or 7.5 volts; 0° F.
(iv) 11.0 or 5.5 volts; 125° F.
(v) 14.0 or 7.0 volts; 125° F.

(c) For hazard warning signal flashers, the operating tolerances apply over the combinations of bulb voltages and ambient temperatures listed below as applicable:

(i) 12.8 or 6.4 volts; 75° F.
(ii) 11.0 or 5.5 volts; 0° F.
(iii) 13.0 or 6.5 volts; 0° F.
(iv) 11.0 or 5.5 volts; 125° F.
(v) 13.0 or 6.5 volts; 125° F.

S4.6.2 *Durability requirements.*

S4.6.2.1 *Turn signal flashers.* Each turn signal flasher shall operate continuously for not less than 25 hours with the design load connected in the standard test circuit with the power source adjusted to apply 14 volts or 7.0 volts to the input terminals of the circuit. Each flasher shall then meet the requirements of paragraphs S4.6.1.1, S4.6.1.2, and

S4.6.1.3 under the conditions of S4.6.1.3 (a) and (b)(i). The ambient temperature for the durability test is 75° F.

S4.6.2.2 *Hazard warning signal flashers.* Each hazard warning signal flasher shall operate continuously for not less than 12 hours with the design load connected in the standard test circuit with the power source adjusted to apply 13 volts or 6.5 volts to the input terminals of the circuit. Each flasher shall then meet the requirements of paragraphs S4.6.1.1, S4.6.1.2, and S4.6.1.3 under the conditions of S4.6.1.3 (a) and (c)(i). The ambient temperature for the durability test is 75° F.

S4.6.3 *Combination flashers.* Each combination turn signal and hazard warning signal flasher shall meet the requirements of paragraph S4.6.1 and S4.6.2 when tested in the following sequence:

(a) For performance as a turn signal flasher pursuant to paragraph S4.6.1;

(b) For performance as a hazard warning signal flasher pursuant to paragraph S4.6.1;

(c) For durability as a turn signal flasher pursuant to paragraph S4.6.2.1; and

(d) For durability as a hazard warning signal flasher pursuant to paragraph S4.6.2.2.

S4.7 *Replacement equipment.* Each lamp, reflective device, or item of associated equipment manufactured to replace any lamp, reflective device, or item of associated equipment on any vehicle to which this standard applies, shall be designed to conform with this standard.

S5. *Subreferenced SAE Standards and Recommended Practices.*

S5.1 SAE Standards and Recommended Practices subreferenced by the SAE Standards and Recommended Practices included in Tables I and III and paragraphs S4.1.4 and S4.5.1 are those published in the 1970 edition of the SAE Handbook.

S5.2 In subreferenced SAE Standard J575d, "Tests of Motor Vehicle Lighting Devices and Components," August 1967, the maximum photometric candlepower values for one-compartment and two-compartment stop lamps shall be 300 candlepower.

TABLE I.—REQUIRED MOTOR VEHICLE LIGHTING EQUIPMENT

MULTIPURPOSE PASSENGER VEHICLES, TRUCKS, TRAILERS, AND BUSES, OF 80 OR MORE INCHES OVERALL WIDTH

| Item | Multipurpose passenger vehicles, trucks, and buses | Trailers | Applicable SAE standard or recommended practice |
|---|---|---|---|
| Headlamps | 2 white, 7-inch, Type 2 headlamp units; or 2 white, 5¾-inch, Type 1 headlamp units and 2 white 5¾-inch, Type 2 headlamp units. | None | J580a, June 1966; J579a, August 1965; and J566, January 1960. |
| Taillamps | 2 red [2] | 2 red | J585c, June 1966. |
| Stoplamps | 2 red [2] | 2 red [2] | J586b, June 1966. |
| License plate lamp | 1 white [2 3] | 1 white [2 3] | J587d, March 1969. |
| Reflex reflectors | 4 red; 2 amber [4] | 4 red; 2 amber | J594d, March 1967. |
| Side marker lamps | 2 red; 2 amber [5] | 2 red; 2 amber | J592c, November 1968. |
| Backup lamp | 1 white [2 6] | None | J593c, February 1968. |
| Turn signal lamps | 2 Class A red or amber; 2 Class A amber.[3] | 2 Class A red or amber. | J588d, June 1966. |
| Turn signal operating unit. | 1 | None | J589, April 1964. |
| Vehicular hazard warning signal operating unit. | 1 | None | J910, January 1966. |

TABLE I.—REQUIRED MOTOR VEHICLE LIGHTING EQUIPMENT—Continued

MULTIPURPOSE PASSENGER VEHICLES, TRUCKS, TRAILERS, AND BUSES, OF 80 OR MORE INCHES OVERALL WIDTH—Con.

| Item | Multipurpose passenger vehicles, trucks, and buses | Trailers | Applicable SAE standard or recommended practice |
|---|---|---|---|
| Identification lamps | 3 amber; 3 red [2] | 3 red | J592c, November 1968. |
| Clearance lamps | 2 amber; 2 red [2] | 2 amber, 2 red | J592c, November 1968. |
| Intermediate side marker lamps. | 2 amber [5] | 2 amber [5] | J592c, November 1968. |
| Intermediate reflex reflectors. | 2 amber [4] | 2 amber [4] | J594d, March 1967. |

[1] See S4.1.1.6. [2] See S4.1.10. [3] See S4.5.6. [4] See S4.1.1.3.
[5] See S4.1.1.35. [6] See S4.1.1.14. [7] See S4.1.1.2.

TABLE II.—LOCATION OF REQUIRED EQUIPMENT

MULTIPURPOSE PASSENGER VEHICLES, TRUCKS, TRAILERS, AND BUSES, OF 80 OR MORE INCHES OVERALL WIDTH

| Item | Location on— | | Height above road surface measured from center of item on vehicle at curb weight |
|---|---|---|---|
| | Multipurpose passenger vehicles, trucks, and buses | Trailers | |
| Headlamps | Type 1 headlamps at the same height, 1 on each side of the vertical centerline; Type 2 head lamps at the same height, 1 on each side of the vertical centerline; as far apart as practicable. | Not required | Not less than 24 inches, nor more than 54 inches. |
| Taillamps | On the rear, 1 on each side of the vertical centerline, at the same height, and as far apart as practicable. | On the rear, 1 on each side of the vertical centerline, at the same height, and as far apart as practicable. | Not less than 15 inches, nor more than 72 inches. |
| Stoplamps | On the rear, 1 on each side of the vertical centerline, at the same height, and as far apart as practicable. | On the rear, 1 on each side of the vertical centerline, at the same height, and as far apart as practicable. | Not less than 15 inches, nor more than 72 inches. |
| License plate lamp. | At rear license plate, to illuminate the plate from the top or sides. | At rear license plate, to illuminate the plate from the top or sides. | No requirement. |
| Backup lamp | On the rear | Not required | No requirement. |
| Turn signal lamps. | At or near the front—1 amber on each side of the vertical centerline, at the same height, and as far apart as practicable.<br>On the rear—1 red or amber on each side of the vertical centerline, at the same height, and as far apart as practicable. | On the rear—1 red or amber on each side of the vertical centerline, at the same height, and as far apart as practicable. | Not less than 15 inches, nor more than 83 inches. |
| Identification lamps. | On the front and rear—3 lamps, amber in front, red in rear, as close as practicable to the top of the vehicle, at the same height, one on the vertical centerline, and one on each side of the vertical centerline with lamp centers spaced not less than 6 inches or more than 12 inches apart. | On the rear—3 red lamps as close as practicable to the top of the vehicle, at the same height, one on the vertical centerline, and one on each side of the vertical centerline with lamp centers spaced not less than 6 inches or more than 12 inches apart. | On the front only—No part of the lamps or mountings shall extend below the top of the vehicle's windshield. |
| Clearance lamps | On the front and rear—2 amber lamps on front, 2 red lamps on rear, to indicate the overall width of the vehicle, one on each side of the vertical centerline at the same height, and as near the top as practicable.[2] | On the front and rear—2 amber lamps on front, 2 red lamps on rear, to indicate the overall width of the vehicle, one on each side of the vertical centerline, at the same height, and as near the top thereof as practicable. [2 5] | No requirement. |
| Intermediate side marker lamps. | On each side—1 amber lamp located at or near the midpoint between the front and rear side marker lamps. | On each side—1 amber lamp located at or near the midpoint between the front and rear side marker lamps. | Not less than 15 inches. |

See footnotes at end of table.

TABLE II.—LOCATION OF REQUIRED EQUIPMENT—Continued

MULTIPURPOSE PASSENGER VEHICLES, TRUCKS, TRAILERS, AND BUSES, OF 80 OR MORE INCHES OVERALL WIDTH—Continued

| Item | Location on— | | Height above road surface measured from center of item on vehicle at curb weight |
|---|---|---|---|
| | Multipurpose passenger vehicles, trucks, and buses | Trailers | |
| Intermediate side reflex reflectors. | On each side—1 amber located at or near the midpoint between the front and rear side reflex reflectors. | On each side—1 amber located at or near the midpoint between the front and rear side reflex reflectors. | Not less than 15 inches nor more than 60 inches. |
| Reflex reflectors | On the rear—1 red on each side of the vertical centerline, as far apart as practicable, and at the same height.[3] On each side—1 red as far to the rear as practicable, and 1 amber as far to the front as practicable. | On the rear—1 red on each side of the vertical centerline, as far apart as practicable, and at same height. On each side—1 red as far to the rear as practicable, and 1 amber as far to the front as practicable. | Not less than 15 inches nor more than 60 inches. |
| Side marker lamps. | On each side—1 red as far to the rear as practicable, and 1 amber as far to the front as practicable. | On each side—1 red as far to the rear as practicable, and 1 amber as far to the front as practicable. | Not less than 15 inches. |

[3] See S4.3.1.7. [4] See S4.3.1.3. [5] See S4.3.1.5. [6] See S4.1.1.9.

TABLE III.—REQUIRED MOTOR VEHICLE LIGHTING EQUIPMENT

ALL PASSENGER CARS AND MOTORCYCLES, AND MULTIPURPOSE PASSENGER VEHICLES, TRUCKS, TRAILERS, AND BUSES, OF LESS THAN 80 INCHES OVERALL WIDTH

| Item | Passenger cars, multipurpose passenger vehicles, trucks, and buses | Trailers | Motorcycles | Applicable SAE standard or recommended practice |
|---|---|---|---|---|
| Headlamps | 2 white, 7-inch, Type 2 headlamp units; or 2 white, 5¾-inch, Type 1 headlamp units and 2 white, 5¾-inch, Type 2 headlamp units. | | | J580a, June 1966, J579a, August 1965, and J566, January 1960. |
| | | | 1 white | J584, April 1964 and J566, January 1960. |
| Taillamps | 2 red | 2 red | 1 red | J585c, June 1966. |
| Stoplamps | 2 red [1 2] | 2 red [1] | 1 red [1] | J586b, June 1966. |
| License plate lamp | 1 white [1 13] | 1 white [1 13] | 1 white [1 13] | J587d, March 1969. |
| Parking lamps | 2 amber or white [4] | None | None | J592c, November 1968. |
| Reflex reflectors | 4 red; 2 amber [3] | 4 red; 2 amber | 3 red; 2 amber | J594d, March 1967. |
| Intermediate side reflex reflectors. | 2 amber [12] | 2 amber [12] | None | J594d, March 1967. |
| Intermediate side marker lamps. | 2 amber [12] | 2 amber [12] | None | J592c, November 1968. |
| Side marker lamps | 2 red; 2 amber [5] | 2 red; 2 amber | None | J592c, November 1968. |
| Backup lamp | 1 white [1 13] | None | None | J593c, February 1968. |
| Turn signal lamps | 2 Class A red or amber; 2 Class A amber.[2 7] | 2 Class A red or amber. | 2 Class B amber[7] 2 Class B red or amber.[7 13] | J588d, June 1966. |
| Turn signal operating unit. | 1 [8 13] | None | 1 [8 13] | J589, April 1964. |
| Vehicular hazard warning signal operating unit. | 1 | None | None | J910, January 1966. |

[1] See S4.1.1.6. [2] See S4.1.1.7. [3] See S4.1.1.10. [4] See S4.1.1.12. [5] See S4.1.1.2. [7] See S4.5.6. [8] See S4.1.1.11. [9] See S4.1.1.5. [10] See S4.1.1.3. [11] See S4.1.1.15. [12] See S4.1.1.14. [13] See S4.1.1.13. [14] See S4.1.1.16.

TABLE IV.—LOCATION OF REQUIRED EQUIPMENT

ALL PASSENGER CARS AND MOTORCYCLES, AND MULTIPURPOSE PASSENGER VEHICLES, TRUCKS, TRAILERS, AND BUSES, OF LESS THAN 80 INCHES OVERALL WIDTH

| Item | Location on | | Height above road surface measured from center of item on vehicle at curb weight |
|---|---|---|---|
| | Passenger cars, multipurpose passenger vehicles, trucks, trailers, and buses | Motorcycles | |
| Column 1 | Column 2 | Column 3 | Column 4 |
| Headlamps | Type 1 headlamps at the same height, 1 on each side of the vertical centerline; Type 2 headlamps at the same height, 1 on each side of the vertical centerline; as far apart as practicable. | On the vertical centerline, except that if two are used, they shall be symmetrically disposed about the vertical centerline. | Not less than 24 inches, nor more than 54 inches. |
| Taillamps | On the rear—1 on each side of the vertical centerline, at the same height, and as far apart as practicable. | On the rear—on the vertical centerline except that if two are used, they shall be symmetrically disposed about the vertical centerline. | Not less than 15 inches, nor more than 72 inches. |
| Stoplamps | On the rear—1 on each side of the vertical centerline, at the same height, and as far apart as practicable. | On the rear—on the vertical centerline except that if two are used, they shall be symmetrically disposed about the vertical centerline. | Not less than 15 inches, nor more than 72 inches. |
| License plate lamp. | At rear license plate, to illuminate the plate from the top or sides. | At rear license plate | No requirement. |
| Parking lamps | On the front—1 on each side of the vertical centerline, at the same height, and as far apart as practicable. | Not required | Not less than 15 inches, nor more than 72 inches. |
| Reflex reflectors. | On the rear—1 red on each side of the vertical centerline, at the same height, and as far apart as practicable. On each side—1 red as far to the rear as practicable, and 1 amber as far to the front as practicable. | On the rear—1 red on the vertical centerline except that, if two are used on the rear, they shall be symmetrically disposed about the vertical centerline. On each side—1 red as far to the rear as practicable, and 1 amber as far to the front as practicable. | Not less than 15 inches, nor more than 60 inches. |
| Backup lamp | On the rear | Not required | No requirement. |
| Turn signal lamps.[1] | At or near the front—1 amber on each side of the vertical centerline, at the same height, and as far apart as practicable. On the rear—1 red or amber on each side of the vertical centerline, at the same height, and as far apart as practicable. | At or near the front—1 amber on each side of the vertical centerline at the same height; and having a minimum horizontal separation distance (centerline of lamps) of 16 inches. Minimum edge to edge separation distance between lamp and headlamp is 4 inches. At or near the rear—1 red or amber on each side of the vertical centerline, at the same height and having a minimum horizontal separation distance (centerline to centerline of lamps) of 9 inches. Minimum edge to edge separation distance between lamp and tail or stop lamp is 4 inches. | Not less than 15 inches, nor more than 83 inches. |
| Side marker lamps. | On each side—1 red as far to the rear as practicable, and 1 amber as far to the front as practicable. | Not required | Not less than 15 inches. |
| Intermediate side marker lamps. | On each side—1 amber located at or near the midpoint between the front and rear side marker lamps. | Not required | Not less than 15 inches. |
| Intermediate side marker reflectors. | On each side—1 amber located at or near the midpoint between the front and rear side marker reflectors. | Not required | Not less than 15 inches, nor more than 60 inches. |

[1] Front turn signal lamps not required for trailers.

§ 571.109 Standard No. 109; New pneumatic tires.

S1. *Purpose and scope.* This standard specifies tire dimensions and laboratory test requirements for bead unseating resistance, strength, endurance and high speed performance; defines tire load ratings; specifies labeling requirements; and sets forth the limited conditions under which passenger car tires that are not certified as complying with this standard may be sold.

S2. *Application.* This standard applies to new pneumatic tires for use on passenger cars manufactured after 1948.

S3. *Definitions.*

"Bead" means that part of the tire made of steel wires, wrapped or reinforced by ply cords, that is shaped to fit the rim.

"Bead separation" means a breakdown of bond between components in the bead area.

"Bias ply tire" means a pneumatic tire in which the ply cords that extend to the beads are laid at alternate angles substantially less than 90° to the centerline of the tread.

"Carcass" means the tire structure, except tread and sidewall rubber.

"Chunking" means the breaking away of pieces of the tread.

"Cord" means the strands forming the plies in the tire.

"Cord separation" means cords parting away from adjacent rubber compounds.

"Groove" means the space between two adjacent tread ribs.

"Load rating" means the maximum load a tire is rated to carry for a given inflation pressure.

"Maximum permissible inflation pressure" means the maximum cold inflation pressure to which a tire may be inflated.

"Maximum load rating" means the load rating at the maximum permissible inflation pressure for that tire.

"Overall width" means the linear distance between the exteriors of the sidewalls of an inflated tire, including elevations due to labeling, decorations, or protective bands or ribs.

"Ply" means a layer of rubber-coated parallel cords.

"Ply separation" means a parting of rubber compound between adjacent plies.

"Pneumatic tire" means a mechanical device made of rubber, chemicals, fabric and steel or other materials, which, when mounted on an automotive wheel, provides the traction and contains the gas or fluid that sustains the load.

"Radial ply tire" means a pneumatic tire in which the ply cords which extend to the beads are laid at substantially 90° to the centerline of the tread.

"Reclassified tire" means a tire designed for passenger car use that is not certified as complying with the requirement of this standard.

"Rim" means a metal support for a tire or a tire and tube assembly upon which the tire beads are seated.

"Section width" means the linear distance between the exteriors of the sidewalls of an inflated tire, excluding elevations due to labeling, decoration, or protective bands.

"Sidewall" means that portion of a tire between the tread and the bead.

"Size factor" means the sum of the section width and the outer diameter of a tire determined on the test rim.

"Test rim" means any rim of the applicable rim width specified in Table I for a particular tire size designation with the rim dimensions shown in the 1967 Tire and Rim Assocation Year Book, the 1967 Tire and Rim Association Supplementary Service Data Book, the Tyre and Wheel Engineering Data Book dated 1965/1966 of the Society of Motor Manufacturers and Traders Limited (SMMT), the Japan Automobile Tire Manufacturers Association, 1966 edition, the Japanese Industrial Standards (JIS–D4202) dated 1966, the European Tire and Rim Technical Organization practices (E.T.R.T.O.), the Deutsche Industrie Norm (DIN) 7818 dated June 1959, or Deutsche Industrie Norm (DIN) 7817 dated August 1962 or an approved equivalent rim.

"Tread" means that portion of a tire that comes into contact with the road.

"Tread rib" means a tread section running circumferentially around a tire.

"Tread separation" means pulling away of the tread from the tire carcass.

S4. *Requirements.*

S4.1 *Size and Construction.* Each tire shall be designed to fit each rim specified for its size designation in each reference cited in the definition of "test rim" in S3.

S4.2 *Performance Requirements.*

S4.2.1 *General.* Except as provided in S6, each tire shall conform to each of the following:

(a) It shall meet the requirements specified in S4.2.2 for its tire size designation, type, and maximum permissible inflation pressure.

(b) Its maximum permissible inflation pressure shall be either 32, 36, or 40 p.s.i.

(c) Its load rating shall be that specified in Table I for its size designation, type, and each appropriate inflation pressure.

(d) If manufactured on or after August 1, 1968, it shall incorporate a tread wear indicator that will provide a visual indication that the tire has worn to a tread depth of 1/16 inch.

S4.2.2 *Test requirements.*

S4.2.2.1 *Test sample.* For each test sample use—

(a) One tire for physical dimensions, resistance to bead unseating, and strength, in sequence;

(b) Another tire for tire endurance; and

(c) A third tire for high speed performance.

S4.2.2.2 *Physical Dimensions.* Each tire, when measured in accordance with S5.1, shall conform to each of the following:

(a) Its actual section width and overall width shall not exceed by more than 7 percent the section width specified in Table I for its size designation and type; and

(b) Its size factor shall be at least as large as that specified in Table I for its size designation and type.

S4.2.2.3 *Tubeless tire resistance to bead unseating.* When tested in accordance with S5.2, the applied force required to unseat the tire bead at the point of contact shall not be less than:

(a) 1,500 pounds for tires with a designated section width of less than six (6) inches;

(b) 2,000 pounds for tires with a designated section width of six (6) inches or more but less than eight (8) inches;

(c) 2,500 pounds for tires with a designated section width of eight (8) inches or more, using the section width specified in Table I for the applicable tire size designation and type.

S4.2.2.4 *Tire strength.* Each tire shall meet the requirements for minimum breaking energy specified in Table II when tested in accordance with S5.3.

S4.2.2.5 *Tire endurance.* After completion of the laboratory test wheel endurance test specified in S5.4, no tire shall have tread, ply, cord, or bead separation; chunking; or broken cords.

S4.2.2.6 *High speed performance.* After completion of the laboratory high speed performance test specified in S5.5, no tire shall have tread, ply, cord, or bead separation; chunking; or broken cords.

S4.3 *Labeling requirements.* Except as provided in S4.3.1 and S4.3.2, each tire shall be conspicuously labeled on both sidewalls with each of the following permanently molded into or onto the tire:

(a) One size designation, except that equivalent inch and metric size designations may be used.

(b) Maximum permissible inflation pressure.

(c) Maximum load rating.

(d) Composition of the material used in the ply cord.

(e) Actual number of plies in the sidewall and the actual number of plies in the tread area, if different.

(f) The word "tubeless" or "tube type", as applicable.

(g) The word "radial", if a radial ply tire.

S4.3.1 Each tire shall be labeled with the symbol DOT in the manner specified in Part 574 of this chapter, which shall constitute a certification that the tire conforms to applicable Federal motor vehicle safety standards.

S4.3.2 Each tire shall be labeled with the name of the manufacturer, or brand name and number assigned to the manufacturer in the manner specified in Part 574.

S4.3.3 Each tire manufactured between March 1, 1971, and May 22, 1971, shall either—

(a) Comply with S4.3(d)(2) and S4.3(i) (as effective until May 22, 1971); or

(b) Be labeled with the tire identification number required by 574.5 of this chapter and comply with S4.3.1 and S4.3.2 (as effective on and after May 22, 1971).

S5. *Test procedures.*

S5.1 *Physical Dimensions.* Determine tire physical dimensions under uniform ambient conditions as follows:

(a) Mount the tire on a test rim and inflate it to the applicable pressure specified in Table III.

(b) Condition it at ambient room temperature for at least 24 hours.

(c) Readjust pressure to that specified in (a).

(d) Caliper the section width and overall width at six points approximately equally spaced around the tire circumference.

(e) Record the average of these measurements as the section width and overall width, respectively.

(f) Determine tire outer diameter by measuring the maximum circumference of the tire and dividing this dimension by pi (3.14).

S5.2 *Tubeless tire bead unseating resistance.*

S5.2.1 *Preparation of tire-wheel assembly.*

S5.2.1.1 Wash the tire, dry it at the beads, and mount it without lubrication or adhesives on a clean, painted test rim.

S5.2.1.2 Inflate it to the applicable pressure specified in Table III at ambient room temperature.

S5.2.1.3 Mount the wheel and tire in the fixture shown in Figure 2, and force the standard block shown in Figure 3 against the tire sidewall as required by the geometry of the fixture.

S5.2.2 *Test procedure.*

S5.2.2.1 Apply a load through the block to the tire outer sidewall at the distance specified in Figure 2 for the applicable wheel size at a rate of 2 inches per minute, with the load arm substantially parallel to the tire and rim assembly at the time of engagement.

S5.2.2.2 Increase the load until the bead unseats or the applicable value specified in S4.2.2.3 is reached.

S5.2.2.3 Repeat the test at least four places equally spaced around the tire circumference.

S5.3 *Tire strength.*

S5.3.1 *Preparation of tire.*

S5.3.1.1 Mount the tire on a test rim and inflate it to the applicable pressure specified in Table III;

S5.3.1.2 Condition it at room temperature for at least 3 hours; and

S5.3.1.3 Readjust its pressure to that specified in S5.3.1.1.

S5.3.2 *Test procedure.*

S5.3.2.1 Force a ¾-inch diameter cylindrical steel plunger with a hemispherical end perpendicularly into the tread rib as near to the centerline as possible, avoiding penetration into the tread groove, at the rate of 2 inches per minute.

S5.3.2.2 Record the force and penetration at five test points equally spaced around the circumference of the tire. If the tire fails to break before the plunger is stopped by reaching the rim, record the force and penetration as the rim is reached and use these values in S5.3.2.3.

S5.3.2.3 Compute the breaking energy for each test point by means of the following formula:

$$W = \frac{F \times P}{2}$$

where

$W$ = Energy, inch-pounds;
$F$ = Force, pounds; and
$P$ = Penetration, inches.

S5.3.2.4 Determine the breaking energy value for the tire by computing the average of the five values obtained in accordance with S5.3.2.3.

S5.4 *Tire endurance.*

S5.4.1 *Preparation of tire.*

S5.4.1.1 Mount a new tire on a test rim and inflate it to the applicable pressure specified in Table III.

S5.4.1.2 Condition the tire assembly to 100±5° F. for at least three hours.

S5.4.1.3 Readjust tire pressure to that specified in S5.4.1.1 immediately before testing.

S5.4.2 *Test procedure.*

S5.4.2.1 Mount the tire and wheel assembly on a test axle and press it against a flat-faced steel test wheel 67.23 inches in diameter and at least as wide as the section width of the tire to be tested or an approved equivalent test wheel, with the applicable test load specified in Table I for the tire's size designation, type, and maximum permissible inflation pressure.

S5.4.2.2 During the test, the air surrounding the test area shall be 100±5° F.

S5.4.2.3 Conduct the test at 50 miles per hour in accordance with the following schedule without pressure adjustment or other interruptions:

| Maximum permissible inflation pressure (p.s.i.) | Load (from table I)— | | |
|---|---|---|---|
| | For 4 hours | For 6 hours | For 24 hours |
| 32 | 24 p.s.i. column. | 28 p.s.i. column. | 32 p.s.i. column. |
| 36 | 28 p.s.i. column. | 32 p.s.i. column. | 36 p.s.i. column. |
| 40 | 32 p.s.i. column. | 36 p.s.i. column. | 40 p.s.i. column. |

S5.5 *High speed performance.*

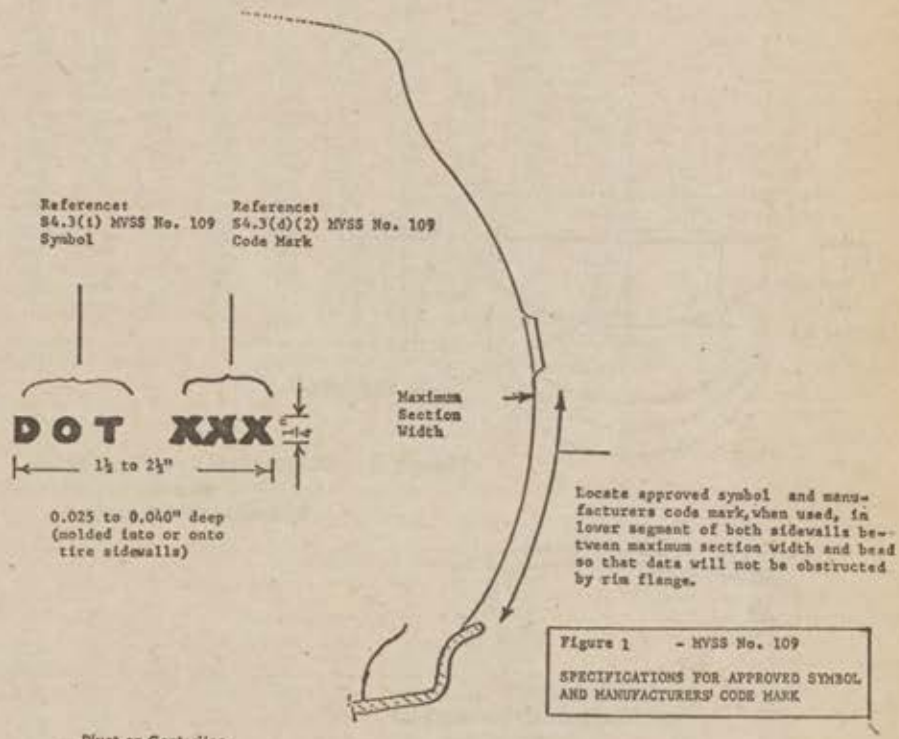
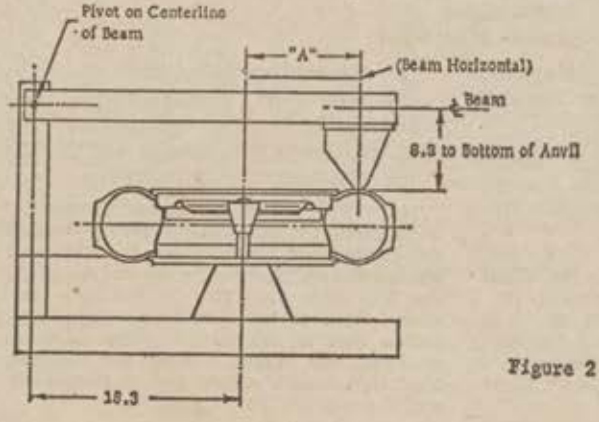



Figure 1 - MVSS No. 109

SPECIFICATIONS FOR APPROVED SYMBOL AND MANUFACTURERS' CODE MARK




| Wheel Size | Dim. "A" |
|---|---|
| 17 | 12.0 |
| 16 | 11.5 |
| 15 | 11.0 |
| 14 | 10.5 |
| 13 | 10.0 |
| 12 | 9.5 |
| 11 | 9.0 |
| 10 | 8.5 |

Figure 2 - Bead Unseating Fixture Dimensions in Inches

S5.5.1 After preparing the tire in accordance with S5.4.1, mount the tire and wheel assembly in accordance with S5.4.2.1, and press it against the test wheel with the load specified in Table I for the tire's size designation and the applicable pressure specified in Column B of the following table:

| A | B |
|---|---|
| *Maximum permissible inflation pressure (p.s.i.)* | *Load from Table I* |
| 32 | 24 p.s.i. column. |
| 36 | 28 p.s.i. column. |
| 40 | 32 p.s.i. column. |

S5.5.2 Break in the tire by running it for 2 hours at 50 m.p.h.

S5.5.3 Allow it to cool to 100±5° F. and readjust the inflation pressure to the applicable pressure specified in Table III.

S5.5.4 Without readjusting inflation pressure, test at 75 m.p.h. for 30 minutes, 80 m.p.h. for 30 minutes, and 85 m.p.h. for 30 minutes.

S6. *Requirements for reclassified tires.* Reclassified tires may be sold by the manufacturer under the following conditions only:

S6.1 *Labeling.* Each reclassified tire shall be labeled on both sidewalls with the information described in subparagraphs (a), (b), (c), and (d), permanently molded into or onto the tires, except that the number assigned the manufacturer and the information described in subparagraph (d) need only appear on one sidewall. All other labeling required by § 571.109 shall be removed.

(a) Size designation.

(b) Name of manufacturer or brand name and number assigned manufacturer pursuant to Part 574 of this chapter.

(c) The word "tubeless" or "tube type", as applicable.

(d) A serial number that enables the manufacturer or band name owner to identify the week and year of production.

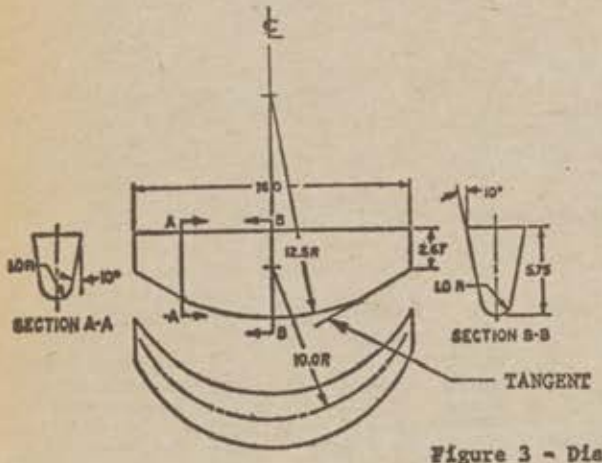
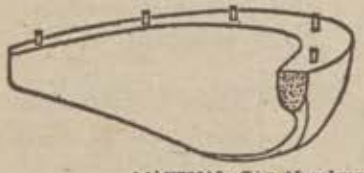



**Figure 3 - Diagram of Bead Unseating Block**
**Dimensions in Inches**



MATERIAL: Cast Aluminum #355
T-6 Condition
Finish - 50 Micro Inch

S6.1.1 Each reclassified tire shall have the words "Unsafe for Highway Use" impressed on both sidewalls in letters not less than one-half of an inch high between the maximum section width and tread. The depth and the stroke of the letters shall be not less than one-sixteenth of an inch.

S6.1.2 Each reclassified tire shall have two labels affixed to the tread surface, approximately 180° apart, in a manner so that they are not easily removable, and containing the following information in the English language in lettering not less than three thirty-seconds of an inch high:

(a) Name of manufacturer;

(b) The word "Manufactured," followed by the week of the year and the year, expressed numerically, as "25-70."

(c) The following statement:

This Tire Does Not Conform to the Requirements of the Federal Motor Vehicle Safety Standard for Passenger Car Tires and Should Not Be Used for Passenger Cars. Anyone Who Sells This Tire for Use on a Passenger Car, or Who Removes This Label Before Sale to the User, or Who Removes or Alters the Legend "Unsafe for Highway Use" Imprinted on This Tire Is Subject to a Civil Penalty of up to $1,000.

S6.2 *Reporting.* On July 31, 1971, each manufacturer reclassifying passenger car tires shall submit to: Reclassified Tires, National Highway Traffic Safety Administration, 400 Seventh Street SW., Washington, DC 20590 a report containing the information specified below for the period covering December 1, 1970 through June 30, 1971. Thereafter, each manufacturer reclassifying passenger car tires shall submit a report containing the information specified below on July 31 of each year for the period covering the preceding January 1 to June 30 and on January 31 of each year for the period covering the preceding July 1 to December 31.

(a) The number of tires reclassified that are not certified as meeting this standard and that are reclassified and branded "Unsafe for Highway Use."

(b) A list of the serial numbers of the tires reclassified and the distributors or dealers to whom these tires were sold.

APPENDIX A

The following tables list tire sizes and tire constructions with proper load and inflation values. The tables group tires of related constructions and load/inflation values. Persons requesting the addition of new tire sizes to the tables or the addition of tables for new tire constructions may, when the additions requested are compatible with existent groupings, or when adequate justification for new tables exists, submit five (5) copies of information and data supporting the request to the Secretary of Transportation, Attention: Motor Vehicle Programs, National Highway Traffic Safety Administration, U.S. Department of Transportation, Washington, D.C. 20590.

The information should contain the following:

1. The tire size designation, and a statement either that the tire is an addition to a category of tires listed in the tables or that it is in a new category for which a table has not been developed.

2. The tire dimensions, including aspect ratio, size factor, section width, overall width, and test rim size.

3. The load-inflation schedule of the tire.

4. A statement that the tire size designation and load inflation schedule has been coordinated with the Tire and Rim Association, the European Tire and Rim Technical Organisation, the Society of Manufacturers and Traders Limited, the Japan Automobile Tire Manufacturers Association, the Deutsche Industrie Norm and the Scandanavian Tire and Rim Organization.

5. Copies of test data sheets showing test conditions, results and conclusions obtained for individual tests specified in § 571.109.

6. Justification for the additional tire sizes.

TABLE I-A

(Amendment No. 5)

TIRE LOAD RATINGS, TEST RIMS, MINIMUM SIZE FACTORS, AND SECTION WIDTHS FOR CONVENTIONAL AND LOW SECTION HEIGHT BIAS PLY TIRES

| Tire size designation [1] | Maximum tire loads (pounds) at various cold inflation pressures (p.s.i.) | | | | | | | | | | | | | Test rim width (inches) | Minimum size factor (inches) | Section width [2] (inches) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 16 | 18 | 20 | 22 | 24 | 26 | 28 | 30 | 32 | 34 | 36 | 38 | 40 | | | |
| 6.00-13 | | | 770 | 820 | 860 | 900 | 930 | 970 | 1,010 | 1,040 | 1,080 | 1,110 | 1,140 | 4 | 29.37 | 6.00 |
| 6.50-13 | | | 890 | 930 | 980 | 1,030 | 1,070 | 1,110 | 1,150 | 1,190 | 1,230 | 1,270 | 1,300 | 4½ | 30.75 | 6.60 |
| 7.00-13 | | | 980 | 1,030 | 1,080 | 1,130 | 1,180 | 1,230 | 1,270 | 1,310 | 1,360 | 1,400 | 1,440 | 5 | 31.88 | 7.10 |
| 6.00-14 | | | 840 | 900 | 930 | 980 | 1,020 | 1,060 | 1,100 | 1,130 | 1,170 | 1,210 | 1,240 | 4 | 30.64 | 6.10 |
| 6.45-14 | | | 860 | 910 | 960 | 1,000 | 1,040 | 1,080 | 1,120 | 1,160 | 1,200 | 1,240 | 1,270 | 4½ | 30.92 | 6.60 |
| 6.50-14 | | | 930 | 990 | 1,030 | 1,080 | 1,130 | 1,170 | 1,210 | 1,250 | 1,300 | 1,330 | 1,370 | 4½ | 31.75 | 6.60 |
| 6.95-14 | | | 950 | 1,000 | 1,050 | 1,100 | 1,140 | 1,190 | 1,230 | 1,270 | 1,310 | 1,350 | 1,390 | 5 | 31.96 | 7.00 |
| 7.00-14 | | | 1,030 | 1,100 | 1,140 | 1,190 | 1,240 | 1,290 | 1,340 | 1,380 | 1,430 | 1,470 | 1,520 | 5 | 32.88 | 7.10 |
| 7.35-14 | | | 1,040 | 1,100 | 1,160 | 1,210 | 1,260 | 1,310 | 1,360 | 1,400 | 1,450 | 1,490 | 1,540 | 5 | 32.92 | 7.30 |
| 7.50-14 | | | 1,150 | 1,230 | 1,280 | 1,340 | 1,390 | 1,450 | 1,500 | 1,550 | 1,600 | 1,650 | 1,700 | 5½ | 34.19 | 7.65 |
| 7.75-14 | | | 1,150 | 1,210 | 1,270 | 1,330 | 1,390 | 1,440 | 1,500 | 1,550 | 1,600 | 1,650 | 1,690 | 5½ | 34.09 | 7.75 |
| 8.00-14 | | | 1,240 | 1,320 | 1,380 | 1,440 | 1,500 | 1,560 | 1,620 | 1,670 | 1,730 | 1,780 | 1,830 | 6 | 35.17 | 8.10 |
| 8.25-14 | | | 1,250 | 1,310 | 1,380 | 1,440 | 1,500 | 1,560 | 1,620 | 1,670 | 1,730 | 1,780 | 1,830 | 6 | 35.11 | 8.20 |
| 8.50-14 | | | 1,330 | 1,420 | 1,480 | 1,550 | 1,610 | 1,670 | 1,740 | 1,790 | 1,850 | 1,910 | 1,960 | 6 | 35.91 | 8.38 |
| 8.55-14 | | | 1,360 | 1,430 | 1,510 | 1,580 | 1,640 | 1,710 | 1,770 | 1,830 | 1,890 | 1,950 | 2,000 | 6 | 36.06 | 8.50 |
| 8.85-14 | | | 1,430 | 1,510 | 1,580 | 1,660 | 1,730 | 1,790 | 1,860 | 1,920 | 1,990 | 2,050 | 2,100 | 6½ | 36.82 | 8.98 |
| 9.00-14 | | | 1,430 | 1,510 | 1,580 | 1,660 | 1,730 | 1,790 | 1,860 | 1,920 | 1,990 | 2,050 | 2,100 | 6½ | 36.91 | 8.80 |
| 9.50-14 | | | 1,540 | 1,640 | 1,700 | 1,780 | 1,850 | 1,930 | 2,000 | 2,060 | 2,130 | 2,200 | 2,260 | 6½ | 37.74 | 9.05 |
| 6.00-15 | | | 890 | 940 | 980 | 1,030 | 1,070 | 1,110 | 1,150 | 1,190 | 1,230 | 1,270 | 1,300 | 4 | 31.64 | 6.10 |
| 6.50-15 | | | 980 | 1,040 | 1,080 | 1,130 | 1,180 | 1,230 | 1,270 | 1,320 | 1,360 | 1,400 | 1,440 | 4½ | 32.75 | 6.60 |
| 6.70-15 | | | 1,110 | 1,190 | 1,230 | 1,290 | 1,340 | 1,400 | 1,450 | 1,500 | 1,550 | 1,590 | 1,640 | 4½ | 33.95 | 7.00 |
| 6.85-15 | | | 950 | 1,000 | 1,050 | 1,100 | 1,140 | 1,190 | 1,230 | 1,270 | 1,320 | 1,360 | 1,390 | 5 | 32.48 | 6.90 |
| 7.00-15 | 1,170 | 1,240 | 1,310 | 1,380 | 1,450 | 1,515 | 1,580 | 1,640 | 1,700 | 1,760 | 1,820 | 1,870 | 1,930 | 5 | 36.02 | 7.35 |
| 7.10-15 | | | 1,190 | 1,270 | 1,320 | 1,380 | 1,440 | 1,500 | 1,550 | 1,600 | 1,660 | 1,710 | 1,760 | 5 | 34.89 | 7.40 |
| 7.35-15 | | | 1,070 | 1,130 | 1,180 | 1,240 | 1,290 | 1,340 | 1,390 | 1,440 | 1,480 | 1,530 | 1,570 | 5½ | 33.86 | 7.50 |
| 7.60-15 | | | 1,310 | 1,400 | 1,450 | 1,520 | 1,580 | 1,640 | 1,710 | 1,760 | 1,820 | 1,880 | 1,930 | 5½ | 36.05 | 7.90 |
| 7.75-15 | | | 1,150 | 1,210 | 1,270 | 1,330 | 1,380 | 1,440 | 1,490 | 1,540 | 1,590 | 1,640 | 1,690 | 5½ | 34.53 | 7.65 |
| 8.00-15 | | | 1,380 | 1,470 | 1,530 | 1,600 | 1,670 | 1,730 | 1,800 | 1,860 | 1,920 | 1,980 | 2,040 | 6 | 36.84 | 8.30 |
| 8.15-15 | | | 1,240 | 1,300 | 1,370 | 1,430 | 1,490 | 1,550 | 1,610 | 1,660 | 1,720 | 1,770 | 1,820 | 6 | 35.50 | 8.15 |
| 8.20-15 | | | 1,470 | 1,570 | 1,630 | 1,710 | 1,780 | 1,850 | 1,920 | 1,980 | 2,050 | 2,110 | 2,170 | 6 | 37.80 | 8.50 |
| 8.25-15 | 1,030 | 1,190 | 1,250 | 1,310 | 1,380 | 1,440 | 1,500 | 1,560 | 1,620 | 1,670 | 1,730 | 1,780 | 1,830 | 6 | 35.57 | 8.20 |
| 8.45-15 | | | 1,340 | 1,410 | 1,480 | 1,550 | 1,620 | 1,680 | 1,740 | 1,800 | 1,860 | 1,920 | 1,970 | 6 | 36.37 | 8.35 |
| 8.55-15 | 1,220 | 1,290 | 1,360 | 1,430 | 1,510 | 1,580 | 1,640 | 1,710 | 1,770 | 1,830 | 1,890 | 1,950 | 2,000 | 6 | 36.57 | 8.45 |
| 8.85-15 | | | 1,430 | 1,510 | 1,580 | 1,650 | 1,720 | 1,790 | 1,860 | 1,920 | 1,980 | 2,040 | 2,100 | 6½ | 37.29 | 8.80 |
| 8.90-15 | | | 1,700 | 1,810 | 1,880 | 1,970 | 2,050 | 2,130 | 2,210 | 2,280 | 2,360 | 2,430 | 2,500 | 6½ | 39.54 | 9.30 |
| 9.00-15 | | | 1,460 | 1,540 | 1,620 | 1,690 | 1,760 | 1,830 | 1,900 | 1,970 | 2,030 | 2,090 | 2,150 | 6 | 37.45 | 8.50 |
| 9.15-15 | | | 1,510 | 1,600 | 1,680 | 1,750 | 1,830 | 1,900 | 1,970 | 2,030 | 2,100 | 2,160 | 2,230 | 6½ | 37.92 | 9.05 |
| 6.00-16 | | | 1,075 | 1,135 | 1,195 | 1,250 | 1,300 | 1,350 | 1,400 | 1,450 | 1,500 | | | 4 | 34.17 | 6.25 |
| 6.50-16 | 1,090 | 1,150 | 1,215 | 1,280 | 1,345 | 1,405 | 1,465 | 1,525 | 1,580 | 1,635 | 1,690 | 1,740 | 1,790 | 4½ | 35.59 | 6.80 |
| 6.70-16 | | 1,185 | 1,240 | 1,300 | 1,355 | 1,410 | 1,465 | 1,525 | 1,580 | 1,635 | 1,690 | 1,740 | 1,795 | 4½ | 35.69 | 7.40 |
| 7.00-16 | | | 1,365 | 1,440 | 1,515 | 1,585 | 1,650 | 1,715 | 1,780 | 1,840 | 1,900 | | | 5 | 37.02 | 7.35 |
| 7.50-16 | | | 1,565 | 1,650 | 1,735 | 1,810 | 1,890 | 1,960 | 2,035 | 2,105 | 2,175 | | | 5½ | 38.78 | 8.00 |
| 6.50-17 | | 1,215 | 1,275 | 1,330 | 1,390 | 1,450 | 1,500 | 1,560 | 1,620 | 1,680 | 1,740 | 1,795 | 1,850 | 5 | 37.00 | 7.60 |
| L84-15 | | | 1,510 | 1,600 | 1,680 | 1,750 | 1,830 | 1,900 | 1,970 | 2,030 | 2,100 | 2,160 | 2,230 | 6 | 37.88 | 8.65 |

[1] The letter "H", "S", or "V" may be included in any specified tire size designation adjacent to or in place of the "dash".

[2] Actual section width and overall width shall not exceed the specified section width by more than 7 percent.

Changes: Reissued with no changes.

TABLE I-B

(Amendment No. 7)

TIRE LOAD RATINGS, TEST RIMS, MINIMUM SIZE FACTORS, AND SECTION WIDTHS FOR "70 SERIES" BIAS PLY TIRES

| Tire size [1] designation | Maximum tire loads (pounds) at various cold inflation pressures (p.s.i.) | | | | | | | | | | | | | Test rim width (inches) | Minimum size factor (inches) | Section width [2] (inches) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 16 | 18 | 20 | 22 | 24 | 26 | 28 | 30 | 32 | 34 | 36 | 38 | 40 | | | |
| A70-13 | 720 | 770 | 810 | 860 | 900 | 940 | 980 | 1,020 | 1,060 | 1,090 | 1,130 | 1,160 | 1,200 | 5½ | 30.27 | 7.30 |
| D70-13 | 890 | 950 | 1,010 | 1,070 | 1,120 | 1,170 | 1,220 | 1,270 | 1,320 | 1,360 | 1,410 | 1,450 | 1,490 | 5½ | 32.34 | 8.00 |
| D70-14 | 890 | 950 | 1,010 | 1,070 | 1,120 | 1,170 | 1,220 | 1,270 | 1,320 | 1,360 | 1,410 | 1,450 | 1,490 | 5½ | 32.81 | 7.85 |
| E70-14 | 950 | 1,010 | 1,070 | 1,130 | 1,190 | 1,240 | 1,300 | 1,350 | 1,400 | 1,440 | 1,490 | 1,540 | 1,580 | 5½ | 33.45 | 8.05 |
| F70-14 | 1,020 | 1,090 | 1,160 | 1,220 | 1,280 | 1,340 | 1,400 | 1,450 | 1,500 | 1,550 | 1,610 | 1,650 | 1,700 | 5½ | 34.16 | 8.30 |
| G70-14 | 1,100 | 1,180 | 1,250 | 1,310 | 1,380 | 1,440 | 1,500 | 1,560 | 1,620 | 1,680 | 1,730 | 1,780 | 1,830 | 6 | 35.18 | 8.75 |
| H70-14 | 1,200 | 1,290 | 1,360 | 1,440 | 1,510 | 1,580 | 1,650 | 1,710 | 1,770 | 1,830 | 1,890 | 1,950 | 2,010 | 6 | 36.19 | 9.10 |
| J70-14 | 1,260 | 1,350 | 1,430 | 1,500 | 1,580 | 1,650 | 1,720 | 1,790 | 1,860 | 1,920 | 1,980 | 2,040 | 2,100 | 6½ | 36.87 | 9.50 |
| L70-14 | 1,340 | 1,430 | 1,520 | 1,600 | 1,680 | 1,750 | 1,830 | 1,900 | 1,970 | 2,040 | 2,100 | 2,170 | 2,230 | 6½ | 37.62 | 9.75 |
| C70-15 | 840 | 890 | 950 | 1,000 | 1,050 | 1,100 | 1,140 | 1,190 | 1,230 | 1,270 | 1,320 | 1,360 | 1,390 | 5½ | 32.75 | 7.50 |
| D70-15 | 890 | 950 | 1,010 | 1,070 | 1,120 | 1,170 | 1,220 | 1,270 | 1,320 | 1,360 | 1,410 | 1,450 | 1,490 | 5½ | 33.37 | 7.70 |
| E70-15 | 950 | 1,010 | 1,070 | 1,130 | 1,190 | 1,240 | 1,300 | 1,350 | 1,400 | 1,440 | 1,490 | 1,540 | 1,580 | 6 | 34.13 | 8.10 |
| F70-15 | 1,020 | 1,090 | 1,160 | 1,220 | 1,280 | 1,340 | 1,400 | 1,450 | 1,500 | 1,550 | 1,610 | 1,650 | 1,700 | 6 | 34.89 | 8.35 |
| G70-15 | 1,100 | 1,180 | 1,250 | 1,310 | 1,380 | 1,440 | 1,500 | 1,560 | 1,620 | 1,680 | 1,730 | 1,780 | 1,830 | | 35.66 | 8.60 |
| H70-15 | 1,200 | 1,290 | 1,360 | 1,440 | 1,510 | 1,580 | 1,650 | 1,710 | 1,770 | 1,830 | 1,890 | 1,950 | 2,010 | 6 | 36.64 | 8.95 |
| J70-15 | 1,260 | 1,350 | 1,430 | 1,500 | 1,580 | 1,650 | 1,720 | 1,790 | 1,860 | 1,920 | 1,980 | 2,040 | 2,100 | 6½ | 37.36 | 9.35 |
| K70-15 | 1,290 | 1,380 | 1,460 | 1,540 | 1,620 | 1,690 | 1,770 | 1,830 | 1,900 | 1,970 | 2,030 | 2,090 | 2,150 | 6½ | 37.66 | 9.40 |
| L70-15 | 1,340 | 1,430 | 1,520 | 1,600 | 1,680 | 1,750 | 1,830 | 1,900 | 1,970 | 2,040 | 2,100 | 2,170 | 2,230 | 6½ | 38.09 | 9.60 |

[1] The letter "H", "S", or "V" may be included in any specified tire size designation adjacent to or in place of the "dash".

[2] Actual section width and overall width shall not exceed the specified section width by more than 7 percent.

Changes: A70-13 Max. load @26# corrected to 940.

TABLE I-C

(Amendment No. 4)

TIRE LOAD RATINGS, TEST RIMS, MINIMUM SIZE FACTORS, AND SECTION WIDTHS FOR BIAS PLY TIRES

| Tire size designation [1] | Maximum tire loads (pounds) at various cold inflation pressures (p.s.i.) | | | | | | | | | | | | | Test rim width (inches) | Minimum size factor (inches) | Section width [2] (inches) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 16 | 18 | 20 | 22 | 24 | 26 | 28 | 30 | 32 | 34 | 36 | 38 | 40 | | | |
| **"Super Balloon" Sizes** | | | | | | | | | | | | | | | | |
| 4.50-10 | 320 | 355 | 390 | 430 | 470 | 490 | 510 | 535 | 555 | 575 | 595 | | | 3½ | 23.90 | 5.06 |
| 5.20-10 | 350 | 395 | 440 | 485 | 530 | 555 | 575 | 605 | 625 | 650 | 670 | 695 | 715 | 3½ | 24.84 | 5.26 |
| 5.90-10 | 385 | 430 | 475 | 515 | 550 | 580 | 605 | 630 | 650 | 675 | 700 | | | 4 | 24.00 | 5.80 |
| 5.20-12 | 395 | 445 | 495 | 545 | 595 | 625 | 655 | 685 | 710 | 735 | 760 | 785 | 810 | 3½ | 26.79 | 5.39 |
| 5.60-12 | 460 | 520 | 575 | 620 | 670 | 715 | 760 | 795 | 825 | 855 | 885 | 915 | 940 | 4 | 27.83 | 5.71 |
| 5.90-12 | 460 | 505 | 550 | 595 | 640 | 665 | 700 | 730 | 755 | 785 | 810 | | | 4 | 26.00 | 5.90 |
| 6.20-12 | 505 | 555 | 605 | 655 | 705 | 735 | 775 | 805 | 835 | 865 | 895 | | | 4½ | 27.00 | 6.30 |
| 5.20-13 | 430 | 485 | 540 | 590 | 640 | 670 | 710 | 740 | 765 | 795 | 820 | 850 | 875 | 3½ | 27.72 | 5.29 |
| 5.60-13 | 495 | 560 | 620 | 675 | 725 | 770 | 810 | 850 | 880 | 910 | 945 | 975 | 1,005 | 4 | 28.92 | 5.71 |
| 5.90-13 | 555 | 625 | 695 | 755 | 815 | 860 | 895 | 935 | 970 | 1,005 | 1,040 | 1,075 | 1,105 | 4 | 29.74 | 5.91 |
| 6.20-13 | 520 | 580 | 640 | 700 | 750 | 780 | 820 | 850 | 880 | 910 | 945 | | | 4½ | 28.00 | 6.30 |
| 6.40-13 | 630 | 705 | 785 | 845 | 915 | 945 | 985 | 1,025 | 1,060 | 1,100 | 1,140 | 1,175 | 1,210 | 4½ | 31.26 | 6.42 |
| 6.70-13 | 690 | 775 | 860 | 935 | 1,000 | 1,045 | 1,090 | 1,135 | 1,175 | 1,220 | 1,260 | 1,305 | 1,340 | 4½ | 32.14 | 6.69 |
| 6.90-13 | 695 | 745 | 795 | 845 | 915 | 955 | 1,005 | 1,045 | 1,085 | 1,120 | 1,160 | | | 5 | 30.00 | 7.20 |
| 5.20-14 | 475 | 535 | 595 | 645 | 695 | 735 | 785 | 825 | 855 | 885 | 915 | 945 | 975 | 3½ | 28.89 | 5.26 |
| 5.60-14 | 530 | 595 | 660 | 715 | 770 | 815 | 855 | 890 | 920 | 955 | 990 | 1,020 | 1,050 | 4 | 29.94 | 5.71 |
| 5.90-14 | 585 | 660 | 730 | 785 | 850 | 880 | 925 | 970 | 1,005 | 1,040 | 1,080 | 1,115 | 1,145 | 4 | 30.76 | 5.91 |
| 6.40-14 | 660 | 745 | 825 | 890 | 960 | 1,000 | 1,050 | 1,090 | 1,130 | 1,170 | 1,210 | 1,250 | 1,290 | 4½ | 32.19 | 6.42 |
| 6.45-14 | | | 860 | 910 | 960 | 1,000 | 1,040 | 1,080 | 1,120 | | | | | 4½ | 30.92 | 6.60 |
| 5.20-15 | 505 | 570 | 630 | 685 | 740 | 780 | 830 | 870 | 900 | 935 | 965 | 1,000 | 1,030 | 3½ | 29.75 | 5.20 |
| 5.60-15 | 555 | 625 | 695 | 755 | 815 | 860 | 895 | 935 | 970 | 1,005 | 1,040 | 1,075 | 1,105 | 4 | 30.87 | 5.71 |
| 5.90-15 | 615 | 695 | 770 | 825 | 890 | 935 | 980 | 1,015 | 1,050 | 1,090 | 1,130 | 1,165 | 1,200 | 4 | 31.77 | 5.91 |
| 6.40-15 | | | 875 | 950 | 1,010 | 1,055 | 1,100 | 1,150 | 1,190 | 1,230 | 1,260 | | | 4½ | 33.20 | 6.42 |
| **"Low Section" Sizes** | | | | | | | | | | | | | | | | |
| 5.00-12 | 370 | 420 | 465 | 505 | 540 | 565 | 580 | 605 | 625 | 650 | 670 | 695 | 715 | 3½ | 25.62 | 5.04 |
| 5.50-12 | 415 | 470 | 520 | 560 | 605 | 635 | 665 | 695 | 720 | 745 | 770 | 800 | 820 | 4 | 26.93 | 5.59 |
| 6.00-12 | 485 | 545 | 605 | 655 | 705 | 735 | 785 | 815 | 845 | 875 | 905 | 935 | 965 | 4½ | 28.33 | 6.14 |
| 5.00-13 | 410 | 460 | 510 | 545 | 585 | 610 | 635 | 660 | 685 | 710 | 735 | 755 | 780 | 3½ | 26.64 | 5.04 |
| 5.50-13 | 445 | 495 | 550 | 595 | 640 | 670 | 710 | 740 | 765 | 795 | 820 | 850 | 875 | 4 | 27.95 | 5.59 |
| 7.25-13 | 730 | 825 | 915 | 990 | 1,070 | 1,110 | 1,160 | 1,200 | 1,245 | 1,290 | 1,335 | 1,380 | 1,420 | 5 | 32.51 | 7.24 |
| 7.50-13 | 775 | 875 | 970 | 1,040 | 1,120 | 1,180 | 1,225 | 1,270 | 1,315 | 1,365 | 1,410 | 1,460 | 1,500 | 5½ | 33.22 | 7.48 |
| 5.50-15L | 505 | 570 | 630 | 675 | 725 | 760 | 800 | 840 | 870 | 900 | 935 | 965 | 995 | 4 | 29.97 | 5.59 |
| 6.00-15L | 595 | 665 | 740 | 800 | 860 | 890 | 930 | 970 | 1,005 | 1,040 | 1,080 | 1,115 | 1,145 | 4½ | 31.29 | 6.14 |
| 6.50-15L | 675 | 755 | 840 | 900 | 970 | 1,010 | 1,060 | 1,105 | 1,145 | 1,185 | 1,230 | 1,270 | 1,305 | 4½ | 32.68 | 6.54 |
| 7.00-15L | 760 | 855 | 950 | 1,025 | 1,100 | 1,145 | 1,190 | 1,235 | 1,280 | 1,325 | 1,375 | 1,420 | 1,460 | 5 | 33.85 | 7.01 |
| **"Super Low Section" Sizes** | | | | | | | | | | | | | | | | |
| 145-10/5.95-10 | 380 | 430 | 475 | 515 | 550 | 580 | 605 | 630 | 650 | 675 | 700 | 725 | 745 | 4 | 24.76 | 5.79 |
| 125-12/5.35-12 | 335 | 380 | 420 | 450 | 485 | 510 | 535 | 550 | 570 | 590 | 610 | 630 | 650 | 3½ | 24.68 | 5.00 |
| 135-12/5.65-12 | 370 | 420 | 465 | 505 | 540 | 570 | 590 | 620 | 640 | 665 | 690 | 710 | 730 | 4 | 25.53 | 5.29 |
| 145-12/5.95-12 | 440 | 495 | 550 | 595 | 640 | 665 | 700 | 730 | 755 | 785 | 810 | 840 | 865 | 4 | 26.69 | 5.79 |
| 155-12/6.15-12 | 485 | 545 | 605 | 655 | 705 | 735 | 775 | 805 | 835 | 865 | 895 | 925 | 950 | 4½ | 29.36 | 6.18 |
| 135-13/5.65-13 | 415 | 470 | 520 | 555 | 595 | 625 | 655 | 685 | 710 | 735 | 760 | 785 | 810 | 4 | 26.53 | 5.39 |
| 145-13/5.95-13 | 470 | 525 | 585 | 620 | 670 | 705 | 745 | 770 | 800 | 825 | 855 | 885 | 910 | 4 | 27.61 | 5.79 |
| 155-13/6.15-13 | 515 | 575 | 640 | 700 | 750 | 780 | 820 | 850 | 880 | 910 | 945 | 975 | 1,005 | 4½ | 28.44 | 6.18 |
| 165-13/6.45-13 | 575 | 645 | 715 | 770 | 825 | 865 | 905 | 935 | 970 | 1,005 | 1,040 | 1,075 | 1,105 | 4½ | 29.52 | 6.57 |
| 175-13/6.95-13 | 635 | 715 | 795 | 845 | 915 | 955 | 1,005 | 1,045 | 1,085 | 1,120 | 1,160 | 1,200 | 1,235 | 5 | 30.34 | 7.01 |
| 185-13/7.35-13 | 695 | 785 | 870 | 945 | 1,010 | 1,060 | 1,115 | 1,160 | 1,205 | 1,245 | 1,290 | 1,335 | 1,370 | 5½ | 31.41 | 7.40 |
| 135-14/5.65-14 | 440 | 495 | 550 | 595 | 640 | 665 | 700 | 730 | 755 | 785 | 810 | 840 | 865 | 4 | 27.54 | 5.59 |
| 145-14/5.95-14 | 495 | 560 | 620 | 665 | 715 | 750 | 785 | 815 | 845 | 875 | 905 | 935 | 965 | 4 | 28.54 | 5.78 |
| 155-14/6.15-14 | 540 | 610 | 675 | 730 | 780 | 825 | 860 | 895 | 925 | 960 | 995 | 1,030 | 1,060 | 4½ | 29.45 | 6.18 |
| 125-15/5.35-15 | 395 | 445 | 495 | 535 | 570 | 600 | 625 | 650 | 675 | 700 | 720 | 745 | 770 | 3½ | 27.69 | 5.00 |
| 135-15/5.65-15 | 460 | 520 | 575 | 610 | 660 | 690 | 720 | 750 | 775 | 805 | 835 | 860 | 885 | 4 | 28.53 | 5.39 |
| 145-15/5.95-15 | 520 | 585 | 650 | 710 | 760 | 790 | 830 | 860 | 890 | 925 | 955 | 985 | 1,015 | 4 | 29.54 | 5.79 |
| 155-15/6.35-15 | 585 | 660 | 730 | 780 | 835 | 875 | 915 | 950 | 985 | 1,020 | 1,055 | 1,090 | 1,125 | 4½ | 30.45 | 6.18 |
| 175-15/7.15-15 | 705 | 795 | 880 | 955 | 1,030 | 1,070 | 1,125 | 1,170 | 1,215 | 1,255 | 1,300 | 1,345 | 1,385 | 5 | 32.42 | 7.01 |
| 165-14 | 650 | 715 | 770 | 815 | 880 | 925 | 970 | 1,000 | 1,035 | 1,080 | 1,115 | 1,145 | 1,170 | 4½ | 31.22 | 6.57 |
| 175-14 | 715 | 780 | 850 | 915 | 980 | 1,025 | 1,070 | 1,115 | 1,160 | 1,200 | 1,235 | 1,270 | 1,310 | 5 | 32.13 | 7.01 |
| 185-14 | 805 | 870 | 940 | 1,000 | 1,080 | 1,135 | 1,190 | 1,235 | 1,290 | 1,325 | 1,370 | 1,400 | 1,435 | 5½ | 33.15 | 7.40 |
| 195-14 | 890 | 950 | 1,025 | 1,105 | 1,180 | 1,235 | 1,290 | 1,345 | 1,400 | 1,445 | 1,490 | 1,535 | 1,580 | 5½ | 34.18 | 7.80 |
| 205-14 | 940 | 1,025 | 1,115 | 1,190 | 1,270 | 1,335 | 1,400 | 1,455 | 1,510 | 1,565 | 1,610 | 1,655 | 1,700 | 6 | 35.36 | 8.19 |
| 215-14 | 1,015 | 1,115 | 1,200 | 1,290 | 1,380 | 1,445 | 1,520 | 1,580 | 1,640 | 1,700 | 1,740 | 1,785 | 1,830 | 6 | 36.30 | 8.58 |
| 225-14 | 1,080 | 1,180 | 1,280 | 1,380 | 1,465 | 1,540 | 1,620 | 1,700 | 1,750 | 1,810 | 1,850 | 1,915 | 1,970 | 6½ | 37.25 | 8.98 |
| 165-15 | 685 | 750 | 805 | 860 | 915 | 970 | 1,015 | 1,060 | 1,105 | 1,135 | 1,180 | 1,200 | 1,235 | 4½ | 32.16 | 6.57 |
| 185-15 | 815 | 905 | 970 | 1,050 | 1,115 | 1,180 | 1,235 | 1,280 | 1,325 | 1,370 | 1,410 | 1,445 | 1,490 | 5½ | 34.09 | 7.40 |
| 195-15 | 880 | 970 | 1,060 | 1,135 | 1,215 | 1,280 | 1,335 | 1,390 | 1,445 | 1,450 | 1,535 | 1,580 | 1,620 | 5½ | 35.12 | 7.80 |
| 205-15 | 970 | 1,060 | 1,145 | 1,225 | 1,300 | 1,370 | 1,445 | 1,500 | 1,565 | 1,610 | 1,665 | 1,720 | 1,765 | 6 | 36.30 | 8.19 |
| 215-15 | 1,050 | 1,145 | 1,235 | 1,335 | 1,435 | 1,500 | 1,590 | 1,640 | 1,700 | 1,740 | 1,800 | 1,850 | 1,910 | 6 | 37.24 | 8.57 |
| 235-15 | 1,150 | 1,295 | 1,435 | 1,545 | 1,660 | 1,735 | 1,825 | 1,895 | 1,965 | 2,035 | 2,110 | 2,180 | 2,245 | 6½ | 38.26 | 9.38 |
| 5.0-15 | 460 | 520 | 575 | 610 | 660 | 690 | 720 | 750 | 775 | 805 | 835 | 860 | 885 | 4 | 28.53 | 5.39 |
| 5.5-15 | 520 | 585 | 650 | 710 | 760 | 790 | 830 | 860 | 890 | 925 | 955 | 985 | 1,015 | 4 | 29.54 | 5.79 |

[1] The letter "H", "S", or "V" may be included in any specified tire size designation adjacent to or in place of the "dash".

[2] Actual section width and overall width shall not exceed the specified section width by more than 7 percent.

Changes: Reissued with no changes.

TABLE I-D
[Amdt. No. 4]
TIRE LOAD RATINGS, TEST RIMS, MINIMUM SIZE FACTORS, AND SECTION WIDTHS FOR DASH (—) RADIAL PLY TIRES

| Tire size designation [1] | Maximum tire loads (pounds) at various cold inflation pressures (p.s.i.) | | | | | | | | | | | | | Test rim width (inches) | Minimum size factor (inches) | Section width [2] (inches) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 16 | 18 | 20 | 22 | 24 | 26 | 28 | 30 | 32 | 34 | 36 | 38 | 40 | | | |
| 145-10 | 495 | 525 | 545 | 565 | 585 | 605 | 625 | 640 | 655 | 670 | 685 | 700 | 710 | 4½ | 24.76 | 5.79 |
| 125-12 | 405 | 430 | 445 | 465 | 480 | 495 | 505 | 525 | 535 | 550 | 560 | 575 | 580 | 3½ | 24.68 | 5.60 |
| 135-12 | 480 | 510 | 530 | 550 | 565 | 585 | 600 | 620 | 635 | 650 | 665 | 675 | 685 | 4 | 25.53 | 5.39 |
| 145-12 | 570 | 605 | 625 | 650 | 675 | 695 | 715 | 740 | 760 | 775 | 790 | 805 | 815 | 4 | 26.69 | 5.79 |
| 155-12 | 630 | 670 | 695 | 720 | 745 | 770 | 795 | 820 | 840 | 860 | 875 | 890 | 905 | 4½ | 27.36 | 6.18 |
| 135-13 | 515 | 545 | 565 | 590 | 610 | 630 | 650 | 670 | 690 | 705 | 715 | 730 | 740 | 4 | 26.53 | 5.39 |
| 145-13 | 605 | 640 | 665 | 695 | 720 | 740 | 765 | 790 | 815 | 830 | 845 | 855 | 870 | 4 | 27.61 | 5.79 |
| 155-13 | 670 | 710 | 735 | 765 | 790 | 815 | 840 | 870 | 895 | 910 | 925 | 940 | 955 | 4½ | 28.44 | 6.18 |
| 165-13 | 700 | 750 | 800 | 850 | 890 | 930 | 970 | 1,010 | 1,050 | 1,090 | 1,130 | 1,170 | 1,200 | 4½ | 29.52 | 6.57 |
| 175-13 | | | 810 | 860 | 920 | 980 | 1,040 | 1,100 | 1,150 | 1,200 | 1,240 | 1,300 | 1,350 | 4½ | 30.30 | 6.75 |
| 185-13 | | | 870 | 940 | 1,010 | 1,080 | 1,140 | 1,210 | 1,270 | 1,330 | 1,390 | 1,450 | 1,510 | 5 | 31.42 | 7.25 |
| 195-13 | | | 970 | 1,040 | 1,110 | 1,180 | 1,250 | 1,320 | 1,400 | 1,450 | 1,520 | 1,580 | 1,640 | 5½ | 32.38 | 7.70 |
| 135-14 | 555 | 585 | 610 | 635 | 655 | 675 | 695 | 720 | 740 | 750 | 765 | 780 | 790 | 4 | 27.54 | 5.39 |
| 145-14 | 645 | 680 | 710 | 735 | 760 | 785 | 810 | 840 | 865 | 885 | 905 | 920 | 935 | 4 | 28.54 | 5.79 |
| 155-14 | 630 | 680 | 720 | 760 | 800 | 840 | 880 | 920 | 950 | 980 | 1,010 | 1,040 | 1,070 | 4½ | 29.45 | 6.18 |
| 165-14 | 740 | 790 | 840 | 890 | 940 | 980 | 1,020 | 1,060 | 1,100 | 1,140 | 1,180 | 1,220 | 1,250 | 4½ | 30.53 | 6.57 |
| 175-14 | | | 830 | 900 | 960 | 1,030 | 1,100 | 1,160 | 1,230 | 1,280 | 1,350 | 1,400 | 1,470 | 5 | 31.63 | 7.00 |
| 185-14 | | | 920 | 1,000 | 1,070 | 1,140 | 1,220 | 1,290 | 1,360 | 1,420 | 1,500 | 1,560 | 1,640 | 5 | 32.59 | 7.30 |
| 195-14 | | | 1,020 | 1,100 | 1,180 | 1,270 | 1,340 | 1,420 | 1,500 | 1,570 | 1,650 | 1,720 | 1,800 | 5½ | 33.09 | 7.89 |
| 205-14 | | | 1,100 | 1,180 | 1,270 | 1,380 | 1,450 | 1,540 | 1,630 | 1,700 | 1,770 | 1,860 | 1,940 | 6 | 34.82 | 8.80 |
| 215-14 | | | 1,200 | 1,300 | 1,390 | 1,510 | 1,580 | 1,670 | 1,770 | 1,850 | 1,920 | 2,010 | 2,100 | 6 | 35.79 | 8.60 |
| 225-14 | | | 1,320 | 1,420 | 1,510 | 1,610 | 1,710 | 1,800 | 1,900 | 1,970 | 2,050 | 2,150 | 2,230 | 6½ | 36.44 | 8.95 |
| 125-15 | 495 | 525 | 545 | 565 | 585 | 605 | 625 | 640 | 655 | 670 | 685 | 700 | 710 | 3½ | 27.69 | 5.00 |
| 135-15 | 585 | 620 | 645 | 670 | 695 | 715 | 735 | 755 | 775 | 795 | 810 | 825 | 840 | 4 | 28.53 | 5.39 |
| 145-15 | 680 | 720 | 750 | 780 | 805 | 830 | 855 | 875 | 895 | 920 | 940 | 960 | 975 | 4 | 29.54 | 5.79 |
| 155-15 | 740 | 785 | 815 | 850 | 880 | 905 | 930 | 955 | 980 | 1,005 | 1,025 | 1,045 | 1,060 | 4½ | 30.45 | 6.18 |
| 165-15 | 770 | 820 | 870 | 920 | 970 | 1,020 | 1,070 | 1,110 | 1,150 | 1,190 | 1,230 | 1,270 | 1,310 | 4½ | 31.15 | 6.57 |
| 175-15 | | | 900 | 1,050 | 1,100 | 1,150 | 1,200 | 1,250 | 1,300 | 1,350 | 1,400 | 1,440 | 1,480 | 5 | 32.41 | 7.00 |
| 185-15 | 925 | 980 | 1,020 | 1,080 | 1,095 | 1,130 | 1,170 | 1,190 | 1,230 | 1,260 | 1,280 | 1,305 | 1,325 | 4½ | 32.04 | 6.62 |
| 195-15 | | | 1,000 | 1,070 | 1,140 | 1,210 | 1,280 | 1,350 | 1,420 | 1,480 | 1,540 | 1,600 | 1,660 | 5½ | 33.58 | 7.45 |
| 205-15 | | | 1,080 | 1,160 | 1,240 | 1,330 | 1,400 | 1,470 | 1,550 | 1,620 | 1,680 | 1,760 | 1,820 | 5½ | 34.22 | 7.65 |
| 215-15 | | | 1,190 | 1,280 | 1,370 | 1,450 | 1,530 | 1,620 | 1,700 | 1,760 | 1,840 | 1,920 | 2,000 | 6 | 35.20 | 8.10 |
| 225-15 | | | 1,280 | 1,380 | 1,480 | 1,570 | 1,660 | 1,760 | 1,860 | 1,940 | 2,020 | 2,100 | 2,200 | 6 | 36.00 | 8.35 |
| 230-15 | | | 1,370 | 1,470 | 1,580 | 1,670 | 1,780 | 1,880 | 1,980 | 2,060 | 2,150 | 2,240 | 2,340 | 6½ | 36.94 | 8.80 |
| 235-15 | | | 1,405 | 1,515 | 1,625 | 1,725 | 1,825 | 1,925 | 2,020 | 2,110 | 2,190 | 2,280 | 2,360 | 6 | 37.30 | 8.60 |
| 245-15 | | | 1,430 | 1,540 | 1,640 | 1,750 | 1,850 | 1,960 | 2,060 | 2,160 | 2,250 | 2,350 | 2,450 | 6½ | 37.75 | 9.05 |
| 185-16 | | | 1,140 | 1,210 | 1,270 | 1,330 | 1,390 | 1,450 | 1,500 | 1,550 | 1,600 | 1,650 | 1,700 | 5½ | 34.14 | 7.40 |
| 165-400 | 800 | 860 | 920 | 980 | 1,030 | 1,080 | 1,130 | 1,180 | 1,220 | 1,260 | 1,300 | 1,340 | 1,380 | 4.65 | 32.04 | 6.62 |

1. The letter "H", "S", or "V" may be included in any specified tire size designation adjacent to or in place of the "dash".

2. Actual section width and overall width shall not exceed the specified section width by more than 7 percent.

Changes: New size 230-15 added.

TABLE I-E
(Amendment No. 2)
TIRE LOAD RATINGS, TEST RIMS, MINIMUM SIZE FACTORS, AND SECTION WIDTHS FOR "77 SERIES" BIAS PLY TIRES

| Tire size [1] designation | Maximum tire loads (pounds) at various cold inflation pressures (p.s.i.) | | | | | | | | | | | | | Test rim width (inches) | Minimum size factor (inches) | Section width [2] (inches) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 16 | 18 | 20 | 22 | 24 | 26 | 28 | 30 | 32 | 34 | 36 | 38 | 40 | | | |
| G77-14 | [illegible] | | 1,250 | 1,310 | 1,380 | 1,440 | 1,500 | 1,560 | 1,620 | 1,680 | 1,730 | 1,780 | 1,830 | 6 | 35.04 | 8.45 |
| 5.9-10 | 385 | 430 | 475 | 515 | 550 | 580 | 605 | 630 | 660 | 675 | 700 | ---- | ---- | 4 | 24.00 | 5.86 |
| 5.9-12 | 460 | 505 | 550 | 595 | 640 | 665 | 700 | 730 | 755 | 785 | 810 | ---- | ---- | 4 | 26.00 | 5.90 |
| 6.3-12 | 485 | 545 | 605 | 655 | 705 | 735 | 775 | 805 | 835 | 865 | 895 | 925 | 950 | 4 | 27.21 | 6.00 |
| 6.3-13 | 515 | 575 | 640 | 700 | 750 | 780 | 820 | 850 | 880 | 910 | 945 | 975 | 1,005 | 4 | 28.19 | 6.06 |
| 6.5-13 | 575 | 645 | 715 | 770 | 825 | 865 | 905 | 935 | 970 | 1,005 | 1,040 | 1,075 | 1,105 | 4½ | 29.18 | 6.54 |
| 6.9-13 | 635 | 715 | 795 | 845 | 915 | 955 | 1,005 | 1,045 | 1,085 | 1,120 | 1,160 | ---- | ---- | 4½ | 29.92 | 6.77 |
| 6.2-15 | 585 | 660 | 730 | 780 | 835 | 875 | 915 | 950 | 985 | 1,020 | 1,055 | 1,090 | 1,125 | 4 | 30.17 | 6.06 |
| 6.9-15 | 705 | 795 | 880 | 955 | 1,030 | 1,070 | 1,125 | 1,170 | 1,215 | 1,255 | 1,300 | 1,345 | 1,385 | 4½ | 31.93 | 6.77 |

1 The letter "H", "S", or "V" may be included in any specified tire size designation adjacent to or in place of the "dash".

2 Actual section width and overall width shall not exceed the specified section width by more than 7 percent.

Changes: New adoption 6.5-13 added.

TABLE I-F

(Amendment No. 3)

TIRE LOAD RATINGS, TEST RIMS, MINIMUM SIZE FACTORS, AND SECTION WIDTHS FOR TYPE "R" RADIAL PLY TIRES

| Tire size designation [1] | Maximum tire loads (pounds) at various cold inflation pressures (p.s.i.) | | | | | | | | | | | | | Test rim width (inches) | Minimum size factor (inches) | Section width [2] (inches) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 16 | 18 | 20 | 22 | 24 | 26 | 28 | 30 | 32 | 34 | 36 | 38 | 40 | | | |
| 5.20R10 | 435 | 460 | 485 | 510 | 535 | 560 | 585 | 615 | 635 | 660 | 685 | 710 | 735 | 3½ | 24.84 | 5.20 |
| 5.00R12 | 480 | 505 | 515 | 535 | 555 | 575 | 595 | 615 | 635 | 650 | 670 | 690 | 710 | 3½ | 25.62 | 5.04 |
| 5.20R12 | 515 | 540 | 565 | 590 | 615 | 640 | 665 | 695 | 715 | 740 | 765 | 790 | 815 | 3½ | 26.79 | 5.20 |
| 5.50R12 | 530 | 545 | 570 | 595 | 620 | 650 | 670 | 705 | 725 | 750 | 775 | 800 | 825 | 4 | 26.93 | 5.49 |
| 5.60R12 | 600 | 630 | 655 | 685 | 715 | 740 | 770 | 800 | 825 | 850 | 875 | 905 | 930 | 4 | 27.83 | 5.71 |
| 5.00R13 | 535 | 555 | 575 | 590 | 615 | 630 | 650 | 670 | 690 | 705 | 725 | 745 | 765 | 3½ | 26.64 | 5.04 |
| 5.20R13 | 570 | 595 | 620 | 645 | 670 | 695 | 720 | 750 | 770 | 795 | 820 | 845 | 870 | 3½ | 27.72 | 5.20 |
| 5.50R13 | 575 | 600 | 625 | 650 | 675 | 695 | 725 | 750 | 775 | 795 | 825 | 850 | 875 | 4 | 27.95 | 5.49 |
| 5.60R13 | 655 | 685 | 710 | 740 | 765 | 795 | 825 | 855 | 880 | 905 | 935 | 960 | 990 | 4 | 28.92 | 5.71 |
| 6.00R13 | 675 | 705 | 735 | 760 | 790 | 815 | 845 | 875 | 900 | 925 | 950 | 975 | 1,005 | 4 | 29.37 | 6.00 |
| 5.90R13 | 705 | 780 | 805 | 830 | 860 | 885 | 915 | 940 | 965 | 990 | 1,015 | 1,045 | 1,070 | 4 | 29.74 | 5.91 |
| 6.40R13 | 810 | 840 | 870 | 905 | 940 | 970 | 1,005 | 1,040 | 1,070 | 1,100 | 1,135 | 1,165 | 1,200 | 4½ | 31.26 | 6.43 |
| 6.50R13 | 800 | 850 | 880 | 890 | 925 | 960 | 995 | 1,030 | 1,060 | 1,090 | 1,120 | 1,150 | 1,180 | 4½ | 30.78 | 6.60 |
| 6.70R13 | 690 | 775 | 860 | 935 | 1,000 | 1,045 | 1,090 | 1,135 | 1,175 | 1,220 | 1,260 | 1,305 | 1,340 | 4½ | 32.14 | 6.69 |
| 7.00R13 | 870 | 910 | 950 | 985 | 1,025 | 1,060 | 1,100 | 1,145 | 1,175 | 1,215 | 1,255 | 1,295 | 1,335 | 5 | 31.88 | 7.10 |
| 7.25R13 | 940 | 980 | 1,020 | 1,060 | 1,100 | 1,135 | 1,175 | 1,215 | 1,255 | 1,290 | 1,330 | 1,370 | 1,410 | 5 | 32.51 | 7.24 |
| 5.20R14 | 605 | 640 | 670 | 700 | 730 | 760 | 795 | 830 | 855 | 885 | 915 | 950 | 980 | 3½ | 28.89 | 5.20 |
| 5.90R14 | 750 | 785 | 815 | 845 | 875 | 905 | 935 | 970 | 995 | 1,025 | 1,055 | 1,085 | 1,115 | 4 | 30.76 | 5.91 |
| 7.00R14 | 925 | 960 | 1,000 | 1,040 | 1,075 | 1,115 | 1,155 | 1,195 | 1,235 | 1,270 | 1,320 | 1,350 | 1,380 | 5 | 32.88 | 7.10 |
| 7.50R14 | 1,065 | 1,100 | 1,140 | 1,180 | 1,220 | 1,260 | 1,300 | 1,340 | 1,380 | 1,415 | 1,460 | 1,500 | 1,540 | 5½ | 34.19 | 7.68 |
| 5.60R15 | 705 | 780 | 805 | 830 | 860 | 885 | 915 | 940 | 965 | 990 | 1,015 | 1,045 | 1,070 | 4 | 30.87 | 5.71 |
| 6.40R15 | 885 | 925 | 965 | 1,005 | 1,040 | 1,080 | 1,120 | 1,160 | 1,200 | 1,235 | 1,275 | 1,310 | 1,350 | 4½ | 33.26 | 6.42 |
| 6.70R15 | 975 | 1,015 | 1,055 | 1,095 | 1,130 | 1,170 | 1,215 | 1,255 | 1,290 | 1,325 | 1,365 | 1,405 | 1,445 | 4½ | 33.95 | 7.00 |
| 7.60R15 | 1,160 | 1,200 | 1,245 | 1,285 | 1,325 | 1,370 | 1,415 | 1,465 | 1,500 | 1,535 | 1,575 | 1,610 | 1,655 | 5½ | 36.00 | 7.76 |

[1] The letter "H", "S", or "V" may be included in any specified tire size designation adjacent to the "R".

[2] Actual section width and overall width shall not exceed the specified width by more than 7 percent.

Changes: Reissued with no changes.

TABLE I-G

(Amendment No. 5)

TIRE LOAD RATINGS, TEST RIMS, MINIMUM SIZE FACTORS, AND SECTION WIDTHS FOR "70 SERIES" TYPE "R" RADIAL PLY TIRES

| Tire size designation [1] | Maximum tire loads (pounds) at various cold inflation pressures (p.s.i.) | | | | | | | | | | | | | Test rim width (inches) | Minimum size factor (inches) | Section width [2] (inches) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 16 | 18 | 20 | 22 | 24 | 26 | 28 | 30 | 32 | 34 | 36 | 38 | 40 | | | |
| D R70-13 | 890 | 950 | 1,010 | 1,070 | 1,120 | 1,170 | 1,220 | 1,270 | 1,320 | 1,360 | 1,410 | 1,450 | 1,490 | 5½ | 32.29 | 8.03 |
| C R70-14 | 840 | 890 | 950 | 1,000 | 1,050 | 1,100 | 1,140 | 1,190 | 1,230 | 1,270 | 1,320 | 1,360 | 1,400 | 5½ | 32.23 | 7.65 |
| D R70-14 | 890 | 950 | 1,010 | 1,070 | 1,120 | 1,170 | 1,220 | 1,270 | 1,320 | 1,360 | 1,410 | 1,450 | 1,490 | 5½ | 32.78 | 7.90 |
| E R70-14 | 950 | 1,010 | 1,070 | 1,130 | 1,190 | 1,240 | 1,300 | 1,350 | 1,400 | 1,440 | 1,490 | 1,540 | 1,580 | 5½ | 33.42 | 8.10 |
| F R70-14 | 1,020 | 1,090 | 1,160 | 1,220 | 1,280 | 1,340 | 1,400 | 1,450 | 1,500 | 1,550 | 1,610 | 1,650 | 1,700 | 6 | 34.34 | 8.53 |
| G R70-14 | 1,100 | 1,180 | 1,250 | 1,310 | 1,380 | 1,440 | 1,500 | 1,560 | 1,620 | 1,680 | 1,730 | 1,780 | 1,830 | 6 | 35.12 | 8.83 |
| H R70-14 | 1,200 | 1,290 | 1,360 | 1,440 | 1,510 | 1,580 | 1,650 | 1,710 | 1,770 | 1,830 | 1,890 | 1,950 | 2,010 | 6½ | 36.31 | 9.40 |
| J R70-14 | 1,260 | 1,350 | 1,430 | 1,500 | 1,580 | 1,650 | 1,720 | 1,790 | 1,860 | 1,920 | 1,980 | 2,040 | 2,100 | 6½ | 36.86 | 9.55 |
| L R70-14 | 1,340 | 1,430 | 1,520 | 1,600 | 1,680 | 1,750 | 1,830 | 1,900 | 1,970 | 2,040 | 2,100 | 2,170 | 2,230 | 6½ | 37.59 | 9.80 |
| D R70-15 | 890 | 950 | 1,010 | 1,070 | 1,120 | 1,170 | 1,220 | 1,270 | 1,320 | 1,360 | 1,410 | 1,450 | 1,490 | 5½ | 33.34 | 7.70 |
| E R70-15 | 950 | 1,010 | 1,070 | 1,130 | 1,190 | 1,240 | 1,300 | 1,350 | 1,400 | 1,440 | 1,490 | 1,540 | 1,580 | 5½ | 33.91 | 7.95 |
| F R70-15 | 1,020 | 1,090 | 1,160 | 1,220 | 1,280 | 1,340 | 1,400 | 1,450 | 1,500 | 1,550 | 1,610 | 1,650 | 1,700 | 6 | 34.87 | 8.45 |
| G R70-15 | 1,100 | 1,180 | 1,250 | 1,310 | 1,380 | 1,440 | 1,500 | 1,560 | 1,620 | 1,680 | 1,730 | 1,780 | 1,830 | 6 | 35.65 | 8.60 |
| H R70-15 | 1,200 | 1,290 | 1,360 | 1,440 | 1,510 | 1,580 | 1,650 | 1,710 | 1,770 | 1,830 | 1,890 | 1,950 | 2,010 | 6½ | 36.83 | 9.25 |
| J R70-15 | 1,260 | 1,350 | 1,430 | 1,500 | 1,580 | 1,650 | 1,720 | 1,790 | 1,860 | 1,920 | 1,980 | 2,040 | 2,100 | 6½ | 37.31 | 9.40 |
| K R70-15 | 1,290 | 1,380 | 1,460 | 1,540 | 1,620 | 1,690 | 1,770 | 1,830 | 1,900 | 1,970 | 2,030 | 2,090 | 2,150 | 6½ | 37.62 | 9.50 |
| L R70-15 | 1,340 | 1,430 | 1,520 | 1,600 | 1,680 | 1,750 | 1,830 | 1,900 | 1,970 | 2,040 | 2,100 | 2,170 | 2,230 | 6½ | 38.06 | 9.60 |

[1] The letters "HR", "SR or "VR" may be included in any specified tire size designation adjacent to or in place of the "dash".

[2] Actual section width and overall width shall not exceed the specified section width by more than 7 percent.

Changes—New tire sizes D R70-13, C R70-14.

TABLE I-H

(Amendment No. 3)

TIRE LOAD RATINGS, TEST RIMS, MINIMUM SIZE FACTORS, AND SECTION WIDTHS FOR TYPE "R" RADIAL PLY TIRES

| Tire size designation [1] | Maximum tire loads (pounds) at various cold inflation pressures (p.s.i.) | | | | | | | | | | | | | Test rim width (inches) | Minimum size factor (inches) | Section width [2] (inches) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 16 | 18 | 20 | 22 | 24 | 26 | 28 | 30 | 32 | 34 | 36 | 38 | 40 | | | |
| 145R10 | 465 | 495 | 525 | 550 | 580 | 605 | 630 | 655 | 680 | 700 | 725 | 750 | 770 | 4 | 24.76 | 5.79 |
| 125R12 | 370 | 400 | 430 | 450 | 475 | 495 | 515 | 535 | 555 | 575 | 595 | 610 | 630 | 3½ | 24.68 | 5.00 |
| 135R12 | 440 | 475 | 505 | 535 | 560 | 585 | 610 | 635 | 655 | 680 | 700 | 725 | 745 | 4 | 25.53 | 5.39 |
| 145R12 | 530 | 565 | 600 | 625 | 665 | 695 | 725 | 755 | 780 | 810 | 835 | 860 | 885 | 4 | 26.69 | 5.79 |
| 155R12 | 590 | 630 | 665 | 700 | 735 | 770 | 800 | 835 | 865 | 895 | 925 | 950 | 980 | 4½ | 27.36 | 6.18 |
| 135R13 | 480 | 515 | 545 | 575 | 600 | 630 | 655 | 680 | 705 | 730 | 755 | 780 | 800 | 4 | 26.53 | 5.39 |
| 145R13 | 590 | 630 | 665 | 700 | 735 | 770 | 800 | 835 | 860 | 890 | 920 | 950 | 980 | 4 | 27.59 | 5.79 |
| 155R13 | 645 | 690 | 730 | 770 | 810 | 845 | 885 | 915 | 950 | 985 | 1,015 | 1,045 | 1,075 | 4½ | 28.44 | 6.18 |
| 165R13 | 680 | 730 | 770 | 820 | 860 | 900 | 930 | 970 | 1,010 | 1,040 | 1,080 | 1,110 | 1,140 | 4½ | 29.18 | 6.40 |
| 175R13 | 790 | 840 | 890 | 930 | 980 | 1,030 | 1,070 | 1,110 | 1,150 | 1,190 | 1,230 | 1,270 | 1,300 | 4½ | 30.30 | 6.75 |
| 185R13 | 870 | 930 | 980 | 1,030 | 1,080 | 1,130 | 1,180 | 1,230 | 1,270 | 1,310 | 1,360 | 1,400 | 1,440 | 5 | 31.42 | 7.25 |
| 195R13 | 955 | 1,010 | 1,060 | 1,110 | 1,170 | 1,220 | 1,280 | 1,320 | 1,370 | 1,420 | 1,470 | 1,510 | 1,550 | 5½ | 32.38 | 7.70 |
| 135R14 | 515 | 550 | 585 | 615 | 645 | 675 | 705 | 730 | 760 | 785 | 810 | 835 | 860 | 4 | 27.54 | 5.39 |
| 145R14 | 595 | 635 | 675 | 715 | 750 | 785 | 815 | 850 | 880 | 910 | 940 | 965 | 995 | 4 | 28.54 | 5.79 |
| 155R14 | 690 | 740 | 780 | 820 | 860 | 900 | 940 | 970 | 1,010 | 1,040 | 1,080 | 1,110 | 1,140 | 4 | 29.51 | 6.05 |
| 165R14 | 760 | 810 | 860 | 910 | 960 | 1,000 | 1,040 | 1,080 | 1,120 | 1,160 | 1,200 | 1,240 | 1,270 | 4½ | 30.65 | 6.55 |
| 175R14 | 840 | 900 | 950 | 1,000 | 1,050 | 1,100 | 1,140 | 1,190 | 1,230 | 1,270 | 1,310 | 1,350 | 1,390 | 5 | 31.63 | 7.00 |
| 185R14 | 920 | 980 | 1,040 | 1,100 | 1,160 | 1,210 | 1,260 | 1,310 | 1,360 | 1,400 | 1,450 | 1,490 | 1,540 | 5 | 32.59 | 7.30 |
| 195R14 | 1,020 | 1,090 | 1,150 | 1,210 | 1,270 | 1,330 | 1,390 | 1,440 | 1,500 | 1,550 | 1,600 | 1,650 | 1,690 | 5½ | 33.69 | 7.80 |
| 205R14 | 1,110 | 1,190 | 1,250 | 1,310 | 1,380 | 1,440 | 1,500 | 1,560 | 1,620 | 1,670 | 1,730 | 1,780 | 1,830 | 6 | 34.82 | 8.30 |
| 215R14 | 1,210 | 1,290 | 1,360 | 1,430 | 1,510 | 1,580 | 1,640 | 1,710 | 1,770 | 1,830 | 1,890 | 1,950 | 2,000 | 6 | 35.79 | 8.60 |
| 225R14 | 1,270 | 1,350 | 1,430 | 1,510 | 1,580 | 1,660 | 1,730 | 1,790 | 1,860 | 1,920 | 1,990 | 2,050 | 2,100 | 6½ | 36.44 | 8.95 |
| 125R15 | 460 | 490 | 520 | 550 | 575 | 605 | 630 | 655 | 680 | 705 | 725 | 745 | 770 | 3½ | 27.69 | 5.00 |
| 135R15 | 545 | 580 | 615 | 650 | 680 | 715 | 745 | 775 | 800 | 830 | 855 | 880 | 910 | 4 | 28.53 | 5.39 |
| 145R15 | 640 | 680 | 720 | 760 | 795 | 830 | 865 | 900 | 935 | 965 | 995 | 1,025 | 1,055 | 4 | 29.54 | 5.79 |
| 155R15 | 690 | 735 | 780 | 825 | 865 | 905 | 940 | 980 | 1,015 | 1,050 | 1,085 | 1,115 | 1,150 | 4½ | 30.45 | 6.18 |
| 165R15 | 770 | 820 | 870 | 910 | 960 | 1,000 | 1,050 | 1,090 | 1,130 | 1,170 | 1,200 | 1,240 | 1,270 | 4½ | 31.18 | 6.40 |
| 175R15 | 840 | 900 | 950 | 1,000 | 1,050 | 1,100 | 1,140 | 1,190 | 1,230 | 1,270 | 1,320 | 1,360 | 1,390 | 5 | 32.30 | 6.90 |
| 185R15 | 950 | 1,010 | 1,070 | 1,130 | 1,180 | 1,240 | 1,290 | 1,340 | 1,390 | 1,440 | 1,480 | 1,530 | 1,570 | 5½ | 33.58 | 7.45 |
| 195R15 | 1,020 | 1,090 | 1,150 | 1,210 | 1,270 | 1,330 | 1,380 | 1,440 | 1,490 | 1,540 | 1,590 | 1,640 | 1,690 | 5½ | 34.22 | 7.65 |
| 205R15 | 1,100 | 1,170 | 1,240 | 1,300 | 1,370 | 1,430 | 1,490 | 1,550 | 1,610 | 1,660 | 1,720 | 1,770 | 1,820 | 6 | 35.20 | 8.10 |
| 215R15 | 1,190 | 1,270 | 1,340 | 1,410 | 1,480 | 1,550 | 1,620 | 1,680 | 1,740 | 1,800 | 1,860 | 1,920 | 1,970 | 6 | 36.00 | 8.35 |
| 225R15 | 1,270 | 1,350 | 1,430 | 1,510 | 1,580 | 1,650 | 1,720 | 1,790 | 1,860 | 1,920 | 1,980 | 2,040 | 2,100 | 6½ | 36.94 | 8.80 |
| 235R15 | 1,340 | 1,430 | 1,510 | 1,600 | 1,680 | 1,750 | 1,830 | 1,900 | 1,970 | 2,030 | 2,100 | 2,160 | 2,230 | 6½ | 37.75 | 9.05 |

[1] The letter "H", "S", or "V" may be included in any specified tire size designation adjacent to the "R".

[2] Actual section width and overall width shall not exceed the specified section width by more than 7 percent.

CHANGES: 16 and 18 p.s.i. loads added.

TABLE I-J (AMENDMENT NO. 9)

TIRE LOAD RATINGS, TEST RIMS, MINIMUM SIZE FACTORS, AND SECTION WIDTHS FOR "78 SERIES" BIAS PLY TIRES

| Tire size designation [1] | Maximum tire loads (pounds) at various cold inflation pressures (p.s.i.) | | | | | | | | | | | | | Test rim width (inches) | Minimum size factor (inches) | Section [2] width (inches) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 16 | 18 | 20 | 22 | 24 | 26 | 28 | 30 | 32 | 34 | 36 | 38 | 40 | | | |
| A78-13 | 720 | 770 | 810 | 860 | 900 | 940 | 980 | 1,020 | 1,060 | 1,090 | 1,130 | 1,160 | 1,200 | 4½ | 29.74 | 6.60 |
| B78-13 | 780 | 840 | 890 | 930 | 980 | 1,030 | 1,070 | 1,110 | 1,150 | 1,190 | 1,230 | 1,270 | 1,300 | 5 | 30.72 | 7.05 |
| C78-13 | 840 | 890 | 950 | 1,000 | 1,050 | 1,100 | 1,140 | 1,190 | 1,230 | 1,270 | 1,320 | 1,360 | 1,400 | 5½ | 31.56 | 7.45 |
| B78-14 | 780 | 840 | 890 | 930 | 980 | 1,030 | 1,070 | 1,110 | 1,150 | 1,190 | 1,230 | 1,270 | 1,300 | 4½ | 31.04 | 6.65 |
| C78-14 | 840 | 890 | 950 | 1,000 | 1,050 | 1,100 | 1,140 | 1,190 | 1,230 | 1,270 | 1,320 | 1,360 | 1,400 | 5 | 31.95 | 7.05 |
| D78-13 | 890 | 950 | 1,010 | 1,070 | 1,120 | 1,170 | 1,220 | 1,270 | 1,320 | 1,360 | 1,410 | 1,450 | 1,490 | 5½ | 32.18 | 7.70 |
| D78-14 | 890[3] | 950 | 1,010 | 1,070 | 1,120 | 1,170 | 1,220 | 1,270 | 1,320 | 1,360 | 1,410 | 1,450 | 1,490 | 5 | 32.62 | 7.35 |
| E78-14 | 950 | 1,010 | 1,070 | 1,130 | 1,190 | 1,240 | 1,300 | 1,350 | 1,400 | 1,440 | 1,490 | 1,540 | 1,580 | 5½ | 33.29 | 7.65 |
| F78-14 | 1,020 | 1,090 | 1,160 | 1,220 | 1,280 | 1,340 | 1,400 | 1,450 | 1,500 | 1,550 | 1,610 | 1,650 | 1,700 | 5½ | 34.04 | 7.90 |
| G78-14 | 1,100 | 1,180 | 1,250 | 1,310 | 1,380 | 1,440 | 1,500 | 1,560 | 1,620 | 1,680 | 1,730 | 1,780 | 1,830 | 6 | 35.02 | 8.35 |
| H78-14 | 1,200 | 1,290 | 1,360 | 1,440 | 1,510 | 1,580 | 1,650 | 1,710 | 1,770 | 1,830 | 1,890 | 1,950 | 2,010 | 6 | 36.06 | 8.70 |
| J78-14 | 1,200 | 1,350 | 1,430 | 1,500 | 1,580 | 1,650 | 1,720 | 1,790 | 1,860 | 1,920 | 1,980 | 2,040 | 2,100 | 6 | 36.58 | 8.80 |
| A78-15 | 720 | 770 | 810 | 860 | 900 | 940 | 980 | 1,020 | 1,060 | 1,090 | 1,130 | 1,160 | 1,200 | 4½ | 30.85 | 6.35 |
| C78-15 | 840 | 890 | 950 | 1,000 | 1,050 | 1,100 | 1,140 | 1,190 | 1,230 | 1,270 | 1,320 | 1,360 | 1,400 | 5 | 32.45 | 6.95 |
| D78-15 | 890 | 950 | 1,010 | 1,070 | 1,120 | 1,170 | 1,220 | 1,270 | 1,320 | 1,360 | 1,410 | 1,450 | 1,490 | 5 | 33.05 | 7.15 |
| E78-15 | 950 | 1,010 | 1,070 | 1,130 | 1,190 | 1,240 | 1,300 | 1,350 | 1,400 | 1,440 | 1,490 | 1,540 | 1,580 | 5 | 33.65 | 7.35 |
| F78-15 | 1,030 | 1,090 | 1,160 | 1,220 | 1,280 | 1,340 | 1,400 | 1,450 | 1,500 | 1,500 | 1,610 | 1,650 | 1,700 | 5½ | 34.56 | 7.70 |
| G78-15 | 1,100 | 1,180 | 1,250 | 1,310 | 1,380 | 1,440 | 1,500 | 1,560 | 1,620 | 1,680 | 1,730 | 1,780 | 1,830 | 5½ | 35.36 | 8.05 |
| H78-15 | 1,200 | 1,290 | 1,360 | 1,440 | 1,510 | 1,580 | 1,650 | 1,710 | 1,770 | 1,830 | 1,890 | 1,950 | 2,010 | 6 | 36.50 | 8.55 |
| J78-15 | 1,200 | 1,350 | 1,430 | 1,500 | 1,580 | 1,650 | 1,720 | 1,790 | 1,860 | 1,920 | 1,980 | 2,040 | 2,100 | 6 | 37.02 | 8.70 |
| L78-15 | 1,340 | 1,430 | 1,520 | 1,600 | 1,680 | 1,750 | 1,830 | 1,900 | 1,970 | 2,040 | 2,100 | 2,170 | 2,230 | 6 | 37.73 | 8.85 |
| N78-15 | 1,500 | 1,600 | 1,700 | 1,790 | 1,880 | 1,970 | 2,050 | 2,130 | 2,210 | 2,280 | 2,360 | 2,430 | 2,500 | 7 | 39.50 | 9.80 |

[1] The letter "H", "S", or "V" may be included in any specified tire size designation adjacent to or in place of the "dash".

[2] Actual section width and overall width shall not exceed the specified section width by more than 7 percent.

Changes: New tire sizes: D78-13 and A78-15.

TABLE I-K

(Amendment 7)

TIRE LOAD RATINGS, TEST RIMS, MINIMUM SIZE FACTORS, AND SECTION WIDTHS FOR "60 SERIES" BIAS PLY TIRES

| Tire size designation [1] | Maximum tire loads (pounds) at various cold inflation pressures (p.s.i.) | | | | | | | | | | | | | Test rim width (inches) | Minimum size factor (inches) | Section width [2] (inches) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 16 | 18 | 20 | 22 | 24 | 26 | 28 | 30 | 32 | 34 | 36 | 38 | 40 | | | |
| E60-14 | 950 | 1,010 | 1,070 | 1,130 | 1,190 | 1,240 | 1,300 | 1,350 | 1,400 | 1,440 | 1,490 | 1,540 | 1,580 | 7 | 33.69 | 9.26 |
| F60-14 | 1,020 | 1,090 | 1,160 | 1,220 | 1,280 | 1,340 | 1,400 | 1,450 | 1,500 | 1,550 | 1,610 | 1,650 | 1,700 | 7 | 34.44 | 9.55 |
| G60-14 | 1,100 | 1,180 | 1,250 | 1,310 | 1,380 | 1,440 | 1,500 | 1,560 | 1,620 | 1,680 | 1,730 | 1,780 | 1,830 | 7 | 35.23 | 9.85 |
| H60-14 | 1,200 | 1,290 | 1,360 | 1,440 | 1,510 | 1,580 | 1,650 | 1,710 | 1,770 | 1,830 | 1,890 | 1,950 | 2,010 | 7 | 36.41 | 10.23 |
| J60-14 | 1,260 | 1,350 | 1,430 | 1,500 | 1,580 | 1,650 | 1,720 | 1,790 | 1,860 | 1,920 | 1,980 | 2,040 | 2,100 | 7 | 36.70 | 10.43 |
| L60-14 | 1,340 | 1,430 | 1,520 | 1,600 | 1,680 | 1,750 | 1,830 | 1,900 | 1,970 | 2,040 | 2,100 | 2,170 | 2,230 | 8 | 37.83 | 11.16 |
| E60-15 | 950 | 1,010 | 1,070 | 1,130 | 1,190 | 1,240 | 1,300 | 1,350 | 1,400 | 1,440 | 1,490 | 1,540 | 1,580 | 6 | 33.83 | 8.70 |
| F60-15 | 1,020 | 1,090 | 1,160 | 1,220 | 1,280 | 1,340 | 1,400 | 1,450 | 1,500 | 1,550 | 1,610 | 1,650 | 1,700 | 7 | 34.94 | 9.40 |
| G60-15 | 1,100 | 1,180 | 1,250 | 1,310 | 1,380 | 1,440 | 1,500 | 1,560 | 1,620 | 1,680 | 1,730 | 1,780 | 1,830 | 7 | 35.73 | 9.70 |
| H60-15 | 1,200 | 1,290 | 1,360 | 1,440 | 1,510 | 1,580 | 1,650 | 1,710 | 1,770 | 1,830 | 1,890 | 1,950 | 2,010 | 7 | 36.70 | 10.05 |
| J60-15 | 1,260 | 1,350 | 1,430 | 1,500 | 1,580 | 1,650 | 1,720 | 1,790 | 1,860 | 1,920 | 1,980 | 2,040 | 2,100 | 7 | 37.20 | 10.25 |
| L60-15 | 1,340 | 1,430 | 1,520 | 1,600 | 1,680 | 1,750 | 1,830 | 1,900 | 1,970 | 2,040 | 2,100 | 2,170 | 2,230 | 7 | 37.91 | 10.50 |

[1] The letter "H", "S", or "V" may be included in any specified tire size designation adjacent to or in place of the "dash".

[2] Actual section width and overall width shall not exceed the specified section width by more than 7 percent.

CHANGES: Test Rim for J60-14, J60-15, and L60-15 changed to 7-inch.

TABLE I-L

(Amendment No. 2)

TIRE LOAD RATINGS, TEST RIMS, MINIMUM SIZE FACTORS AND SECTION WIDTHS FOR SERIES 50 CANTILEVERED SIDEWALL TIRES

| Tire size designation [1] | Maximum tire loads (pounds) at various cold inflation pressures (p.s.i.) | | | | | | | | | | | Test rim width (inches) | Minimum size factor (inches) | Section width [2] (inches) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 20 | 22 | 24 | 26 | 28 | 30 | 32 | 34 | 36 | 38 | 40 | | | |
| E50C-16 | 1,070 | 1,130 | 1,190 | 1,240 | 1,300 | 1,350 | 1,400 | 1,440 | 1,490 | 1,540 | 1,580 | 3½ | 33.31 | 7.36 |
| F50C-16 | 1,160 | 1,220 | 1,280 | 1,340 | 1,400 | 1,450 | 1,500 | 1,550 | 1,610 | 1,650 | 1,700 | 3½ | 34.04 | 8.20 |
| G50C-17 | 1,250 | 1,310 | 1,380 | 1,440 | 1,500 | 1,560 | 1,620 | 1,680 | 1,730 | 1,780 | 1,830 | 3½ | 35.34 | 8.43 |
| H50C-17 | 1,360 | 1,440 | 1,510 | 1,580 | 1,650 | 1,710 | 1,770 | 1,830 | 1,890 | 1,950 | 2,010 | 3½ | 36.30 | 8.80 |
| L50C-18 | 1,520 | 1,600 | 1,680 | 1,750 | 1,830 | 1,900 | 1,970 | 2,040 | 2,100 | 2,170 | 2,230 | 3½ | 38.00 | 9.10 |

[1] The letter "H", "S" or "V" may be included in any specified tire size designation adjacent to or in place of the "dash".

[2] Actual section width and overall width shall not exceed the specified section width by more than 7 percent.

Changes: Reissued with no changes.

TABLE I-M

(Amendment No. 4)

TIRE LOAD RATINGS, TEST RIMS, MINIMUM SIZE FACTORS AND SECTION WIDTHS FOR "78 SERIES" RADIAL PLY TIRES

| Tire size designation [1] | Maximum tire loads (pounds) at various cold inflation pressures (p.s.i.) | | | | | | | | | | | | | Test rim width (inches) | Minimum size factor (inches) | Section width [2] (inches) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 16 | 18 | 20 | 22 | 24 | 26 | 28 | 30 | 32 | 34 | 36 | 38 | 40 | | | |
| A R78-13 | 720 | 770 | 810 | 860 | 900 | 940 | 980 | 1,020 | 1,060 | 1,090 | 1,130 | 1,160 | 1,200 | 4½ | 29.55 | 6.50 |
| B R78-13 | 780 | 840 | 890 | 930 | 980 | 1,030 | 1,070 | 1,110 | 1,150 | 1,190 | 1,230 | 1,270 | 1,300 | 4½ | 30.31 | 6.73 |
| C R78-13 | 840 | 890 | 950 | 1,000 | 1,050 | 1,100 | 1,140 | 1,190 | 1,230 | 1,270 | 1,320 | 1,360 | 1,400 | 5 | 31.13 | 7.15 |
| B R78-14 | 780 | 840 | 890 | 930 | 980 | 1,030 | 1,070 | 1,110 | 1,150 | 1,190 | 1,230 | 1,270 | 1,300 | 4½ | 30.84 | 6.69 |
| C R78-14 | 840 | 890 | 950 | 1,000 | 1,050 | 1,100 | 1,140 | 1,190 | 1,230 | 1,270 | 1,320 | 1,360 | 1,400 | 5 | 31.67 | 7.00 |
| D R78-14 | 890 | 950 | 1,010 | 1,070 | 1,120 | 1,170 | 1,220 | 1,270 | 1,320 | 1,360 | 1,410 | 1,450 | 1,490 | 5 | 32.26 | 7.20 |
| E R78-14 | 950 | 1,010 | 1,070 | 1,130 | 1,190 | 1,240 | 1,300 | 1,350 | 1,400 | 1,440 | 1,490 | 1,540 | 1,580 | 5 | 32.86 | 7.40 |
| F R78-14 | 1,020 | 1,090 | 1,160 | 1,220 | 1,280 | 1,340 | 1,400 | 1,450 | 1,500 | 1,550 | 1,610 | 1,650 | 1,700 | 5½ | 33.78 | 7.85 |
| G R78-14 | 1,100 | 1,180 | 1,250 | 1,310 | 1,380 | 1,440 | 1,500 | 1,560 | 1,620 | 1,680 | 1,730 | 1,780 | 1,830 | 6 | 34.78 | 8.30 |
| H R78-14 | 1,200 | 1,290 | 1,360 | 1,440 | 1,510 | 1,580 | 1,650 | 1,710 | 1,770 | 1,830 | 1,890 | 1,950 | 2,010 | 6 | 35.77 | 8.69 |
| J R78-14 | 1,260 | 1,350 | 1,430 | 1,500 | 1,580 | 1,650 | 1,720 | 1,790 | 1,860 | 1,920 | 1,980 | 2,040 | 2,100 | 6½ | 36.47 | 8.93 |
| A R78-15 | 720 | 770 | 810 | 860 | 900 | 940 | 980 | 1,020 | 1,060 | 1,090 | 1,130 | 1,160 | 1,200 | 4½ | 30.66 | 6.43 |
| B R78-15 | 780 | 840 | 890 | 930 | 980 | 1,030 | 1,070 | 1,110 | 1,150 | 1,190 | 1,230 | 1,270 | 1,300 | 4½ | 31.38 | 6.65 |
| E R78-15 | 950 | 1,010 | 1,070 | 1,130 | 1,190 | 1,240 | 1,300 | 1,350 | 1,400 | 1,440 | 1,490 | 1,540 | 1,580 | 5½ | 33.58 | 7.45 |
| F R78-15 | 1,020 | 1,090 | 1,160 | 1,220 | 1,280 | 1,340 | 1,400 | 1,450 | 1,500 | 1,550 | 1,610 | 1,650 | 1,700 | 5½ | 34.28 | 7.70 |
| G R78-15 | 1,100 | 1,180 | 1,250 | 1,310 | 1,380 | 1,440 | 1,500 | 1,560 | 1,620 | 1,680 | 1,730 | 1,780 | 1,830 | 6 | 35.30 | 8.15 |
| H R78-15 | 1,200 | 1,290 | 1,360 | 1,440 | 1,510 | 1,580 | 1,650 | 1,710 | 1,770 | 1,830 | 1,890 | 1,950 | 2,010 | 6 | 36.23 | 8.45 |
| J R78-15 | 1,260 | 1,350 | 1,430 | 1,500 | 1,580 | 1,650 | 1,720 | 1,790 | 1,860 | 1,920 | 1,980 | 2,040 | 2,100 | 6½ | 36.98 | 8.80 |
| L R78-15 | 1,340 | 1,430 | 1,520 | 1,600 | 1,680 | 1,750 | 1,830 | 1,900 | 1,970 | 2,040 | 2,100 | 2,170 | 2,230 | 6½ | 37.66 | 9.00 |

[1] The letter "H", "S" or "V" may be included in any specified tire size designation adjacent to or in place of the "dash".

[2] Actual section width and overall width shall not exceed the specified section width by more than 7 percent.

Changes: New tire sizes: A R78-13, C R78-13, B R78-14, A R78-15.

TABLE I-N

(Amendment No. 2)

TIRE LOAD RATINGS, TEST RIMS, MINIMUM SIZE FACTORS, AND SECTION WIDTHS FOR "70 SERIES" RADIAL PLY TIRES

| Tire size designation [1] | Maximum tire loads (pounds) at various cold inflation pressures (p.s.i.) | | | | | | | | | | | Test rim width (inches) | Minimum size factor (inches) | Section width [2] (inches) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 20 | 22 | 24 | 26 | 28 | 30 | 32 | 34 | 36 | 38 | 40 | | | |
| 165/70 R 13 | 750 | 770 | 795 | 815 | 835 | 860 | 880 | 900 | 920 | 940 | 960 | 4½ | 28.45 | 6.50 |
| 175/70 R 13 | 845 | 865 | 890 | 910 | 935 | 955 | 980 | 1,000 | 1,025 | 1,045 | 1,070 | 5 | 29.31 | 6.92 |
| 185/70 R 13 | 940 | 965 | 990 | 1,015 | 1,040 | 1,065 | 1,090 | 1,115 | 1,140 | 1,165 | 1,190 | 5 | 30.39 | 7.31 |
| 195/70 R 13 | 1,045 | 1,070 | 1,100 | 1,125 | 1,155 | 1,180 | 1,210 | 1,240 | 1,265 | 1,295 | 1,320 | 5½ | 31.20 | 7.74 |
| 155/70 R 14 | 700 | 720 | 740 | 760 | 780 | 795 | 815 | 835 | 850 | 870 | 890 | 4 | 28.15 | 5.99 |
| 165/70 R 14 | 775 | 795 | 820 | 840 | 860 | 880 | 900 | 920 | 940 | 960 | 980 | 5 | 31.39 | 7.35 |
| 175/70 R 14 | 860 | 885 | 910 | 935 | 955 | 980 | 1,000 | 1,025 | 1,045 | 1,070 | 1,090 | 5 | 31.39 | 7.74 |
| 185/70 R 14 | 990 | 1,015 | 1,045 | 1,070 | 1,100 | 1,130 | 1,155 | 1,180 | 1,210 | 1,235 | 1,265 | 5½ | 32.30 | 7.74 |
| 195/70 R 14 | 1,090 | 1,120 | 1,155 | 1,185 | 1,220 | 1,250 | 1,280 | 1,310 | 1,340 | 1,375 | 1,405 | 5 | 31.36 | 6.92 |
| 175/70 R 15 | 940 | 965 | 990 | 1,015 | 1,040 | 1,065 | 1,090 | 1,115 | 1,140 | 1,165 | 1,190 | 5 | 32.34 | 7.31 |
| 185/70 R 15 | 1,040 | 1,070 | 1,100 | 1,130 | 1,155 | 1,180 | 1,210 | 1,235 | 1,265 | 1,290 | 1,320 | | | |

[1] The letter "H", "S", or "V" may be included in any specified tire size designation adjacent to the "R".

[2] Actual section width and overall width shall not exceed the specified section width by more than 7 percent.

Changes: Reissued with no changes.

TABLE I-O

(Amendment No. 2)

TIRE LOAD RATINGS, TEST RIMS, MINIMUM SIZE FACTORS AND SECTION WIDTHS FOR "LOW SECTION" TYPE "R" [1] RADIAL PLY TIRES

| Tire size designation [1] | Maximum tire loads (pounds) at various cold inflation pressures (p.s.i.) | | | | | | | | | | | Test rim width (inches) | Minimum size factor (inches) | Section width [2] (inches) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 20 | 22 | 24 | 26 | 28 | 30 | 32 | 34 | 36 | 38 | 40 | | | |
| 140R12 | 490 | 520 | 550 | 580 | 610 | 640 | 660 | 690 | 710 | 740 | 770 | 4 | 26.2 | 5.40 |
| 150R12 | 570 | 610 | 640 | 670 | 700 | 730 | 760 | 790 | 820 | 850 | 880 | 4 | 27.19 | 5.75 |
| 150R13 | 600 | 640 | 680 | 720 | 750 | 780 | 810 | 840 | 780 | 900 | 940 | 4 | 28.17 | 5.75 |
| 160R13 | 670 | 700 | 740 | 780 | 820 | 860 | 900 | 940 | 980 | 1,010 | 1,040 | 4½ | 29.23 | 6.25 |
| 170R13 | 720 | 760 | 800 | 840 | 880 | 920 | 960 | 1,000 | 1,040 | 1,080 | 1,110 | 5 | 30.08 | 6.65 |
| 150R14 | 640 | 670 | 710 | 750 | 780 | 820 | 860 | 900 | 940 | 970 | 1,000 | 4 | 29.16 | 5.70 |
| 180R15 | 920 | 970 | 1,020 | 1,070 | 1,120 | 1,170 | 1,230 | 1,280 | 1,330 | 1,380 | 1,430 | 5 | 32.97 | 6.85 |

[1] The letter "H", "S", or "V" may be included in any specified tire size designation adjacent to the letter "R".

[2] Actual section width and overall width shall not exceed the specified section width by more than 7 percent.

CHANGES: New size 150R12, 150R14, and 180R15 added.

TABLE I-P

(Amendment No. 1)

TIRE LOAD RATINGS, TEST RIMS, MINIMUM SIZE FACTORS AND SECTION WIDTHS FOR SERIES 45 CANTILEVERED SIDEWALL TIRES

| Tire size designation [1] | Maximum tire loads (pounds) at various cold inflation pressures (p.s.i.) | | | | | | | | | | | Test rim width (inches) | Minimum size factor (inches) | Section width [2] (inches) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 20 | 22 | 24 | 26 | 28 | 30 | 32 | 34 | 36 | 38 | 40 | | | |
| 045C-16 | 1,250 | 1,310 | 1,380 | 1,440 | 1,500 | 1,560 | 1,620 | 1,680 | 1,730 | 1,780 | 1,830 | 5 | 35.53 | 9.70 |

[1] The letter "H," "S" or "V" may be included in any specified tire size designation adjacent to or in place of the "dash".

[2] Actual section width and overall width shall not exceed the specified section width by more than 7 percent.

Changes: Reissued with no changes.

TABLE I-R

[Amdt. No. 4]

TIRE LOAD RATINGS, TEST RIMS, MINIMUM SIZE FACTORS, AND SECTION WIDTHS FOR "60 SERIES" RADIAL PLY TIRES

| Tire size designation [1] | Maximum tire loads (pounds) at various cold inflation pressures (p.s.i.) | | | | | | | | | | | | | Test rim width (inches) | Minimum size factor (inches) | Section width [2] (inches) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 16 | 18 | 20 | 22 | 24 | 26 | 28 | 30 | 32 | 34 | 36 | 38 | 40 | | | |
| GR60-14 | 1,100 | 1,180 | 1,250 | 1,310 | 1,380 | 1,440 | 1,500 | 1,560 | 1,620 | 1,680 | 1,730 | 1,780 | 1,830 | 7 | 35.24 | 9.85 |
| FR60-15 | 1,020 | 1,090 | 1,160 | 1,220 | 1,280 | 1,340 | 1,400 | 1,450 | 1,500 | 1,550 | 1,610 | 1,650 | 1,700 | 7 | 35.02 | 9.30 |
| GR60-15 | 1,100 | 1,180 | 1,250 | 1,310 | 1,380 | 1,440 | 1,500 | 1,560 | 1,620 | 1,680 | 1,730 | 1,780 | 1,830 | 7 | 35.81 | 9.60 |
| HR60-15 | 1,200 | 1,290 | 1,360 | 1,440 | 1,510 | 1,580 | 1,650 | 1,710 | 1,770 | 1,830 | 1,890 | 1,950 | 2,010 | 7 | 36.70 | 10.05 |

[1] The letter "H", "S", or "V" may be included in any specified tire size designation adjacent to or in place of the "dash."

[2] Actual section width and overall width shall not exceed the specified section width by more than 7 percent.

Changes: New size GR60-14 added.

TABLE I-S

[Amdt. No. 2]

TIRE LOAD RATINGS, TEST RIMS, MINIMUM SIZE FACTORS, AND SECTION WIDTHS FOR "60 SERIES" RADIAL PLY TIRES

| Tire size designation [1] | Maximum tire loads (pounds) at various cold inflation pressures (p.s.i.) | | | | | | | | | | | | | Test rim width (inches) | Minimum size factor (inches) | Section width [2] (inches) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 16 | 18 | 20 | 22 | 24 | 26 | 28 | 30 | 32 | 34 | 36 | 38 | 40 | | | |
| 185/60 R 13 | | | 780 | 815 | 845 | 880 | 915 | 945 | 980 | 1,010 | 1,045 | 1,075 | 1,110 | 5 | 28.61 | 7.28 |
| 205/60 R 14 | 1,020 | 1,090 | 1,160 | 1,220 | 1,280 | 1,340 | 1,400 | 1,450 | 1,500 | 1,550 | 1,610 | 1,650 | 1,700 | 6½ | 34.25 | 9.35 |
| 255/60 R 15 | 1,200 | 1,290 | 1,360 | 1,440 | 1,510 | 1,580 | 1,650 | 1,710 | 1,770 | 1,830 | 1,890 | 1,950 | 2,010 | 7 | 36.70 | 10.05 |

[1] The letter "H", "S", or "V" may be included in any specified tire size designation adjacent to the "R".

[2] Actual section width and overall width shall not exceed the specified section width by more than 7 percent.

Changes: New size 245/60 R 14 and 255/60 R 15 added.

TABLE I-T

(Amendment No. 1)

TIRE LOAD RATINGS, TEST RIMS, MINIMUM SIZE FACTORS, AND SECTION WIDTHS FOR "70 SERIES" RADIAL PLY TIRES

| Tire size [1] designation | Maximum tire loads (pounds) at various cold inflation pressures (p.s.i.) | | | | | | | | | | | | | Test rim width (inches) | Minimum size factor (inches) | Section width [2] (inches) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 16 | 18 | 20 | 22 | 24 | 26 | 28 | 30 | 32 | 34 | 36 | 38 | 40 | | | |
| 205/70 R 14 | 950 | 1,010 | 1,070 | 1,130 | 1,190 | 1,240 | 1,300 | 1,350 | 1,400 | 1,440 | 1,490 | 1,540 | 1,580 | 5½ | 33.42 | 8.10 |
| 215/70 R 14 | 1,020 | 1,090 | 1,160 | 1,220 | 1,280 | 1,340 | 1,400 | 1,450 | 1,500 | 1,550 | 1,610 | 1,650 | 1,700 | 6 | 34.34 | 8.55 |
| 225/70 R 14 | 1,100 | 1,180 | 1,250 | 1,310 | 1,380 | 1,440 | 1,500 | 1,560 | 1,620 | 1,680 | 1,730 | 1,780 | 1,830 | 6 | 35.12 | 8.85 |
| 195/70 R 15 | 890 | 950 | 1,010 | 1,070 | 1,120 | 1,170 | 1,220 | 1,270 | 1,320 | 1,360 | 1,410 | 1,450 | 1,490 | 5½ | 33.34 | 7.75 |
| 205/70 R 15 | 950 | 1,010 | 1,070 | 1,130 | 1,190 | 1,240 | 1,300 | 1,350 | 1,400 | 1,440 | 1,490 | 1,540 | 1,580 | 5½ | 33.91 | 7.95 |
| 215/70 R 15 | 1,020 | 1,090 | 1,160 | 1,220 | 1,280 | 1,340 | 1,400 | 1,450 | 1,500 | 1,550 | 1,610 | 1,650 | 1,700 | 6 | 34.87 | 8.40 |
| 225/70 R 15 | 1,100 | 1,180 | 1,250 | 1,310 | 1,380 | 1,440 | 1,500 | 1,560 | 1,620 | 1,680 | 1,730 | 1,780 | 1,830 | 6 | 35.65 | 8.65 |

[1] The letter "H", "S", or "V" may be included in any specified tire size designation adjacent to the letter "R".

[2] Actual section width and overall width shall not exceed the specified section width by more than 7 percent.

CHANGES: New table.

TABLE II—MINIMUM BREAKING ENERGY VALUES (INCH-POUNDS)

TABLE II-A—FOR BIAS PLY TIRES WITH SIZE DESIGNATION OF 6.00 (OR 155 MILLIMETERS) AND ABOVE AND 70 SERIES TIRES

| Cord material | Maximum permissible inflation pressure | | |
|---|---|---|---|
| | 32 p.s.i. | 36 p.s.i. | 40 p.s.i. |
| Rayon | 1,650 in.-lbs. | 2,475 in.-lbs. | 3,300 in.-lbs. |
| Nylon or polyester. | 2,600 in.-lbs. | 3,900 in.-lbs. | 5,200 in.-lbs. |

TABLE II-B—FOR BIAS PLY TIRES WITH SIZE DESIGNATION BELOW 6.00 INCHES (OR 155 MILLIMETERS)

| Cord material | Maximum permissible inflation pressure | | |
|---|---|---|---|
| | 32 p.s.i. | 36 p.s.i. | 40 p.s.i. |
| Rayon | 1,000 in.-lbs. | 1,875 in.-lbs. | 2,500 in.-lbs. |
| Nylon or polyester. | 1,950 in.-lbs. | 2,925 in.-lbs. | 3,900 in.-lbs. |

TABLE II-C—FOR RADIAL PLY TIRES

| Size designation | Maximum permissible inflation pressure | | |
|---|---|---|---|
| | 32 p.s.i. | 36 p.s.i. | 40 p.s.i. |
| Below 160 millimeters. | 1,950 in.-lbs. | 2,925 in.-lbs. | 3,900 in.-lbs. |
| 160 millimeters or above. | 2,600 in.-lbs. | 3,900 in.-lbs. | 5,200 in.-lbs. |

TABLE III

TEST INFLATION PRESSURES

| | | | |
|---|---|---|---|
| Maximum permissible inflation pressure (in p.s.i.) | 32 | 36 | 40 |
| Pressure (in p.s.i.) to be used in tests for physical dimensions, bead unseating, tire strength, and tire endurance | 24 | 28 | 32 |
| Pressure (in p.s.i.) to be used in test or high speed performance | 30 | 34 | 38 |

**§ 571.110 Standard No. 110; Tire selection and rims.**

S1. *Purpose and scope.* This standard specifies requirements for tire selection to prevent tire overloading.

S2. *Application.* This standard applies to passenger cars.

S3. *Definitions.*

"Accessory weight" means the combined weight (in excess of those standard items which may be replaced) of automatic transmission, power steering, power brakes, power windows, power seats, radio, and heater, to the extent that these items are available as factory-installed equipment (whether installed or not).

"Curb weight" means the weight of a motor vehicle with standard equipment including the maximum capacity of fuel, oil, and coolant, and, if so equipped, air conditioning and additional weight optional engine.

"Maximum loaded vehicle weight" means the sum of—

(a) Curb weight;

(b) Accessory weight;

(c) Vehicle capacity weight; and

(d) Production options weight.

"Normal occupant weight" means 150 pounds times the number of occupants specified in the second column of Table I.

"Occupant distribution" means distribution of occupants in a vehicle as specified in the third column of Table I.

"Production options weight" means the combined weight of those installed regular production options weighing over 5 pounds in excess of those standard items which they replace, not previously considered in curb weight or accessory weight, including heavy duty brakes, ride levelers, roof rack, heavy duty battery, and special trim.

"Vehicle capacity weight" means the rated cargo and luggage load plus 150 pounds times the vehicles designated seating capacity.

"Vehicle maximum load on the tire" means that load on an individual tire that is determined by distributing to each axle its share of the maximum loaded vehicle weight and dividing by two.

"Vehicle normal load on the tire" means that load on an individual tire (distributed in accordance with Table I) and dividing by two.

TABLE I

OCCUPANT LOADING AND DISTRIBUTION FOR VEHICLE NORMAL LOAD FOR VARIOUS DESIGNATED SEATING CAPACITIES

| Designated seating capacity, number of occupants | Vehicle normal load, number of occupants | Occupant distribution in a normally loaded vehicle |
|---|---|---|
| 2 through 4 | 2 | 2 in front. |
| 5 through 10 | 3 | 2 in front, 1 in second seat. |

S4. *Requirements.*

S4.1 *General.* Passenger Cars shall be equipped with tires that meet the requirements of § 571.109, "New Pneumatic Tires—Passenger Cars."

S4.2 *Tire load limits.*

S4.2.1 The vehicle maximum load on the tire shall not be greater than the applicable maximum load rating specified in Table I of Motor Vehicle Safety Standard No. 109 for the tire's size designation and type.

S4.2.2 The vehicle normal load on the tire shall not be greater than the test load used in the high speed performance test specified in S5.5 of § 571.109 for that tire.

S4.3 *Placard.* A placard, permanently affixed to the glove compartment door or an equally accessible location, shall display the—

(a) Vehicle capacity weight;

(b) Designated seating capacity (expressed in terms of total number of occupants and in terms of occupants for each seat location);

(c) Vehicle manufacturer's recommended cold tire inflation pressure for maximum loaded vehicle weight and, subject to the limitations of S4.3.1, for any other manufacturer-specified vehicle loading condition; and

(d) Vehicle manufacturer's recommended tire size designation.

S4.3.1 No inflation pressure other than the maximum permissible inflation pressure may be specified unless—

(a) It is less than the maximum permissible inflation pressure;

(b) The vehicle loading condition for that pressure is specified; and

(c) The tire load rating from Table I of § 571.109 for the tire at that pressure is not less than the vehicle load on the tire for that vehicle loading condition.

S4.4 *Rims.*

S4.4.1 *Requirements.* Each rim shall:

(a) Be constructed to the dimensions of a rim specified for the applicable tire's size designation in a reference cited in the definition of test rim in S3 of § 571.109. Approved alternative size rims, not cited in S3 of § 571.109 are listed in Table II of Appendix A of this section.

(b) In the event of rapid loss of inflation pressure with the vehicle traveling in a straight line at a speed of 60 miles per hour, retain the deflated tire until the vehicle can be stopped with a controlled braking application.

APPENDIX A

The following table lists alternative size rims for tire and rim combinations not contained in any reference in S3 of § 571.109.

Persons requesting the addition of alternative tire rims to this appendix should submit five (5) copies of information and data supporting the request to the Secretary of Transportation, Attention: Motor Vehicle Programs, National Highway Traffic Safety Administration, U.S. Department of Transportation, Washington, D.C. 20590.

The information should contain the following:

1. The request alternative rim and tire size combination.

2. A statement as to whether the alternative tire/rim combination has been coordinated with an organization such as the Tire and Rim Association, the European Tire and Technical Organisation, the Society of Manufacturers and Traders Limited, the Japan Automobile Tire Manufacturers Association, the Deutsche Industrie Norm and the Scandanavian Tire and Rim Organization.

3. A statement that the additional rim size request has been tested in accordance with the requirements of § 571.110 and meets the requirements of the standard.

4. Copies of the test data sheets showing test conditions, results of tests performed on the tire/rim combination, and conclusions obtained for the individual tests specified in § 571.109.

5. Justification for the additional rim size.

The addition of alternative size rims for the tire and rim combinations is accomplished through the abbreviated procedure consisting of publication in the FEDERAL REGISTER of the size rim for which a petition has been received. If no comments are received, the amendment becomes effective 30 days from date of publication. If objections to the amendment are received, additional rulemaking pursuant to Part 553 of this chapter will be initiated.

FMVSS No. 110—APPENDIX A

TABLE I

(Amendment No. 22)

ALTERNATIVE RIMS

Table I–A

| Tire Size [3] | Rim [1] [2] |
|---|---|
| 6.00–13 | 5–JJ, 6–JJ |
| 7.35–14 | 6–JJ |
| 6.85–15 | 4½–JJ, 5½–JJ |
| 7.00–15 | *5.00F, 5–K* |
| 8.25–15 | 5–JJ, 5½–JJ, *6–JJ, 6–K, 6–L,* 6½–JJ |
| 8.55–15 | 5½–JJ, *6–JJ, 6–K, 6–L,* 6½–JJ |
| 8.90–15 | 6–JJ, *6½–L,* 7–L |
| 9.15–15 | 5½–JJ, 5½–K |
| L84–15 | 5½–JJ, *6–JJ,* 6½–JJ, 7–JJ |

Table I–B

| | |
|---|---|
| A70–13 | 5–JJ, *5½–JJ,* 6–JJ |
| D70–13 | *5½–JJ, 5½–K* |
| D70–14 | 5–JJ |
| E70–14 | 7–JJ |
| F70–14 | 7–JJ, 8–JJ |
| G70–14 | 7–JJ |
| C70–15 | *5½–JJ* |
| E70–15 | 7–JJ, 8–JJ |
| F70–15 | 8–JJ |
| G70–15 | 7–JJ, 7½–K, 8–JJ |
| H70–15 | 8–JJ |

Table I–C

| | |
|---|---|
| 4.80–10 | 3.50D |
| 5.60–14 | 4½–JJ |
| 6.40–15 | 4–JJ, *4½–JJ, 4½–K, 4.50E,* 5.00E, 5–JJ, 5–K, 5½–JJ |
| 155–13/6.15–13 | 5–JJ |
| 175–13/6.95–13 | 5½–JJ |
| 5.0–15 | 3.50B, 3.50D, 3½–JJ, *4–JJ, 4.00C* |
| 5.5–15 | 3.50D, 3½–JJ, *4–JJ,* 4½–JJ |

Table I–D

| | |
|---|---|
| 145–10 | 3.50B |
| 145–13 | 3½–JJ, 4½–JJ |
| 165–13 | *4½–JJ* |
| 135–15 | 4½–JJ |
| 185–15 | 4½–JJ |
| 230–15 | *6–JJ,* 6½–JJ, 7–JJ |

Table I–E

| | |
|---|---|
| 6.2–13 | 4½–JJ |
| 6.5–13 | *4½–JJ,* 5–JJ |

Table I–F

| | |
|---|---|
| 5.20–13 | 4½–JJ |
| 5.60–13 | 3½–JJ, 4–JJ |
| 6.00–13 | *4–JJ* |
| 5.60–15 | 5–K |

Table I–G

| | |
|---|---|
| DR70–13 | *5½–JJ* |
| CR70–14 | *5½–JJ* |
| DR70–14 | 6–JJ, 6½–JJ, 6½–K |
| FR70–15 | 5½–JJ, 6½–JJ, 7–JJ, 8–JJ |
| ER70–15 | 6–JJ, 6½–JJ, 7–JJ |
| FR70–15 | 6½–JJ, 7–JJ, 7½–K, 7½–L |
| GR70–15 | 6½–JJ, 7–JJ, 7–L, 7½–K, 8–K, 8½–L |
| HR70–15 | 6–JJ |
| JR70–15 | 6–JJ |
| LR70–15 | 6–JJ |

Table I–H

| | |
|---|---|
| 155 R 12 | 4–JJ |
| 135 R 13 | 4½–JJ |
| 145 R 13 | 4½–JJ, 4.50B |
| 155 R 13 | 4.50B, 5–JJ, 5½–JJ |
| 165 R 13 | 4–JJ, 4.50B, 5.50B |
| 175 R 13 | 4–JJ, 5½–JJ |
| 165 R 14 | 5½–JJ |
| 175 R 14 | 4½–JJ |
| 205 R 14 | 7½–K |
| 135 R 15 | 4½–JJ |
| 165 R 15 | 5–JJ, 5–K, 5½–JJ |
| 205 R 15 | 6½–L, 7–L, 7½–K |

Table I–J

| Tire Size [3] | Rim [1] [2] |
|---|---|
| A78–13 | 4–JJ, *4½–JJ,* 5–JJ, 5½–JJ, 6–JJ |
| B78–13 | *5–JJ* |
| C78–13 | *5½–JJ* |
| D78–13 | *5½–JJ* |
| B78–14 | *4½–JJ, 4½–K,* 5–JJ, 5–K, 5½–JJ |
| C78–14 | 4½–JJ, *5–JJ, 5–K,* 5½–JJ, 6–JJ |
| D78–14 | 4½–JJ, *5–JJ, 5–K,* 5½–JJ, 6–JJ |
| E78–14 | 4½–JJ, 5–JJ, 5–K, *5½–JJ, 5½–K,* 6–JJ, 6½–JJ, 7–JJ |
| F78–14 | 5–JJ, 5–K, *5½–JJ, 5½–K,* 6–JJ, 6–K, 6½–JJ, 7–JJ |
| G78–14 | 5–JJ, 5½–JJ, 5½–K, *6–JJ, 6–K,* 7–JJ |
| H78–14 | 5½–JJ, *6–JJ, 6–K,* 6½–JJ, 6½–K, 7–JJ |
| J78–14 | *6–JJ, 6–K,* 6½–JJ |
| A78–15 | *4½–JJ* |
| C78–15 | 4½–JJ, 4½–K, *5–JJ, 5–K* |
| D78–15 | *5–JJ, 5–K* |
| E78–15 | 4½–K, *5–JJ 5–K,* 5½–JJ, 5½–K, 6–JJ |
| F78–15 | 4½–K, 5–JJ, 5–K, *5½–JJ, 5½–K,* 6–JJ |
| G78–15 | 5–JJ, 5–K, *5½–JJ, 5½–K,* 6–JJ, 6–K, 6–L, 6½–JJ, 7–JJ |
| H78–15 | 5½–JJ, 5½–K, *6–JJ, 6–K, 6–L,* 6½–K, 6½–JJ, 7–JJ |
| J78–15 | 5½–JJ, *6–JJ, 6–K, 6–L,* 6½–JJ, 7–JJ |
| L78–15 | 5½–JJ, 5½–K, *6–JJ, 6–K, 6–L,* 6½–JJ, 7–JJ, 8–JJ |
| N78–15 | 6–JJ, 7–JJ |

Table I–K

| | |
|---|---|
| E60–14 | *7–JJ* |
| F60–14 | *7–JJ* |
| G60–14 | *7–JJ* |
| J60–14 | *7–JJ,* 7½–JJ |
| H60–14 | 6½–JJ, *7–JJ* |
| L60–14 | *8–JJ* |
| E60–15 | *6–JJ,* 7–JJ, 8–JJ |
| F60–15 | 6½–JJ, *7–JJ,* 8–JJ |
| G60–15 | *7–JJ,* 8–JJ, 9–JJ |
| H60–15 | *7–JJ* |
| J60–15 | *7–JJ,* 7½–JJ |
| L60–15 | *7–JJ,* 7½–JJ |

Table I–L

| | |
|---|---|
| E50C–16 | 3½ |
| F50C–16 | 3½ |
| G50C–17 | 3½ |
| H50C–17 | 3½ |
| L50C–18 | 3½, 4 |

Table I–M

| | |
|---|---|
| AR78–13 | *4½–JJ* |
| BR78–13 | *4½–JJ* |
| CR78–13 | *5–JJ* |
| BR78–14 | *4½–JJ* |
| CR78–14 | *5–JJ* |
| DR78–14 | *5–JJ,* 6–JJ |
| ER78–14 | *5–JJ* |
| FR78–14 | 5–JJ, *5½–JJ,* 6–JJ |
| GR78–14 | *6–JJ* |
| HR78–14 | *6–JJ* |
| JR78–14 | *6½–JJ* |
| AR78–15 | *4½–JJ* |
| BR78–15 | *4½–JJ* |
| ER78–15 | *5½–JJ* |
| FR78–15 | *5½–JJ* |
| GR78–15 | *6–JJ* |
| HR87–15 | 5½–JJ, *6–JJ* |
| JR78–15 | 6–JJ, *6½–JJ* |
| LR78–15 | 6–JJ, *6½–JJ* |

Table I–N

| | |
|---|---|
| 165/70 R 13 | *4½–JJ,* 5–JJ |
| 175/70 R 13 | *5–JJ,* 5½–JJ |
| 185/70 R 13 | 4½–JJ, *5–JJ,* 5½–JJ |

TABLE I–N—Continued

| Tire Size [3] | Rim [1] [2] |
|---|---|
| 195/70 R 13 | *5½–JJ,* 6–JJ |
| 155/70 R 14 | *4–JJ* |
| 185/70 R 14 | 4½–JJ, *5–JJ,* 5½–JJ |
| 195/70 R 14 | 5½–JJ, 6–JJ |
| 175/70 R 15 | *5–JJ* |
| 185/70 R 15 | *5–JJ,* 5½–JJ, 6–JJ, 7–K |

Table I–O

| | |
|---|---|
| 140 R 12 | *4.00, 400–B, 4–JJ,* 4.50, 4.50–B, 4½–JJ |
| 150 R 12 | 3½–JJ, *4.00B, 4–JJ,* 4½–JJ |
| 150 R 13 | 3½–JJ, *4.00B,* 4½–JJ, 5–JJ |
| 160 R 13 | 4.00B, 4½–JJ, 5–JJ, 5½–JJ |
| 170 R 13 | 4½–JJ, *5–JJ,* 5½–JJ, 6–JJ |
| 150 R 14 | *4–JJ,* 4½–JJ |
| 180 R 15 | *5–JJ,* 5½–JJ |

Table I–P

| | |
|---|---|
| G45C–16 | *5* |

Table I–R

| | |
|---|---|
| GR60–14 | *7–JJ* |
| FR60–15 | *7–JJ,* 8–JJ |
| GR60–15 | *7–JJ,* 8–JJ |
| HR60–15 | *7–JJ,* 9–L |

Table I–S

| | |
|---|---|
| 185/60 R 13 | *5–JJ,* 5½–JJ |
| 245/60 R 14 | *6½–JJ,* 7–JJ |
| 255/60 R 15 | *7–JJ,* 9–JJ, 9–L |

Table I–T

| | |
|---|---|
| 205/70 R 14 | *5½–JJ,* 6–JJ, 6½–JJ |
| 215/70 R 14 | 5½–JJ, *6–JJ,* 6½–JJ, 7–JJ, 8–JJ |
| 225/70 R 14 | *6–JJ,* 7½–K |
| 195/70 R 15 | *5½–JJ,* 6–JJ |
| 205/70 R 15 | 5½–JJ, 6–JJ, 6½–JJ, 6½–L, 7–JJ |
| 215/70 R 15 | *6–JJ,* 6½–JJ, 6½–L, 7–JJ, 7–L, 7½–JJ, 7½–L, 7½–K, 8–K |
| 225/70 R 15 | *6–JJ,* 6½–JJ, 7–L, 7½–K, 8–K, 8½–L, 9–L |

[1] Italic designations denote test rims.

[2] Where JJ rims are specified in the above Table J and JK rim contours are permissible.

[3] Table designations refer to tables listed in Appendix A of 571.109.

Changes:

Table I–A 8.25–15, rim 6½–JJ added.

Table I–B D70–14, rim 5–JJ added, F70–14, rim 8–JJ added.

Table I–D 230–15, rims 6–JJ, 6½–JJ, and 7–JJ added.

Table I–G GR70–15, rim 7–JJ added.

Table I–H 155 R13, rim 5½–JJ added.

Table I–K G60–15, rim 9–JJ added.

Table I–M FR78–14, rims 5–JJ and 6–JJ added.

Table I–R GR60–14, rim 7–JJ added, HR60–15, rim 9–L added.

Table I–S 245/60 R14, rims 6½ and 7–JJ added, 255/60 R15, rims 7–JJ, 9–JJ, and 9–L added.

Table I–T 255/70 R15, rims 8–K and 8½–L added.

## § 571.111 Standard No. 111; Rearview mirrors.

S1. *Purpose and scope.* This standard specifies requirements for rearview mirrors to provide the driver with a clear and reasonably unobstructed view to the rear.

S2. *Application.* This standard applies to passenger cars and multipurpose passenger vehicles.

S3. *Requirements.*

S3.1 *Inside rearview mirrors.*

S3.1.1 *Field of view.* A mirror shall be installed that provides the driver a

view to the rear, of substantially unit magnification, with an included horizontal angle of at least 20 degrees and sufficient vertical angle to provide a view of a level road surface extending to the horizon beginning at a point not greater than 200 feet to the rear of the vehicle when the vehicle is occupied by the driver and four passengers or the designed occupant capacity, if less, based on 150 pound average occupant weight. The line of sight may be partially obscured by seated occupants or by head restraints.

S3.1.2 *Mounting.*

S3.1.2.1 The mirror mounting shall provide a stable support for the mirror, and shall provide for mirror adjustment by tilting in both horizontal and vertical directions.

S3.1.2.2 If the mirror is in the head impact area, the mounting shall break away without leaving sharp edges or deflect or collapse when the mirror is subjected to a force of 90 pounds in a forward or sideward direction in any plane 45° above or below the horizontal.

S3.2 *Outside mirrors.*

S3.2.1 *Driver's side.*

S3.2.1.1 *Field of view.* An outside mirror shall be installed that provides the driver a view, of substantially unit magnification, of a level road surface extending to the horizon from a line perpendicular to a plane tangent to the driver's side of the vehicle at the widest point and parallel to the longitudinal axis of the vehicle extending 8 feet out from the tangent plane 35 feet behind the driver's eyes, with the seat in the rearmost position. The line of sight may be partially obscured by rear body or fender contours.

S3.2.1.2 *Mounting.* The mounting shall provide a stable support for the mirror and neither the mirror nor the mounting shall protrude further than the widest part of the vehicle body, except to the extent necessary to produce a field of view meeting or exceeding the requirements of S3.2.1.1. The mirror shall not be obscured by the unwiped portion of the windshield, and shall be adjustable from the driver's seated position. The mirror and mounting shall be free of sharp points or edges that could contribute to pedestrian injury.

S3.2.2 *Passenger's side.* If the inside mirror required by S3.1 does not meet the field of view requirements of S3.1.1, an outside mirror of substantially unit magnification shall be installed on the passenger's side.

S3.2.2.1 *Mounting.* The mounting shall provide a stable support for the mirror, and the mirror and mounting shall be free of sharp points or edges that could contribute to pedestrian injury.

S3.3 *Mirror construction.* The reflectance value of the reflective film employed shall be at least 35 percent. If a mirror is of the selective position prismatic type, the reflectance value in the night driving position shall be at least 4 percent.

S.4. *Demonstration procedures.* Reflectance shall be determined in accordance with Society of Automotive Engineers Recommended Practice J964, "Test Procedure for Determining Reflectivity of Rearview Mirrors," June 1966.

NOTE: (1) When a supplemental mirror is furnished in addition to the inside rearview mirror and the driver's side outside rearview mirror, the supplemental mirror need not be adjustable from the driver's seat.

(2) The location of the driver's eye reference point may be that established in Motor Vehicle Safety Standard No. 104, or it may be a nominal location appropriate for any 95th percentile male driver.

(3) The horizontal angle is measured from the projected eye point, rather than the plane of the mirror.

### § 571.112 Standard No. 112; Headlamp concealment devices.

S1. *Scope.* This standard specifies requirements for headlamp concealment devices.

S2. *Application.* This standard applies to passenger cars, multipurpose passenger vehicles, trucks, buses, and motorcycles.

S3. *Definitions.*

"Fully opened" means the position of the headlamp concealment device in which the headlamp is in the design open operating position.

"Headlamp concealment device" means a device, with its operating system and components, that provides concealment of the headlamp when it is not in use, including a movable headlamp cover and a headlamp that displaces for concealment purposes.

"Power" means any source of energy that operates the headlamp concealment device.

S4. *Requirements.*

S4.1 While the headlamp is illuminated, its fully opened headlamp concealment device shall remain fully opened whenever either or both of the following occur—

a. Any loss of power to or within the headlamp concealment device;

b. Any disconnection, restriction, short-circuit, circuit time delay, or other similar malfunction in any wiring, tubing, hose, solenoid or other component that controls or conducts power for operating the concealment device.

S4.2 Whenever any malfunction occurs in a component that controls or conducts power for the actuation of the concealment device, each closed headlamp concealment device shall be capable of being fully opened—

(a) By automatic means;

(b) By actuation of a switch, lever or other similar mechanism; or

(c) By other means not requiring the use of any tools.

Thereafter, the headlamp concealment device must remain fully opened until intentionally closed.

S4.3 Except for cases of malfunction covered by S4.2, each headlamp concealment device shall be capable of being fully opened and the headlamps illuminated by actuation of a single switch, lever, or similar mechanism, including a mechanism that is automatically actuated by a change in ambient light conditions.

S4.4 Each headlamp concealment device shall be installed so that the headlamp may be mounted, aimed, and adjusted without removing any component of the device, other than components of the headlamp assembly.

S4.5 After December 31, 1969, the headlamp beam of headlamps that illuminate during opening and closing of the headlamp concealment device may not project to the left of or above the position of the beam when the device is fully opened.

S4.6 Except for cases of malfunction covered by S4.2, after December 31, 1969, each headlamp concealment device shall, within an ambient temperature range of −20° to +120° F., be capable of being fully opened in not more than 3 seconds after actuation of the mechanism described in S4.3.

### § 571.113 Standard No. 113; Hood latch system.

S1. *Purpose and scope.* This standard establishes the requirement for providing a hood latch system or hood latch systems.

S2. *Application.* This standard applies to passenger cars, multipurpose passenger vehicles, trucks, and buses.

S3. *Definitions.* "Hood" means any exterior movable body panel forward of the windshield that is used to cover an engine, luggage, storage, or battery compartment.

S4. *Requirements.*

S4.1 Each hood must be provided with a hood latch system.

S4.2 A front opening hood which, in any open position, partially or completely obstructs a driver's forward view through the windshield must be provided with a second latch position on the hood latch system or with a second hood latch system.

### § 571.114 Standard No. 114; Theft protection.

S1. *Purpose and scope.* This standard specifies requirements for theft protection to reduce the incidence of accidents resulting from unauthorized use.

S2. *Application.* This standard applies to passenger cars.

S3. *Definitions.*

"Combination" means one of the specifically planned and constructed variations of a locking system which, when properly actuated, permits operation of the locking system.

"Key" includes any other device designed and constructed to provide a method for operating a locking system which is designed and constructed to be operated by that device.

S4. *Requirements.*

S4.1 Each passenger car shall have a key-locking system that, whenever the key is removed will prevent—

(a) Normal activation of the car's engine or other main source of motive power; and

(b) Either steering or forward self-mobility of the car, or both.

S4.2 The prime means for deactivating the car's engine or other main source of motive power shall not activate the deterrent required by S4.1(b).

S4.3 The number of different combinations of the key locking systems required by S4.1 of each manufacturer shall be at least 1,000, or a number equal to the number of passenger cars manufactured by such manufacturer, whichever is less.

S4.4 A warning to the driver shall be activated whenever the key required by S4.1 has been left in the locking system and the driver's door is opened. The warning to the driver need not operate—

(a) After the key has been manually withdrawn to a position from which it may not be turned;

(b) When the key-locking system is in the "on" or "start" position; or

(c) After the key has been inserted in the locking system and before it has been turned.

§ 571.115 Standard No. 115; Vehicle identification number.

S1. *Purpose and Scope.* This standard specifies requirements for vehicle identification numbers to reduce the incidence of accidents resulting from unauthorized use.

S2. *Application.* This standard applies to passenger cars.

S3. *Definition.* "Vehicle identification number" means a number consisting of arabic numerals, roman letters, or both, which the manufacturer assigns to the vehicle for identification purposes.

S4. *Requirements.*

S4.1 Each passenger car shall have a vehicle identification number.

S4.2 The vehicle identification numbers of two vehicles manufactured by a manufacturer within a 10-year period shall not be identical.

S4.3 The vehicle identification number of each passenger car shall be sunk into or embossed upon either a part of the vehicle (other than the glazing) that is not designed to be removed except for repair or a separate plate which is permanently affixed to such a part.

S4.4 The vehicle identification number shall be located inside the passenger compartment and shall be readable, without moving any part of the vehicle, through the vehicle glazing under daylight lighting conditions by an observer having 20/20 vision (Snellen) whose eyepoint is located outside the vehicle adjacent to the left windshield pillar.

§ 571.116 Standard No. 116; Motor vehicle hydraulic brake fluids.

S1. *Purpose and scope.* This standard specifies requirements for hydraulic brake fluids for use in motor vehicles.

S2. *Application.* This standard applies to hydraulic brake fluids for use in motor vehicles.

S3. *Definitions.* "Hydraulic brake fluid" means any fluid for use in the hydraulic braking system of a motor vehicle, except petroleum base fluid which is in a container clearly identified and distinguishable from the types of non-petroleum hydraulic brake fluids prescribed in this standard.

The abbreviation "°C." means temperature expressed in degrees in Celsius.

The abbreviation "°F." means temperature expressed in degrees in Fahrenheit.

S4. *Requirements.* Hydraulic brake fluid shall comply with the requirements prescribed in S4.1 and S4.2 for one or more of the following types when such type or types are marked on the label of the container or are identified by other means: SAE Type 70R1, SAE Type 70R1 Arctic, SAE Type 70R3. When the type is not indicated on the label of the container or otherwise or when the type indicated is not one of these three types, the hydraulic brake fluid shall comply with the requirements for SAE Type 70R1 prescribed in S4.1.

S4.1 *Requirements for SAE Type 70R1 and SAE Type 70R1 Arctic.* SAE Type 70R1 and SAE Type 70R1 Arctic hydraulic brake fluid shall meet the following requirements when tested in accordance with the designated procedures in SAE Standard J70b dated May 1963 and editorially revised December 1963 for SAE 70R1 and SAE 70R1 Arctic:

(a) *Boiling point.* Brake fluid when tested by the procedure specified in section 4.1 of SAE J70b shall have a boiling point not less than 150° C. or 302° F.

(b) *Flash point.* Brake fluid when tested by the procedure specified in section 4.2 of SAE J70b shall have a flash point not less than 63° C. or 145.4° F.

(c) *Viscosity.* Brake fluid when tested by the procedure specified in section 4.3 of SAE J70b shall have the following kinematic viscosities: SAE Type 70R1 Arctic at minus 55° C. or minus 67° F.—not more than 1,500 centistokes; SAE Type 70R1 at minus 40° C. or minus 40° F.—not more than 1,800 centistokes; SAE Type 70R1 and SAE Type 70R1 Arctic at 50° C. or 122° F.—not less than 3.5 centistokes; and SAE Type 70R1 and SAE Type 70R1 Arctic at 100° C. or 212° F.—not less than 1.3 centistokes.

(d) *pH value.* Brake fluid when tested by the procedure specified in section 4.4 of SAE J70b shall have a pH value not less than 7 nor more than 11.5.

(e) *Stability at high temperature.* When tested by the procedure specified in section 4.5 of SAE J70b the boiling point of the brake fluid shall not be less than 146° C. or 294.8° F. and shall not change by more than 5° C. or 9° F.

(f) *Corrosion.* (1) Brake fluid when tested by the procedure specified in section 4.6 of SAE J70b shall not cause corrosion exceeding the limits shown in Table 1. The metal strips outside of the area where the strips are in contact shall neither be pitted nor roughened to an extent discernible to the naked eye, but staining or discoloration is permitted.

(2) The fluid-water mixtures shall show no jelling at 23°±5° C. or 73.4°±9° F. No crystalline type deposit shall form and adhere to either the glass jar walls or the surface of metal strips. The fluid-water mixture shall contain no more than 0.10 percent sediment by volume. The fluid-water mixture shall have a pH value not less than 7 nor more than 11.5.

(3) The test SBR cup shall show no disintegration, as evidenced by excessive tackiness, blisters, or sloughing indicated by carbon black separation on the surface of the rubber cup. The hardness of the rubber cup shall not decrease by more than 15° and the base diameter shall not increase by more than 1.4 millimeters or 0.055 inch.

(g) *Fluidity and appearance at low temperatures.* At minus 40° C. or minus 40° F., when brake fluid is tested by the procedure specified in section 4.7(a) of SAE J70b, the black contrast lines on a hiding power chart shall be clearly discernible when viewed through the fluid in the sample bottle. The fluid shall show no stratification or sedimentation, and upon inversion of the sample bottle, the air bubble shall travel to the top of the fluid in not more than 10 seconds. At minus 50° C. or minus 58° F., when brake fluid is tested by the procedure specified in section 4.7(b) of SAE J70b, the black contrast lines on a hiding power chart shall be clearly discernible when viewed through the fluid in the sample bottle. The fluid shall show no stratification or sedimentation, and upon inversion of the sample bottle, the air bubble shall travel to the top of the fluid in not more than 25 seconds.

(h) *Evaporation.* When brake fluid is tested by the procedure specified in section 4.8 of SAE J70b, loss by evaporation shall not exceed 80 percent by weight. Residue from the brake fluid after evaporation shall contain no precipitate that remains gritty or abrasive when rubbed with the fingertip. Residue shall have a pour point below minus 5° C. or plus 23° F.

(i) *Water tolerance.* At minus 40° C. or minus 40° F., when brake fluid is tested by the procedure specified in section 4.9(b) of SAE J70b, the black contrast lines on a hiding power chart shall be clearly discernible when viewed through the fluid in the centrifuge tube. The fluid shall show no stratification or sedimentation. Upon inversion of the centrifuge tube, the air bubble shall travel to the top of the fluid in not more than 10 seconds. At 60° C. or 140° F., when brake fluid is tested by the procedure specified in section 4.9(b) of SAE J70b, the fluid shall show no stratification, and sedimentation shall not exceed 0.05 percent by volume either before or after centrifuging.

(j) *Compatibility.* At minus 40° C. or minus 40° F., when brake fluid is tested by the procedure specified in section 4.10(a) of SAE J70b, the black contrast lines on a hiding power chart shall be clearly discernible when viewed through the fluid in the centrifuge tube. The fluid shall show no stratification or sedimentation at 60° C. or 140° F., when brake fluid is tested by the procedure specified in section 4.10(b) of SAE J70b, the fluid shall show no stratification, and sedimentation shall not exceed 0.05 percent

by volume either before or after centrifuging.

(k) *Resistance to oxidation.* Brake fluid when tested by the procedure specified in section 4.11 of SAE J70b shall not cause the metal strips outside of the areas in contact with the tinfoil to be pitted nor roughened to an extent discernible to the naked eye, but staining or discoloration is permitted. No more than a trace of gum shall be deposited on the test strips outside of the areas in contact with the tinfoil. The aluminum strips shall not decrease in weight by more than 0.05 milligram per square centimeter and the cast iron strips shall not decrease in weight by more than 0.3 milligram per square centimeter.

(l) *Effect on SBR.* SBR brake cups subjected to brake fluid as specified in section 4.12 of SAE J70b shall show no increase in hardness, shall not decrease in hardness by more than 10 degrees and shall show no disintegration as evidenced by excessive tackiness, blisters, or sloughing indicated by carbon black separation on the surface of the SBR cup. The increase in the diameter of the base of the cups shall not be less than 0.15 millimeter or 0.006 inch nor more than 1.4 millimeters or 0.055 inch.

(m) *Simulated service performance.* Brake fluid when tested by the procedure specified in section 4.13 of SAE J70b shall meet the following performance requirements:

(1) Metal parts shall not show corrosion as evidenced by pitting to an extent discernible to the naked eye, but staining or discoloration shall be permitted.

(2) The initial diameter of any cylinder or piston shall not change by more than 0.13 millimeter or 0.005 inch during test.

(3) The average lip diameter interference set of the SBR cups shall not be greater than 65 percent.

(4) SBR cups shall not decrease in hardness by more than 10 degrees and shall not be in an unsatisfactory operating condition as evidenced by excessive amounts of tackiness, scoring, scuffing, blistering, cracking, chipping (heel abrasion), or change in shape from original appearance.

(5) During any period of 24,000 strokes, the volume loss of fluid shall be not more than 36 milliliters.

(6) The cylinder pistons shall not freeze nor function improperly throughout the test.

(7) The volume loss of fluid during the 100 strokes at the end of the test shall not be more than 36 milliliters.

(8) The condition of the fluid and brake cylinders at the end of test as evidenced by sludging, jelling sedimentation, or grittiness shall not be such as would be likely to cause improper brake action in actual service.

(9) The base diameter of the SBR cups shall not increase by more than 0.9 millimeter or 0.35 inch.

S4.2 *Requirements for SAE Type 70R3.* SAE Type 70R3 hydraulic brake fluid shall meet the following requirements when tested in accordance with the designated procedures in SAE Standard J70b dated May 1963 and editorially revised December 1963 for SAE 70R3:

(a) *Boiling point.* Brake fluid when tested by the procedure specified in section 8.1 of SAE J70b shall have a boiling point not less than 190° C. or 374° F.

(b) *Flash point.* Brake fluid when tested by the procedure specified in section 8.2 of SAE J70b shall have a flash point not less than 82° C. or 179.6° F.

(c) *Viscosity.* Brake fluid when tested by the procedure specified in section 8.3 of SAE J70b shall have the following kinematic viscosities: At minus 40° C. or minus 40° F.—not more than 1,800 centistokes; at 50° C. or 122° F.—not less than 4.2 centistokes; and at 100° C. or 212° F.—not less than 1.5 centistokes.

(d) *pH value.* Brake fluid when tested by the procedure specified in section 8.4 of SAE J70b shall have a pH value not less than 7 or more than 11.5.

(e) *Stability at high temperature.* When tested by the procedure specified in section 8.5 of SAE J70b, the boiling point of the brake fluid shall not be less than 188° C. or 370.4° F. and shall not change by more than 5° C. or 9° F. for brake fluids boiling below 225° C. or 437° F. nor by more than 5° C. or 9° F. plus 0.05° for each degree that the boiling point exceeds 225° C. or 437° F.

(f) *Corrosion.* (1) Brake fluid when tested by the procedure specified in section 8.6 of SAE J70b shall not cause corrosion exceeding the limits shown in Table 1. The metal strips outside of the area where the strips are in contact shall neither be pitted nor roughened to an extent discernible to the naked eye, but staining or discoloration is permitted.

(2) The fluid-water mixture shall show no jelling at 23°±5° C. or 73.4°±9° F. No crystalline-type deposit shall form and adhere to either the glass jar walls or the surface of metal strips. The fluid-water mixture shall contain no more than 0.10 percent sediment by volume. The fluid-water mixture shall have a pH value of not less than 7 nor more than 11.5.

(3) The test SBR cup shall show no disintegration, as evidenced by excessive tackiness, blisters, or sloughing indicated by carbon black separation on the surface of the SBR cup. The hardness of the SBR cup shall not decrease by more than 15 degrees and the base diameter shall not increase by more than 1.4 millimeters or 0.055 inch.

(g) *Fluidity and appearance at low temperatures.* At minus 40° C. or minus 40° F., when brake fluid is tested by the procedure specified in section 8.7(a) of SAE J70b, the black contrast lines on a hiding power chart shall be clearly discernible when viewed through the fluid in the sample bottle. The fluid shall show no stratification or sedimentation, and upon inversion of the sample bottle, the air bubble shall travel to the top of the fluid in not more than 10 seconds. At minus 50° C. or minus 58° F., when brake fluid is tested by the procedure specified in section 8.7(b) of SAE J70b, the black contrast lines on a hiding power chart shall be clearly discernible when viewed through the fluid in the sample bottle. The fluid shall show no stratification or sedimentation, and upon inversion of the sample bottle, the air bubble shall travel to the top of the fluid in not more than 35 seconds.

(h) *Evaporation.* When brake fluid is tested by the procedure specified in section 8.8 of SAE J70b, loss by evaporation shall not exceed 80 percent by weight. Residue from the brake fluid after evaporation shall contain no precipitate that remains gritty or abrasive when rubbed with the fingertip. Residue shall have a pour point below minus 5° C. or plus 23° F.

(i) *Water tolerance.* At minus 40° C. or minus 40° F., when brake fluid is tested by the procedure specified in section 8.9(a) of SAE J70b, the black contrast lines on a hiding power chart shall be clearly discernible when viewed through the fluid in the centrifuge tube. The fluid shall show no stratification or sedimentation. Upon inversion of the centrifuge tube, the air bubble shall travel to the top of the fluid in not more than 10 seconds. At 60° C. or 140° F., when brake fluid is tested by the procedure specified in section 8.9(b) of SAE J70b, the fluid shall show no stratification and sedimentation shall not exceed 0.05 percent by volume either before or after centrifuging.

(j) *Compatibility.* At minus 40° C. or minus 40° F., when brake fluid is tested by the procedure specified in section 8.10(a) of SAE J70b, the black contrast lines on a hiding power chart shall be clearly discernible when viewed through the fluid in the centrifuge tube. The fluid shall show no stratification or sedimentation. At 60° C. or 140° F., when brake fluid is tested by the procedure specified in section 8.10(b) of SAE J70b, the fluid shall show no stratification, and sedimentation shall not exceed 0.05 percent by volume either or after centrifuging.

(k) *Resistance to oxidation.* Brake fluid when tested by the procedure specified in section 8.11 of SAE J70b shall not cause the metal strips outside of the areas in contact with the tinfoil to be pitted nor roughened to an extent discernible to the naked eye, but staining or discoloration is permitted. No more than a trace of gum shall be deposited on the test strips outside of the areas in contact with the tinfoil. The aluminum strips shall not decrease in weight by more than 0.05 milligram per square centimeter and the cast iron strips shall not decrease in weight by more than 0.3 milligram per square centimeter.

(l) *Effect on SBR.* (1) SBR brake cups subjected to brake fluid as specified in section 8.12(a) of SAE J70b shall show no increase in hardness, shall not decrease in hardness by more than 10 degrees, and shall show no disintegration as evidenced by excessive tackiness, blisters, or sloughing indicated by carbon black separation on the surface of the SBR cup. The increase in the diameter of the base of the cups shall not be less than 0.15 millimeter or 0.006 inch

nor more than 1.4 millimeters or 0.055 inch.

(2) SBR brake cups subjected to brake fluid as specified in section 8.12(b) of SAE J70b shall show no increase in hardness, shall not decrease in hardness by more than 15 degrees, and shall show no disintegration as evidenced by excessive tackiness, blisters, or sloughing indicated by carbon black separation on the surface of the rubber cup. The increase in the diameter of the base of the cups shall not be less than 0.15 millimeter or 0.006 inch nor more than 1.4 millimeters or 0.055 inch.

(m) *Simulated service performance.* Brake fluid when tested by both Procedure I and Procedure II specified in section 8.13 of SAE J70b shall meet the following performance requirements:

(1) Metal parts shall not show corrosion as evidenced by pitting to an extent discernible to the naked eye, but staining or discoloration shall be permitted.

(2) The initial diameter of any cylinder or piston shall not change by more than 0.13 millimeter or 0.005 inch during test.

(3) The average lip diameter interference set of the SBR cups shall not be greater than 65 percent.

(4) SBR cups shall not decrease in hardness by more than 10 degrees in procedure I or by more than 15 degrees in Procedure II and shall not be in an unsatisfactory operating condition as evidenced by excessive amounts of tackiness, scoring, scuffing, blistering, cracking, chipping (heel abrasion), or change in shape from original appearance.

(5) During any period of 24,000 strokes the volume loss of fluid shall not be more than 36 milliliters.

(6) The cylinder pistons shall not freeze nor function improperly throughout the test.

(7) The volume loss of fluid during the 100 strokes at the end of the test shall not be more than 36 milliliters.

(8) The condition of the fluid and brake cylinders at the end of test as evidenced by sludging, jelling, sedimentation, or grittiness shall not be such as would be likely to cause improper brake action in actual service.

(9) The base diameter of the SBR cups shall not increase by more than 0.9 millimeter or 0.035 inch.

TABLE I—CORROSION TEST STRIPS AND WEIGHT CHANGES

| Test strip | Weight change [1] |
|---|---|
| Tinned iron, type I, grade 1, class A–2 of Federal Specification QQ–T–425 | 0.2 |
| Steel, SAE 1010 | .2 |
| Aluminum, SAE AA2024 | .1 |
| Cast iron, SAE 111 or strips from housing of wheel brake cylinder, smooth machined surfaces | .2 |
| Brass, SAE 70C | .4 |
| Copper, SAE 71 | .4 |

[1] Maximum permissible weight change in milligram per square centimeter of surface.

S4.3 *Standard styrene-butadiene rubber (SBR) brake cups.* SBR brake cups for testing motor vehicle brake fluids shall be manufactured using the following formulation:

FORMULATION OF RUBBER COMPOUND

| Ingredient | Parts by weight |
|---|---|
| SBR type 1503[a] | 100 |
| Oil furnace black (NBS 378) | 40 |
| Zinc oxide (NBS 370) | 5 |
| Sulfur (NBS 371) | 0.25 |
| Stearic Acid (NBS 372) | 1 |
| n-tertiary butyl-2-benzothiazole sulfenamide (NBS 384) | 1 |
| Symmetrical dibetanaphthyl - p - phenylenediamine | 1.5 |
| Dicumyl peroxide (40 percent on precipitated $CaCO_3$)[b] | 4.5 |
| Total | 153.25 |

NOTE: The ingredients labeled (NBS ------) must have properties identical with those supplied by the National Bureau of Standards.

[a] Philprene 1503 has been found suitable.
[b] Use only within 90 days of manufacture and store at temperature below 27° C. (80° F.).

Compounding, vulcanization, physical properties, size of the finished cups, and other details shall be as specified in appendix B of SAE J1703a. The cups shall be used in testing brake fluids either within 6 months from date of manufacture when stored at room temperature below 30° C. (86° F.) or within 36 months from date of manufacture when stored at temperatures below minus 15° C. (+5° F.). After removal of cups from refrigeration they shall be conditioned base down on a flat surface for at least 12 hours at room temperature in order to allow cups to reach their true configuration before measurement.

**§ 571.116a Standard No. 116a; Motor vehicle brake fluids. (Effective Mar. 1, 1972)**

S1. *Scope.* This standard specifies requirements for brake fluids for use in hydraulic brake systems of motor vehicles, brake fluid containers, and brake fluid container labeling.

S2. *Purpose.* The purpose of this standard is to reduce failures in the hydraulic braking systems of motor vehicles which may occur because of the manufacture or use of improper or contaminated brake fluid.

S3. *Application.* This standard applies to all brake fluid for use in hydraulic brake systems of motor vehicles, except for petroleum-based and silicone-based brake fluids. In addition, S5.3 applies to passenger cars, multipurpose passenger vehicles, trucks, buses, trailers, and motorcycles.

S4. *Definitions.*

"Blister" means a cavity or sac on the surface of a brake cup.

"Chipping" means a condition in which small pieces are missing from the outer surface of a brake cup.

"Duplicate samples" means two samples of brake fluid taken from a single packaged lot and tested simultaneously.

"Packager" means any person who fills containers with brake fluid that are subsequently distributed for retail sale.

"Packaged lot" is that quantity of brake fluid shipped by the manufacturer to the packager in a single container, or that quantity of brake fluid manufactured by a single plant run of 24 hours or less, through the same processing equipment and with no change in ingredients.

"Scuffing" means a visible erosion of a portion of the outer surface of a brake cup.

"Sloughing" means degradation of a brake cup as evidenced by the presence of carbon black loosely held on the brake cup surface, such that a visible black streak is produced when the cup, with a 500±10 gram deadweight on it, is drawn base down over a sheet of white bond paper placed on a firm flat surface.

"Stickiness" means a condition on the surface of a brake cup such that fibers will be pulled from a wad of U.S.P. absorbent cotton when it is drawn across the surface.

S5. *Requirements.* This section specifies requirements for DOT brake fluids (grades DOT 3 and DOT 4), brake fluid containers, and brake fluid container labeling. Where a range of tolerances is specified, the brake fluid must be capable of meeting the requirements at all points within the range.

S5.1 *Motor vehicle brake fluids.* When tested in accordance with S6, motor vehicle brake fluids shall meet the following requirements.

S5.1.1 *Equilibrium reflux boiling point (ERBP).* When brake fluid is tested according to S6.1, the ERBP shall not be less than the following value for the grade indicated:

(a) DOT 3: 205° C. (401° F.).
(b) DOT 4: 230° C. (446° F.).

S5.1.2 *Wet ERBP.* When brake fluid is tested according to S6.2, the wet ERBP shall not be less than the following value for the grade indicated:

(a) DOT 3: 140° C. (284° F.).
(b) DOT 4: 155° C. (311° F.).

S5.1.3 *Kinematic viscosities.* When brake fluid is tested according to S6.3, the kinematic viscosities in centistokes (cSt.) at stated temperatures shall be neither less than 1.5 cSt. at 100° C. (212° F.) nor more than the following maximum value for the grade indicated:

(a) DOT 3: 1,500 cSt. at minus 40° C. (minus 40° F.).

(b) DOT 4: 1,800 cSt. at minus 40° C. (minus 40° F.).

S5.1.4 *pH value.* When brake fluid is tested according to S6.4, the pH value shall not be less than 7 nor more than 11.5.

S5.1.5 *Brake fluid stability.*

S5.1.5.1 *High-temperature stability.* When brake fluid is tested according to S6.5.3 the ERBP shall not change by more than 3° C. (5.4° F.) plus 0.05° for each degree that the ERBP of the fluid exceeds 225° C. (437° F.).

S5.1.5.2 *Chemical stability.* When brake fluid is tested according to S6.5.4, the change in temperature of the refluxing fluid mixture shall not exceed 3° C. (5.4° F.) plus 0.05° for each degree that

the ERBP of the fluid exceeds 225° C. (437° F).

S5.1.6 *Corrosion.* When brake fluid is tested according to S6.6—

(a) The metal test strips shall not show weight changes exceeding the limits stated in Table I.

TABLE I

| Test strip material: | *Max. permissible weight change, mg./sq. cm. of surface* |
|---|---|
| Steel, tinned iron, cast iron | 0.2 |
| Aluminum | .1 |
| Brass, copper | .4 |

(b) Excluding the area of contact (13±1 mm. (½±1/32 inch) measured from the bolt hole end of the test strip), the metal test strips shall not show pitting or etching to an extent discernible without magnification;

(c) The brake fluid-water mixture at the end of the test shall show no jelling at 23°±5° C. (73.4°±9° F.);

(d) No crystalline deposit shall form and adhere to either the glass jar walls or the surface of the metal strips;

(e) At the end of the tests, sedimentation of the fluid-water mixture shall not exceed 0.10 percent by volume;

(f) The pH value of the fluid-water mixture at the end of the test shall not be less than 7 nor more than 11.5;

(g) The cups at the end of the test shall show no disintegration, as evidenced by blisters or sloughing;

(h) The hardness of the cup shall not decrease by more than 15 International Rubber Hardness Degrees (IRHD); and

(i) The base diameter of the cups shall not increase by more than 1.4 mm. (0.055 inch).

S5.1.7 *Fluidity and appearance at low temperature.* When brake fluid is tested according to S6.7, at the storage temperature and for the storage times given in Table II—

(a) The black contrast lines on the hiding power chart shall be clearly discernible when viewed through every part of the fluid in the sample bottle;

(b) The fluid shall show no stratification or sedimentation; and

(c) Upon inversion of the sample bottle, the time required for the air bubble to travel to the top of the fluid shall not exceed the bubble flow times shown in Table II.

TABLE II—FLUIDITY AND APPEARANCE AT LOW TEMPERATURES

| Storage temperature | Storage time (hours) | Maximum bubble flow time (seconds) |
|---|---|---|
| Minus 40±2° C. (minus 40±3.6° F.) | 144±4.0 | 10 |
| minus 50±2° C. (minus 58±3.6° F.) | 6±0.2 | 35 |

S5.1.8 *Evaporation.* When brake fluid is tested according to S6.8—

(a) The loss by evaporation shall not exceed 80 percent by weight;

(b) The residue from the brake fluid after evaporation shall contain no precipitate that remains gritty or abrasive when rubbed with the fingertip; and

(c) The residue shall have a pour point below minus 5° C. (+23° F.).

S5.1.9 *Water tolerance.*

(a) *At low temperature.* When brake fluid is tested according to S6.9(a)—

(1) The black contrast lines on a hiding power test chart shall be clearly discernible when viewed through every part of the fluid in the centrifuge tube;

(2) The fluid shall show no stratification or sedimentation; and

(3) Upon inversion of the centrifuge tube, the air bubble shall travel to the top of the fluid in not more than 10 seconds; and

(b) *At 60° C. (140° F.).* When brake fluid is tested according to S6.9(b)—

(1) The fluid shall show no stratification; and

(2) Sedimentation shall not exceed 0.15 percent by volume after centrifuging.

S5.1.10 *Compatibility.*

(a) *At low temperature.* When brake fluid is tested according to S6.10(a)—

(1) The black contrast lines on a hiding power test chart shall be clearly discernible when viewed through every part of the fluid in the centrifuge tube; and

(2) The fluid shall show no stratification or sedimentation.

(b) *At 60° C. (140° F.).* When brake fluid is tested according to S6.10(b)—

(1) The fluid shall show no stratification; and

(2) Sedimentation shall not exceed 0.05 percent by the volume after centrifuging.

S5.1.11 *Resistance to oxidation.* When brake fluid is tested according to S6.11—

(a) The metal test strips outside the areas in contact with the tinfoil shall not show pitting or etching to an extent discernible without magnification;

(b) No more than a trace of gum shall be deposited on the test strips outside the areas in contact with the tinfoil;

(c) The aluminum strips shall not change in weight by more than 0.05 mg./sq. cm.; and

(d) The cast iron strips shall not change in weight by more than 0.3 mg./sq. cm.

S5.1.12 *Effects on cups.* When brake cups are subjected to brake fluid in accordance with S6.12 (a) and (b)—

(a) The increase in the diameter of the base of the cups shall be not less than 0.15 mm. (0.006 inch) or more than 1.40 mm. (0.055 inch);

(b) The decrease in hardness of the cups shall be not more than 10 IRHD at 70° C. (158° F.) or more than 15 IRHD at 120° C. (248° F.), and there shall be no increase in hardness of the cups; and

(c) The cups shall show no disintegration as evidenced by stickiness, blisters, or sloughing.

S5.1.13 *Stroking properties.* When brake fluid is tested according to S6.13—

(a) Metal parts of the test system shall show no pitting or etching to an extent discernible without magnification;

(b) The change in diameter of any cylinder or piston shall not exceed 0.13 mm. (0.005 inch);

(c) The average decrease in hardness of nine of the 10 cups tested (eight-wheel cylinder and one master cylinder primary) shall not exceed 15 IRHD. Not more than one of the nine cups shall have a decrease in hardness greater than 17 IRHD;

(d) None of the 10 cups shall be in an unsatisfactory operating condition as evidenced by stickiness, scuffing, blisters, cracking, chipping, or other change in shape from its original appearance;

(e) None of the 10 cups shall show an increase in base diameter greater than 0.90 mm. (0.035 inch);

(f) The average lip diameter set of the 10 cups shall not be greater than 65 percent;

(g) During any period of 24,000 strokes, the volume loss of fluid shall not exceed 36 milliliters;

(h) The cylinder pistons shall not freeze or function improperly throughout the test;

(i) The total loss of fluid during the 100 strokes at the end of the test shall not exceed 36 milliliters;

(j) The fluid at the end of the test shall show no formation of gels;

(k) At the end of the test the amount of sediment shall not exceed 1.5 percent by volume; and

(l) Brake cylinders shall be free of deposits that are abrasive or that cannot be removed when rubbed moderately with a nonabrasive cloth wetted with ethanol.

S5.2 *Packaging and labeling requirements for motor vehicle brake fluids.*

S5.2.1 *Container sealing.* Each brake fluid container with a capacity of 6 fluid ounces or more shall be provided with a resealable closure that has an inner seal impervious to the packaged brake fluid. The container closure shall include a tamper-proof feature that will either be destroyed or substantially altered when the container closure is initially opened.

S5.2.2 *Certification, marking, and labeling.*

S5.2.2.1 Each manufacturer of motor vehicle brake fluid shall furnish to each packager, distributor, or dealer to whom he delivers brake fluid, the following information:

(a) A serial number identifying the production lot and the date of manufacture of the brake fluid.

(b) The grade (DOT 3 or DOT 4) of the brake fluid.

(c) The minimum wet boiling point in Fahrenheit of the brake fluid.

(d) Certification that the brake fluid conforms to § 571.116.

S5.2.2.2 Each packager of motor vehicle brake fluid shall furnish the following information clearly and indelibly marked on each brake fluid container.

(a) Certification that the brake fluid conforms to § 571.116.

(b) The name of the packager of the brake fluid. The information may be in code form and, if coded, shall be placed beneath the distributor's name and mailing address or on the bottom of the container.

(c) The name and complete mailing address of the distributor.

(d) A serial number identifying the packaged lot and date of packaging that shall be legible and stamped on the bottom of the container or beneath the information required in paragraph (c) of this section.

(e) Designation of the contents as "DOT _____ Motor Vehicle Brake Fluid" (Fill in "3" or "4" as applicable).

(f) The minimum wet boiling point in Fahrenheit of the DOT 3 or DOT 4 brake fluid in the container.

(g) The following safety warnings in capital and lower case letters as indicated:

1. FOLLOW VEHICLE MANUFACTURER'S RECOMMENDATIONS WHEN ADDING BRAKE FLUID.

2. KEEP BRAKE FLUID CLEAN AND DRY. Contamination with dirt, water, petroleum products or other materials may result in brake failure or costly repairs.

3. STORE BRAKE FLUID ONLY IN ITS ORIGINIAL CONTAINER. KEEP CONTAINER CLEAN AND TIGHTLY CLOSED TO PREVENT ABSORPTION OF MOISTURE.

4. *CAUTION:* DO NOT REFILL CONTAINER, AND DO NOT USE FOR OTHER LIQUIDS. (Not required for containers with a capacity in excess of 5 gallons.)

S5.3 *Motor vehicle requirement.* Each passenger car, multipurpose passenger vehicle, truck, bus, trailer, and motorcycle that has a hydraulic service brake system shall be equipped either with brake fluid that has been manufactured and packaged in conformity with the requirements of this standard, or with petroleum-based or silicone-based brake fluid.

S6. *Test procedures.*

S6.1 *Equilibrium reflux boiling point.* Determine the ERBP of a brake fluid by running duplicate samples according to the following procedure and averaging the results.

S6.1.1 *Summary of procedure.* Sixty milliliters (ml.) of brake fluid are boiled under specified equilibrium conditions (reflux) at atmospheric pressure in a 100-ml. flask. The average temperature of the boiling fluid at the end of the reflux period, corrected for variations in barometric pressure if necessary, is the ERBP.

S6.1.2 *Apparatus.* (See Figure 1) The test apparatus shall consist of—

(a) *Flask.* (See Figure 2) A 100-ml. round-bottom, short-neck heat-resistant glass flask having a neck with a 19/38 standard taper, female ground-glass joint and a side-entering tube, with an outside diameter of 10 millimeters (mm.), which centers the thermometer bulb in the flask 6.5 mm. from the bottom;

(b) *Condenser.* A water-cooled, reflux, glass-tube type, condenser having a jacket 200 mm. in length, the bottom end of which has a 19/38 standard-taper, drip-tip, male ground-glass joint;

(c) *Boiling stones.* Three clean, unused silicon carbide grains (approximately 2 mm. (0.08 inch) in diameter, grit No. 8);

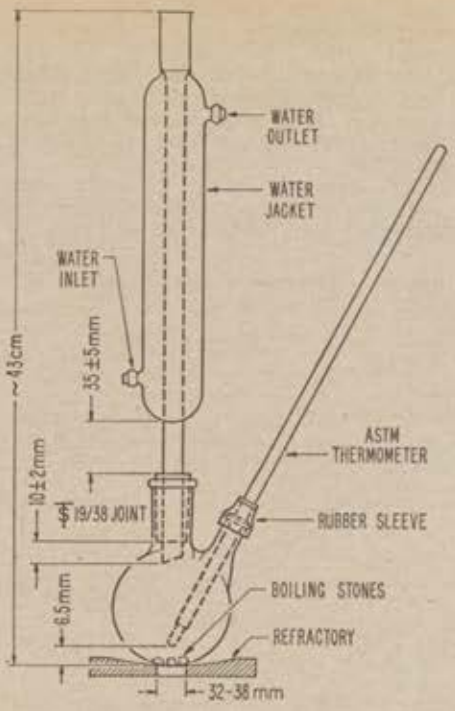



FIG. 1
BOILING POINT TEST APPARATUS

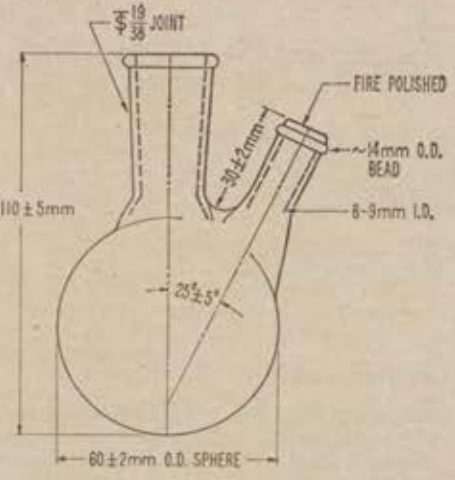



FIG. 2
DETAIL OF 100ml SHORT-NECK FLASK

(d) *Thermometer.* Standardized calibrated partial immersion (76 mm.), solid stem, thermometers conforming to the requirements for an ASTM 2C or 2F, and an ASTM 3C or 3F thermometer; and

(e) *Heat source.* Variable autotransformer-controlled heating mantle designed to fit the flask, or an electric heater with rheostat heat control.

S6.1.3 *Preparation of apparatus.*

(a) Thoroughly clean and dry all glassware.

(b) Insert thermometer through the side tube until the tip of the bulb is 6.5 mm. (¼ inch) from the bottom center of the flask. Seal with a short piece of natural rubber, EPDM, SBR, or butyl tubing.

(c) Place 60±1 ml. of brake fluid and the silicon carbide grains into the flask.

(d) Attach the flask to the condenser. When using a heating mantle, place the mantle under the flask and support it with a ring-clamp and laboratory-type stand, holding the entire assembly in place by a clamp. When using a rheostat-controlled heater, center a standard porcelain or hard asbestos refractory, having a diameter opening 32 to 38 mm., over the heating element and mount the flask so that direct heat is applied only through the opening in the refractory. Place the assembly in an area free from drafts or other types of sudden temperature changes. Connect the cooling water inlet and outlet tubes to the condenser. Turn on the cooling water. The water supply temperature shall not exceed 28° C. (82.4° F.) and the temperature rise through the condenser shall not exceed 2° C. (3.6° F.).

S6.1.4 *Procedure.* Apply heat to the flask so that within 10±2 minutes the fluid is refluxing in excess of 1 drop per second. The reflux rate shall not exceed 5 drops per second at any time. Immediately adjust the heating rate to obtain an equilibrium reflux rate of 1 to 2 drops per second over the next 5±2 minutes. Maintain this rate for an additional 2 minutes, taking four temperature readings at 30-second intervals. Record the average of these as the observed ERBP.

S6.1.5 *Calculation.*

(a) *Thermometer inaccuracy.* Correct the observed ERBP by applying any correction factor obtained in standardizing the thermometer.

(b) *Variation from standard barometric pressure.* Apply the factor shown in Table III to calculate the barometric pressure correction to the ERBP.

TABLE III—CORRECTION FOR BAROMETRIC PRESSURE

| Observed ERBP corrected for thermometer inaccuracy | Correction per 1 mm difference in pressure * | |
|---|---|---|
| | ° C. | (° F.) |
| 100° C. (212° F.) to 190° C. (374° F.) | 0.039 | (0.07) |
| Over 190° C. (374° F.) | 0.04 | (0.08) |

* To be added in case barometric pressure is below 760 mm.; to be subtracted in case barometric pressure is above 760 mm.

(c) If the two corrected observed ERBP's agree within 2° C. (4° C. for brake fluids having an ERBP over 230° C./446° F.) average the duplicate runs as the ERBP; otherwise, repeat the entire test, averaging the four corrected observed values to determine the original ERBP.

S6.2 *Wet ERBP.* Determine the wet ERBP of a brake fluid by running duplicate samples according to the following procedure.

S6.2.1 *Summary of the procedure.* A 100-ml. sample of the brake fluid is humidified under controlled conditions; 100 ml. of SAE RM-1 Compatibility Fluid is used to establish the end point for humidification. After humidification the

water content and ERBP of the brake fluid are determined.

S6.2.2 *Apparatus for humidification.* (See Figure 3) Test apparatus shall consist of—

(a) *Glass jars.* Four SAE RM–49 corrosion test jars or equivalent screw-top, straight-sided, round glass jars each having a capacity of about 475 ml. and approximate inner dimensions of 100 mm. in height by 75 mm. in diameter, with matching lids having new, clean inserts providing water-vapor-proof seals;

(b) *Desiccator and cover.* Four bowl-form glass desiccators, 250-mm. inside diameter, having matching tubulated covers fitted with No. 8 rubber stoppers; and

(c) *Desiccator plate.* Four 230-mm. diameter, perforated porcelain desiccator plates, without feet, glazed on one side.

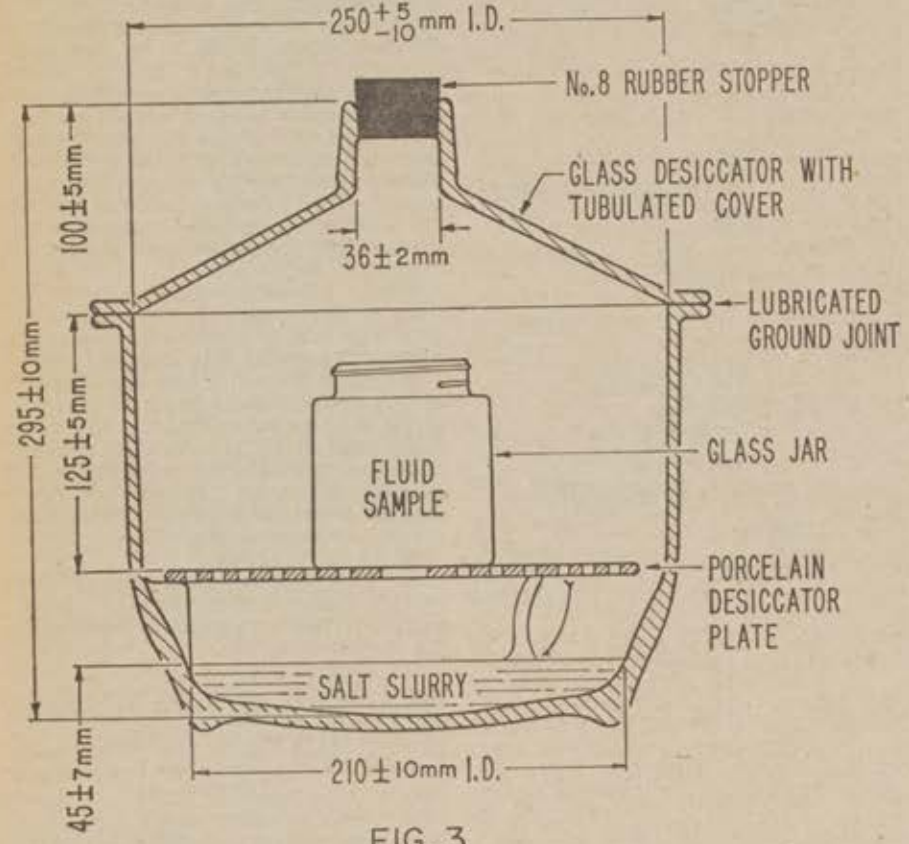



FIG. 3

HUMIDIFICATION APPARATUS

S6.2.3 *Reagents and materials.*

(a) Ammonium sulfate $(NH_4)_2SO_4$. Reagent or A.C.S. grade.

(b) Distilled water, see S7.1.

(c) SAE RM–1 compatibility fluid.

S6.2.4 *Preparation of apparatus.* Lubricate the ground-glass joint of the desiccator. Load each desiccator with 450±25 grams of the ammonium sulfate and add 125±10 ml. of distilled water. The surface of the salt slurry shall lie within 45±7 mm. of the top surface of the desiccator plate. Place the desiccators in an area with temperature controlled at 23°±2° C. (73.4°±3.6° F.) throughout the humidification procedure. Load the desiccators with the slurry and allow to condition with the covers on and stoppers in place at least 12 hours before use. Use a fresh charge of salt slurry for each test.

S6.2.5 *Procedure.* Pour 100±1 ml. of the brake fluid into a corrosion test jar. Promptly place the jar into a desiccator. Prepare duplicate test sample, and two duplicate specimens of the SAE RM–1 compatibility fluid. Adjust water content of the SAE RM–1 fluid to 0.50±0.05 percent by weight at the start of the test in accordance with S7.2. At intervals remove the rubber stopper in the top of each desiccator containing SAE RM–1 fluid. Using a long needled hypodermic syringe, take a sample of not more than 2 ml. from each jar and determine its water content. Remove no more than 10 ml. of fluid from each SAE RM–1 sample during the humidification procedure. When the water content of the SAE fluid reaches 3.50±0.05 percent by weight (average of the duplicates), remove the two test fluid specimens from their desiccators and promptly cap each jar tightly. Measure the water contents of the test fluid specimens in accordance with S7.2 and determine their ERBP's in accordance with S6.1 through S6.1.5. If the two ERBP's agree within 4° C. (8° F.), average them to determine the wet ERBP; otherwise repeat and average the four individual ERBP's as the wet ERBP of the brake fluid.

S6.3 *Kinematic viscosity.* Determine the kinematic viscosity of a brake fluid in centistokes (cSt.) by the following procedure. Run duplicate samples at each of the specified temperatures, making two timed runs on each sample.

S6.3.1 *Summary of the procedure.* The time is measured for a fixed volume of the brake fluid to flow through a calibrated glass capillary viscometer under an accurately reproducible head and at a closely controlled temperature. The kinematic viscosity is then calculated from the measured flow time and the calibration constant of the viscometer.

S6.3.2 *Apparatus.*

(a) *Viscometers.* Calibrated glass capillary-type viscometers, ASTM D2515–66, "Standard Specification for Kinematic Glass Viscometers," measuring viscosity within the precision limits of S6.4.7. Use suspended level viscometers for viscosity measurements at low temperatures. Use Cannon-Fenske Routine or other modified Ostwald viscometers at ambient temperatures and above.

(b) *Viscometer holders and frames.* Mount a viscometer in the constant-temperature bath so that the mounting tube is held within 1° of the vertical.

(c) *Viscometer bath.* A transparent liquid bath of sufficient depth such that at no time during the measurement will any portion of the sample in the viscometer be less than 2 cm. below the surface or less than 2 cm. above the bottom. The bath shall be cylindrical in shape, with turbulent agitation sufficient to meet the temperature control requirements. For measurements within 15° to 100° C. (60° to 212° F.) the temperature of the bath medium shall not vary by more than 0.01° C. (0.02° F.) over the length of the viscometers, or between the positions of the viscometers, or at the locations of the thermometers. Outside this range, the variation shall not exceed 0.03° C. (0.05° F.).

(d) *Thermometers.* Liquid-in-Glass Kinematic Viscosity Test Thermometers, covering the range of test temperatures indicated in Table IV and conforming to ASTM E1–68, "Specifications for ASTM Theromometers," and in the IP requirements for IP Standard Thermometers. Standardize before use (see S6.3.3(b)). Use two standardized thermometers in the bath.

TABLE IV—KINEMATIC VISCOSITY THERMOMETERS

| Temperature range | | For tests at | | Subdivisions | | Thermometer number | |
|---|---|---|---|---|---|---|---|
| °C. | °F. | °C. | °F. | °C. | °F. | ASTM | IP |
| Minus 55.3 to minus 52.5 | Minus 67.5 to minus 62.5. | Minus 55 | Minus 67 | 0.05 | 0.1 | 74 F. | 69 F. or C. |
| Minus 41.4 to minus 38.6 | Minus 42.5 to minus 37.5. | Minus 40 | Minus 40 | 0.05 | 0.1 | 73 F. | 68 F. or C. |
| 98.6 to 101.4 | 207.5 to 212.5 | 100 | 212 | 0.05 | 0.1 | 30 F. | 32 F. or C. |

(e) *Timing device.* Stop watch or other timing device graduated in divisions representing not more than 0.2 second, with an accuracy of at least ±0.05 percent when tested over intervals of 15 minutes. Electrical timing devices may be used when the current frequency is controlled to an accuracy of 0.01 percent or better.

S6.3.3 *Standardization.*

(a) *Viscometers.* Use viscometers calibrated in accordance with Appendix 1 of ASTM D445–65, "Viscosity of Transparent and Opaque Liquids (Kinematic and Dynamic Viscosities)." The calibration constant, *C*, is dependent upon the gravitational acceleration at the place of calibration. This must, therefore, be supplied by the standardization laboratory together with the instrument constant. Where the acceleration of gravity, *g*, in the two locations differs by more than 0.1 percent, correct the calibration constant as follows:

$$C_2 = \frac{g_2}{g_1} \times C_1$$

where the subscripts 1 and 2 indicate respectively the standardization laboratory and the testing laboratory.

(b) *Thermometers.* Check liquid-in-glass thermometers to the nearest 0.01° C. (0.02° F.) by direct comparison with a standardized thermometer. Kinematic Viscosity Test Thermometers shall be standardized at "total immersion." The ice point of standardized thermometers shall be determined before use and the official corrections shall be adjusted to conform to the changes in ice points. (See ASTM E77–66, "Verification and Calibration of Liquid-in-Glass Thermometers.")

(c) *Timers.* Time signals are broadcast by the National Bureau of Standards, Station WWV, Washington, D.C. at 2.5, 5, 10, 15, 20, 25, 30, and 35 Mc/sec (MHz). Time signals are also broadcast by Station CHU from Ottawa, Canada, at 3.330, 7.335, and 14.670 Mc/sec, and Station MSF at Rugby, United Kingdom, at 2.5, 5, and 10 Mc/sec.

S6.3.4 *Procedure.*

(a) Set and maintain the bath at the appropriate test temperature (see S5.1.3) within the limits specified in S6.3.2(c). Apply the necessary corrections, if any, to all thermometer readings.

(b) Select a clean, dry, calibrated viscometer giving a flow time not less than its specified minimum, or 200 seconds, whichever is the greater.

(c) Charge the viscometer in the manner used when the instrument was calibrated. Do not filter or dry the brake fluid, but protect it from contamination by dirt and moisture during filling and measurements.

(1) Charge the suspended level viscometers by tilting about 30° from the vertical and pouring sufficient brake fluid through the fill tube into the lower reservoir so that when the viscometer is returned to vertical position the meniscus is between the fill marks. For measurements below 0° C. (32° F.), before placing the filled viscometer into the constant temperature bath, draw the sample into the working capillary and timing bulb and insert small rubber stoppers to suspend the fluid in this position, to prevent accumulation of water condensate on the walls of the critical portions of the viscometer. Alternatively, fit loosely packed drying tubes into the open ends of the viscometer to prevent water condensation, but do not restrict the flow of the sample under test by the pressures created in the instrument.

(2) If a Cannon-Fenske Routine viscometer is used, charge by inverting and immersing the smaller arm into the brake fluid and applying vacuum to the larger arm. Fill the tube to the upper timing mark, and return the viscometer to an upright position.

(d) Mount the viscometer in the bath in a true vertical position (see S6.3.2(b)).

(e) The viscometer shall remain in the bath until it reaches the test temperature.

(f) At temperatures below 0° C. (32° F.) conduct an untimed preliminary run by allowing the brake fluid to drain through the capillary into the lower reservoir after the test temperature has been established.

(g) Adjust the head level of the brake fluid to a position in the capillary arm about 5 mm. above the first timing mark.

(h) With brake fluid flowing freely measure to within 0.2 second the time required for the meniscus to pass from the first timing mark to the second. If this flow time is less than the minimum specified for the viscometer, or 200 seconds, whichever is greater, repeat using a viscometer with a capillary of smaller diameter.

(i) Repeat S6.3.4 (g) and (h). If the two timed runs do not agree within 0.2 percent, reject and repeat using a fresh sample of brake fluid.

S6.3.5 *Cleaning the viscometers.*

(a) Periodically clean the instrument with chromic acid to remove organic deposits. Rinse thoroughly with distilled water and acetone, and dry with clean dry air.

(b) Between successive samples rinse the viscometer with ethanol followed by an acetone or ether rinse. Pass a slow stream of filtered dry air through the viscometer until the last trace of solvent is removed.

S6.3.6 *Calculation.*

(a) The following viscometers have a fixed volume charged at ambient temperature, and as a consequence *C* varies with test temperature: Cannon-Fenske Routine, Pinkevitch, Cannon-Manning Semi-Micro, and Cannon Fenske Opaque. To calculate *C* at test temperatures other than the calibration temperature for these viscometers, see ASTM D2515–66, "Kinematic Glass Viscometers" or follow instructions given on the manufacturer's certificate of calibration.

(b) Average the four timed runs on the duplicate samples to determine the kinematic viscosities.

S6.3.7 *Precision (at 95 percent confidence level).*

(a) *Repeatibility.* If results on duplicate samples by the same operator differ by more than 1 percent of their mean, repeat the tests.

S6.4 *pH value.* Determine the pH value of a brake fluid by running one sample according to the following procedure.

S6.4.1 *Summary of the procedure.* Brake fluid is diluted with an equal volume of an ethanol-water solution. The pH of the resultant mixture is measured with a prescribed pH meter assembly at 23° C. (73.4° F.).

S6.4.2 *Apparatus.* The pH assembly consists of the pH meter, glass electrode, and calomel electrode, as specified in Appendices A1.1, A1.2, and A1.3 of ASTM D1121–67, "Standard Method of Test for Reserve Alkalinity of Engine Antifreezes and Antirusts." The glass electrode is a full range type (pH 0–14), with low sodium error.

S6.4.3 *Reagents.* Reagent grade chemicals conforming to the specifications of the Committee on Analytical Reagents of the American Chemical Society.

(a) *Distilled water.* Distilled water (S7.1) shall be boiled for about 15 minutes to remove carbon dioxide, and protected with a soda-lime tube or its equivalent while cooling and in storage. (Take precautions to prevent contamination by the materials used for protection against carbon dioxide.) The pH of the boiled distilled water shall be between 6.2 and 7.2 at 25° C. (77° F.).

(b) *Standard buffer solutions.* Prepare buffer solutions for calibrating the pH meter and electrode pair from salts sold specifically for use, either singly or in combination, as pH standards. Dry salts for 1 hour at 110° C. (230° F.) before use except for borax which shall be used as the decahydrate. Store solutions with pH less than 9.5 in bottles of chemically resistant glass or polyethylene. Store the alkaline phosphate solution in a glass bottle coated inside with paraffin. Do not use a standard with an age exceeding three months.

(1) Potassium hydrogen phthalate buffer solution (0.05 M, pH=4.01 at 25° C. (77° F.)). Dissolve 10.21 g. of potas-

sium hydrogen phthalate ($KHC_8H_4O_4$) in distilled water. Dilute to 1 liter.

(2) Neutral phosphate buffer solution (0.025 M with respect to each phosphate salt, pH=6.86 at 25° C. (77° F.)). Dissolve 3.40 g. of potassium dihydrogen phosphate ($KH_2PO_4$) and 3.55 g. of anhydrous disodium hydrogen phosphate ($Na_2HPO_4$) in distilled water.

(3) Borax buffer solution (0.01 M, pH=9.18 at 25° C. (77° F.)). Dissolve 3.81 g. of disodium tetraborate decahydrate ($Na_2B_4O_7 \cdot 10\ H_2O$) in distilled water, and dilute to 1 liter. Stopper the bottle except when actually in use.

(4) Alkaline phosphate buffer solution (0.01 M trisodium phosphate, pH=11.72 at 25° C. (77° F.)). Dissolve 1.42 g. of anhydrous disodium hydrogen phosphate ($Na_2HPO_4$) in 100 ml. of a 0.1 M carbonate-free solution of sodium hydroxide. Dilute to 1 liter with distilled water.

(5) Potassium chloride electrolyte. Prepare a saturated solution of potassium chloride (KCl) in distilled water.

(c) *Ethanol-water mixture.* To 80 parts by volume of ethanol (S7.3) add 20 parts by volume of distilled water. Adjust the pH of the mixture to 7±0.1 using 0.1 N sodium hydroxide (NaOH) solution. If more than 4 ml. of NaOH solution per liter of mixture is required for neutralization, discard the mixture.

S6.4.4 *Preparation of electrode system.*

(a) *Maintenance of electrodes.* Clean the glass electrode before using by immersing in cold chromic-acid cleaning solution. Drain the calomel electrode and fill with KCl electrolyte, keeping level above that of the mixture at all times. When not in use, immerse the lower halves of the electrodes in distilled water, and do not immerse in the mixture for any appreciable period of time between determinations.

(b) *Preparation of electrodes.* Condition new glass electrodes and those that have been stored dry as recommended by the manufacturer. Before and after using, wipe the glass electrode thoroughly with a clean cloth, or a soft absorbent tissue, and rinse with distilled water. Before each pH determination, soak the prepared electrode in distilled water for at least 2 minutes. Immediately before use, remove any excess water from the tips of the electrode.

S6.4.5. *Standardization of the pH assembly and testing of the electrodes.*

(a) Immediately before use, standardize the pH assembly with a standard buffer solution. Then use a second standard buffer solution to check the linearity of the response of the electrodes at different pH values, and to detect a faulty glass electrode or incorrect temperature compensation. The two buffer solutions bracket the anticipated pH value of the test brake fluid.

(b) Allow instrument to warm up, and adjust according to the manufacturer's instructions. Immerse the tips of the electrodes in a standard buffer solution and allow the temperature of the buffer solution and the electrodes to equalize. Set the temperature knob at the temperature of the buffer solution. Adjust the standardization or asymmetry potential control until the meter registers a scale reading, in pH units, equal to the known pH of the standardizing buffer solution.

(c) Rinse the electrodes with distilled water and remove excess water from the tips. Immerse the electrodes in a second standard buffer solution. The reading of the meter shall agree with the known pH of the second standard buffer solution within ±0.05 unit without changing the setting of the standardization of asymmetry potential control.

(d) A faulty electrode is indicated by failure to obtain a correct value for the pH of the second standard buffer solution after the meter has been standardized with the first.

S6.4.6 *Procedure.* To 50±1 ml. of the test brake fluid add 50±1 ml. of the ethanol-water (S6.4.3(c)) and mix thoroughly. Immerse the electrodes in the mixture. Allow the system to come to equilibrium, readjust the temperature compensation if necessary, and take the pH reading.

S6.5 *Fluid stability.* Evaluate the heat and chemical stability of a brake fluid by the following procedure, running duplicate samples for each test and averaging the results.

S6.5.1 *Summary of the procedure.* The degradation of the brake fluid at elevated temperature, alone or in a mixture with a reference fluid, is evaluated by determining the change in boiling point after a period of heating under reflux conditions.

S6.5.2 *Apparatus.* Use the apparatus and preparation specified in S6.1.2 and S6.1.3.

S6.5.3 *High temperature stability.*

S6.5.3.1 *Procedure.*

(a) Heat a new 60±1 ml. sample of the brake fluid to 185°±2° C. (365°±3.6° F.). Hold at this temperature for 120±5 minutes. Bring to a reflux rate in excess of 1 drop per second within 5 minutes. The reflux rate should not exceed 5 drops per second at any time. Over the next 5±2 minutes adjust the heating rate to obtain an equilibrium reflux rate of 1 to 2 drops per second. Maintain this rate for an additional 2 minutes, taking four temperature readings at 30-second intervals. Average these as the observed ERBP.

S6.5.3.2 *Calculation.* Correct the observed ERBP for thermometer and barometric pressure factors according to S6.1.5 (a) and (b). Average the corrected ERBP's of the duplicate samples. The difference between this average and the original ERBP obtained in S6.1 is the change in ERBP of the fluid.

S6.5.4 *Chemical stability.*

S6.5.4.1 *Materials.* SAE RM–1 Compatibility Fluid, as described in Appendix A of SAE Standard J1703b, "Motor Vehicle Brake Fluid," April 1968.

S6.5.4.2 *Procedure.*

(a) Mix 30±1 ml. of the brake fluid with 30±1 ml. of SAE RM–1 Compatibility Fluid in a boiling point flask (S6.1.2(a)). Determine the initial ERBP of the mixture by applying heat to the flask so that the fluid is refluxing in 10±2 minutes at a rate in excess of 1 drop per second, but not more than 5 drops per second. Note the maximum fluid temperature observed during the first minute after the fluid begins refluxing at a rate in excess of 1 drop per second. Over the next 15±1 minutes, adjust and maintain the reflux rate at 1 to 2 drops per second. Maintain this rate for an additional 2 minutes, recording the average value of four temperature readings taken at 30-second intervals as the final ERBP.

(b) Thermometer and barometic corrections are not required.

S6.5.4.3 *Calculation.* The difference between the initial ERBP and the final average temperature is the change in temperature of the refluxing mixture. Average the results of the duplicates to the nearest 0.5° C. (1° F.).

S6.6 *Corrosion.* Evaluate the corrosiveness of a brake fluid by running duplicate samples according to the following procedure.

S6.6.1 *Summary of the procedure.* Six specified metal corrosion test strips are polished, cleaned, and weighed, then assembled as described. Assembly is placed on a standard wheel cylinder cup in a corrosion test jar, immersed in the water-wet brake fluid, capped and placed in an oven at 100° C. (212° F.) for 120 hours. Upon removal and cooling, the strips, fluid, and cups are examined and tested.

S6.6.2 *Equipment.*

(a) *Balance.* An analytical balance having a minimum capacity of 50 grams and capable of weighing to the nearest 0.1 mg.

(b) *Desiccators.* Desiccators containing silica gel or other suitable desiccant.

(c) *Oven.* Gravity convection oven capable of maintaining the desired set point within 2° C. (3.6° F.).

(d) *Micrometer.* A machinist's micrometer 25 to 50 mm. (1 to 2 inches) capacity, or an optical comparator, capable of measuring the diameter of the SBR wheel cylinder (WC) cups to the nearest 0.02 mm. (0.001 inch).

S6.6.3 *Materials.*

(a) *Corrosion test strips.* Two sets of strips from each of the metals listed in Appendix C of SAE Standard J1703b. Each strip shall be approximately 8 cm. long, 1.3 cm. wide, not more than 0.6 cm. thick, and have a surface area of 25±5 sq. cm. and a hole 4 to 5 mm. (0.16 to 0.20 inch) in diameter on the centerline about 6 mm. from one end. The hole shall be clean and free from burrs. Tinned iron strips shall be unused. Other strips, if used, shall not be employed if they cannot be polished to a high finish.

(b) *SBR cups.* Two unused standard SAE SBR wheel cylinder (WC) cups, as specified in S7.6.

(c) *Corrosion test jars and lids.* Two screw-top straight-sided round glass jars, each having a capacity of approximately 475 ml. and inner dimensions of approximately 100 mm. in height and 75 mm. in diameter, and a tinned steel lid (no insert or organic coating) vented with a hole 0.8±0.1 mm. (0.031±0.004 inch) in diameter (No. 68 drill).

(d) *Machine screws and nuts.* Clean, rust and oil-free, uncoated mild steel round or fillister head machine screws, size 6 or 8–32 UNC-Class 2A, five-eighths or three-fourths inch long (or equivalent metric sizes), and matching uncoated nuts.

(e) *Supplies for polishing strips.* Waterproof silicon carbide paper, grit No. 320 A; grade 00 steel wool, lint-free polishing cloth.

(f) *Distilled water* as specified in S7.1.

(g) *Ethanol* as specified in S7.3.

S6.6.4 *Preparation.*

(a) *Corrosion test strips.* Except for the tinned iron strips, abrade corrosion test strips on all surface areas with silicon carbide paper wet with ethanol until all surface scratches, cuts and pits are removed. Use a new piece of paper for each different type of metal. Polish the strips with the 00 grade steel wool. Wash all strips, including the tinned iron and the assembly hardware, with ethanol; dry the strips and assembly hardware with a clean lint free cloth or use filtered compressed air and place the strips and hardware in a desiccator containing silica gel or other suitable desiccant and maintained at 23°±5° C. (73.4°±9° F.), for at least 1 hour. Handle the strips with forceps after polishing. Weigh and record the weight of each strip to the nearest 0.1 mg. Assemble the strips on a clean dry machine screw, with matching plain nut, in the order of tinned iron, steel, aluminum, cast iron, brass, and copper. Bend the strips, other than the cast iron, so that there is a separation of 3±½ mm. (⅛±1/64 inch) between adjacent strips for a distance of about 5 cm. (2 inches) from the free end of the strips. (See Figure 4.) Tighten the screw on each test strip assembly so that the strips are in electrolytic contact, and can be lifted by either of the outer strips (tinned iron or copper) without any of the strips moving relative to the others when held horizontally. Immerse the strip assemblies in 90 percent ethyl alcohol. Dry with dried filtered compressed air, then dessicate at least 1 hour before use.

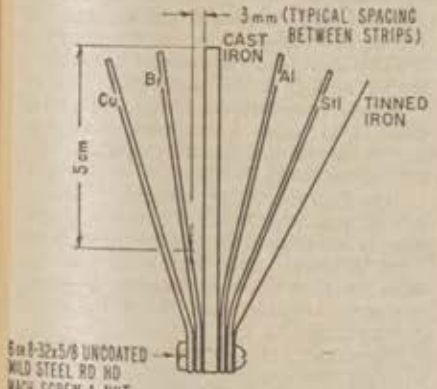



FIG. 4
CORROSION STRIP ASSEMBLY

(b) *SBR WC cups.* Measure the base diameters of the two standard SBR cups, using an optical comparator or micrometer, to the nearest 0.02 mm. (0.001 inch) along the centerline of the SAE and rubber-type identifications and at right angles to this centerline. Take the measurements at least 0.4 mm. (0.015 inch) above the bottom edge and parallel to the base of the cup. Discard any cup if the two measured diameters differ by more than 0.08 mm. (0.003 inch). Average the two readings on each cup. Determine the hardness of the cups according to S7.4.

S6.6.5 *Procedure.* Rinse the cups in ethanol for not more than 30 seconds and wipe dry with a clean lint-free cloth. Place one cup with lip edge facing up, in each jar. Insert a metal strip assembly inside each cup with the fastened end down and the free end extending upward. (See Figure 5.) Mix 760 ml. of brake fluid with 40 ml. of distilled water; using this mixture, cover each strip assembly to a depth of approximately 10 mm. above the tops of the strips. Tighten the lids and place the jars for 120±2 hours in an oven maintained at 100°±2° C. (212°±3.6° F.). Allow the jars to cool at 23°±5° C. (73.4°±9° F.) for 60 to 90 minutes. Immediately remove the strips from the jars using forceps, agitating the strip assembly in the fluid to remove loose adhering sediment. Examine the test strips and jars for adhering crystalline deposits. Disassemble the metal strips, and remove adhering fluid by flushing with water; clean each strip by wiping with a clean cloth wetted with ethanol. Examine the strips for evidence of corrosion and pitting. Disregard staining or discoloration. Place the strips in a desiccator containing silica gel or other suitable desiccant, maintained at 23°±5° C. (73.4°±9° F.), for at least 1 hour. Weigh each strip to the nearest 0.1 mg. Determine the change in weight of each metal strip. Average the results for the two strips of each type of metal. Immediately following the cooling period, remove the cups from the jars with forceps. Remove loose adhering sediment by agitation of the cups in the mixture. Rinse the cups in ethanol and air-dry. Examine the cups for evidence of sloughing, blisters, and other forms of disintegration. Measure the base diameter and hardness of each cup within 15 minutes after removal from the mixture. Examine the mixture for gelling. Agitate the mixture to suspend and uniformly disperse sediment. From each jar, transfer a 100 ml. portion of the mixture to an ASTM cone-shaped centrifuge tube. Determine the percent sediment after centrifuging as described in S7.5. Measure the pH value of the mixture according to S6.4.6.

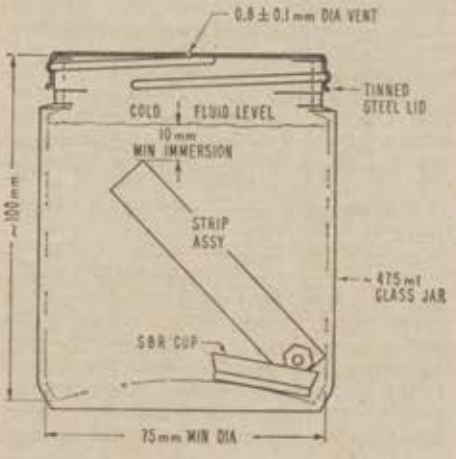



FIG. 5
CORROSION TEST APPARATUS

S6.6.6 *Calculation.*

(a) Measure the area of each type of test strip to the nearest square centimeter. Divide the average change in weight for each type by the area of that type.

(b) Note other data and evaluations indicating compliance with S5.1.6. In the event of a marginal pass on inspection by attributes, or of a failure in one of the duplicates, run another set of duplicate samples. Both repeat samples shall meet all requirements of S5.1.6.

S6.7 *Fluidity and appearance at low temperatures.* Determine the fluidity and appearance of a sample of brake fluid at each of two selected temperatures by the following procedure.

S6.7.1 *Summary of procedure.* Brake fluid is chilled to expected minimum exposure temperatures and observed for clarity, gellation, sediment, separation of components, excessive viscosity or thixotropy.

S6.7.2 *Apparatus.*

(a) *Oil sample bottle.* Two clear flint glass 4-ounce bottles made especially for sampling oil and other liquids, with a capacity of approximately 125 ml., an outside diameter of 37±0.05 mm. and an overall height of 165±2.5 mm.

(b) *Cold chamber.* An air bath cold chamber capable of maintaining storage temperatures down to minus 55° C. (minus 67° F.) with an accuracy of ±2° C. (3.6° F.).

(c) *Timing device.* A timing device in accordance with S6.3.2(e).

(d) *Hiding power test chart.* (SAE RM).

S6.7.3 *Procedure.*

(a) Place 100±2 ml. of brake fluid at room temperature in an oil sample bottle. Stopper the bottle with an unused cork and place in the cold chamber at the higher storage temperature specified in Table II (S5.1.7(c)). After 144±4 hours remove the bottle from the chamber, quickly wipe it with a clean, lint-free cloth saturated with ethanol or acetone. Place against a hiding power test chart and observe if the black contrast lines are clearly discernible when viewed through every part of the fluid. Examine the fluid for evidence of stratification or sedimentation. Invert the bottle and determine the number of seconds required for the air bubble to travel to the top of the fluid.

(b) Repeat S6.7.3(a), substituting the lower cold chamber temperature specified in Table II, and a storage period of 6 hours ±12 minutes.

NOTE: Test specimens from either storage temperature may be used for the other only after warming up to room temperature.

S6.8 *Evaporation.* The evaporation residue, and pour point of the evaporation residue of brake fluid, are determined by the following procedure. Four replicate samples are run.

S6.81 *Summary of the procedure.* The volatile diluent portion of a brake fluid is evaporated in an oven at 100° C. (212° F.). The nonvolatile lubricant portion (evaporation residue) is measured and examined for grittiness; the residues are then combined and checked to assure fluidity at minus 5° C. (23° F.).

S6.8.2 *Apparatus.*

(a) *Petri dishes.* Four covered glass petri dishes approximately 100 mm. in diameter and 15 mm. in height.

(b) *Oven.* A top-vented gravity-convection oven capable of maintaining a temperature of 100°±2° C. (212°±3.6° F.).

(c) *Balance.* A balance having a capacity of at least 100 grams, capable of weighing to the nearest 0.01 gram, and suitable for weighing the petri dishes.

(d) *Oil sample bottle.* A glass sample bottle as described in S6.7.2(a).

(e) *Cold chamber.* Air bath cold chamber capable of maintaining an oil sample bottle at minus 5°±1° C. (23°±2° F.).

(f) *Timing device.* A timing device as described in S6.3.2(e).

S6.8.3 *Procedure.* Obtain the tare weight of each of the four covered petri dishes to the nearest 0.01 gram. Place 25±1 ml. of brake fluid in each dish, replace proper covers and reweigh. Determine the weight of each brake fluid test specimen by the difference. Place the four dishes, each inside its inverted cover, in the oven at 100°±2° C. (212°±3.6° F.) for 46±2 hours. (NOTE: Do not simultaneously heat more than one fluid in the same oven.) Remove the dishes from the oven, allow to cool to 23°±5° C. (73.4°±9° F.), and weigh. Return to the oven for an additional 24±2 hours. If at the end of 72±4 hours the average loss by evaporation is less than 60 percent, discontinue the evaporation procedure and proceed with examination of the residue. Otherwise, continue this procedure either until equilibrium is reached as evidenced by an incremental weight loss of less than 0.25 gram in 24 hours on all individual dishes or for a maximum of 7 days. During the heating and weighing operation, if it is necessary to remove the dishes from the oven for a period of longer than 1 hour, the dishes shall be stored in a desiccator as soon as cooled to room temperature. Calculate the percentage of fluid evaporated from each dish. Examine the residue in the dishes at the end of 1 hour at 23°±5° C. (73.4°±9° F.). Rub any sediment with the fingertip to determine grittiness or abrasiveness. Combine the residues from all four dishes in a 4-ounce oil sample bottle and store vertically in a cold chamber at minus 5°±1° C. (23°±2° F.) for 60±10 minutes. Quickly remove the bottle and place in the horizontal position. The residue must flow at least 5 mm. (0.2 inch) along the tube within 5 seconds.

S6.8.4 *Calculation.* The average of the percentage evaporated from all four dishes is the loss by evaporation.

S6.9 *Water tolerance.* Evaluate the water tolerance characteristics of a brake fluid by running one test specimen according to the following procedure.

S6.9.1 *Summary of the procedure.* Brake fluid is diluted with 3.5 percent water, then stored at minus 40° C. (minus 40° F.) for 24 hours. The cold, water-wet fluid is first examined for clarity, stratification, and sedimentation, then placed in an oven at 60° C. (140° F.) for 24 hours. On removal, it is again examined for stratification, and the volume percent of sediment determined by centrifuging.

S6.9.2 *Apparatus.*

(a) *Centrifuge tube.* See S7.5.1(a).

(b) *Centrifuge.* See S7.5.1(b).

(c) *Cold chamber.* See S6.7.2(b).

(d) *Oven.* Gravity or forced convection oven.

(e) *Timing device.* See S6.3.2(e).

(f) *Hiding power test chart.* (SAE RM).

S6.9.3 *Procedure.*

(a) *At low temperature.* Mix 3.5±0.1 ml. of distilled water with 100±1 ml. of brake fluid and pour into a centrifuge tube. Stopper the tube with a clean cork and place in the cold chamber maintained at minus 40°±2° C. (minus 40°±3.6° F.). After 24±2 hours remove tube, quickly wipe with a clean lint-free cloth saturated with ethanol or acetone, and place against a hiding power test chart. Observe whether the black contrast lines are clearly discernible when viewed through every part of the fluid. Examine the fluid for evidence of stratification or sedimentation. Invert the tube and determine the number of seconds required for the air bubble to travel to the top of the fluid. (The air bubble is considered to have reached the top of the fluid when the top of the bubble reaches the 2 ml. graduation of the centrifuge tube.)

(b) *At 60° C. (140° F.).* Place tube and brake fluid from S6.9.3(a) in an oven maintained at 60°±2° C. (140°±3.6° F.) for 24±2 hours. Remove the tube and immediately examine the contents for evidence of stratification. Determine the percent sediment by centrifuging as described in S7.5.

S6.10 *Compatibility.* The compatibility of a brake fluid with other brake fluids shall be evaluated by running one test sample according to the following procedure.

S6.10.1 *Summary of the procedure.* Brake fluid is mixed with an equal volume of SAE RM–1 Compatibility Fluid, then tested in the same way as for water tolerance (S6.9.3) except that the bubble flow time is not measured. This test is an indication of the compatibility of the test fluid with other motor vehicle brake fluids at both high and low temperatures.

S6.10.2 *Apparatus and materials.*

(a) *Centrifuge tube.* See S7.5.1(a).

(b) *Centrifuge.* See S7.5.1(b).

(c) *Cold chamber.* See S6.7.2(b).

(d) *Oven.* See S6.9.2(d).

(e) *SAE RM–1 Compatibility Fluid.* As described in Appendix A of SAE Standard J1703b.

(f) *Hiding power test chart.* (SAE RM)

S6.10.3 *Procedure.*

(a) *At low temperature.* Mix 50±0.5 ml. of brake fluid with 50±0.5 ml. of SAE RM–1 Compatibility Fluid. Pour this mixture into a centrifuge tube and stopper with a clean dry cork. Place tube in the cold chamber maintained at minus 40°±2° C. (minus 40°±3.6° F.). After 24±2 hours, remove tube, quickly wipe with a clean lint-free cloth saturated with ethanol or acetone. Place tube against a hiding power test chart and observe whether the black contrast lines on the hiding power test chart are clearly discernible when viewed through every part of the fluid. Examine the fluid for evidence of stratification or sedimentation.

(b) *At 60° C. (140° F.).* Place tube and test fluid from S6.10.3(a) for 24±2 hours in an oven maintained at 60°±2° C. (140°±3.6° F.). Remove tube and immediately examine the contents for evidence of stratification. Determine percent sediment by centrifuging as described in S7.5.

S6.11 *Resistance to oxidation.* The stability of a brake fluid under oxidative conditions shall be evaluated by running duplicate samples according to the following procedure.

S6.11.1 *Summary of the procedure.* Brake fluid is activated with a mixture of approximately 0.2 percent benzoyl peroxide and 5 percent water. A corrosion test strip assembly consisting of cast iron and an aluminum strip separated by tinfoil squares at each end is then rested on a piece of SBR WC cup positioned so that the test strip is half immersed in the fluid, and oven-aged at 70° C. (158° F.) for 168 hours. At the end of this period the metal strips are examined for pitting, etching, and weight loss.

S6.11.2 *Equipment.*

(a) *Balance.* See S6.6.2(a).

(b) *Desiccators.* See S6.6.2(b).

(c) *Oven.* See S6.6.2(c).

(d) Three glass test tubes approximately 22 mm. outside diameter by 175 mm. in length.

S6.11.3 *Reagents and materials.*

(a) *Benzoyl peroxide, reagent grade, 96 percent.* (Benzoyl peroxide that is brownish, or dusty, or has less than 90 percent purity, must be discarded.) Reagent strength may be evaluated by ASTM E298–68, "Standard Methods for Assay of Organic Peroxides."

(b) *Corrosion test strips.* Two sets of cast iron and aluminum metal test strips as described in Appendix C of SAE Standard J1703b.

(c) *Tinfoil.* Four unusued pieces of tinfoil approximately 12 mm. (½ inch) square and between 0.02 and 0.06 mm. (0.0008 and 0.0024 inch) in thickness. The foil shall be at least 99.9 percent tin and contain not more than 0.025 percent lead.

(d) *SBR cups.* Two unused, approximately one-eighth sections of a standard SAE SBR WC cup (as described in S7.6).

(e) *Machine screw and nut.* Two clean oil-free, No. 6 or 8–32×⅜– or ¼-inch long (or equivalent metric size), round or fillister head, uncoated mild steel machine screws, with matching plain nuts.

S6.11.4 *Preparation.*

(a) *Corrosion test strips.* Prepare two sets of aluminum and cast iron test strips according to S6.6.4(a) except for assembly. Weigh each strip to the nearest 0.1 mg. and assemble a strip of each

metal on a machine screw, separating the strips at each end with a piece of tinfoil. Tighten the nut enough to hold both pieces of foil firmly in place.

(b) *Test mixture.* Place 30±1 ml. of the brake fluid under test in a 22 by 175 mm. test tube. Add 0.060±0.002 gram of benzoyl peroxide, and 1.50±0.05 ml. of distilled water. Stopper the tube loosely with a clean dry cork, shake, and place in an oven for 2 hours at 70°±2° C. (158°±3.6° F.). Shake every 15 minutes to effect solution of the peroxide, but do not wet cork. Remove the tube from the oven and allow to cool to 23°±5° C. (73.4°±9° F.). Begin testing according to paragraph S6.11.5 not later than 24 hours after removal of tube from oven.

S6.11.5 *Procedure.* Place a one-eighth SBR cup section in the bottom of each tube. Add 10 ml. of prepared test mixture to each test tube. Place a metal-strip assembly in each, the end of the strip without the screw resting on the rubber, and the solution covering about one-half the length of the strips. Stopper the tubes with clean dry corks and store upright for 70±2 hours at 23°±5° C. (73.4°±9° F.). Loosen the corks and place the tubes for 168±2 hours in an oven maintained at 70°±2° C. (158°±3.6° F.). Afterwards remove and disassemble strips. Examine the strips and note any gum deposits. Wipe the strips with a clean cloth wet with ethanol and note any pitting, etching or roughening of surface disregarding stain or discoloration. Place the strips in a desiccator over silica gel or other suitable desiccant, at 23°±5° C. (73.4°±9° F.) for at least 1 hour. Again weigh each strip to the nearest 0.1 mg.

S6.11.6 *Calculation.* Determine corrosion loss by dividing the change in weight of each metal strip by the total surface area of each strip measured in square centimeters, to the nearest square centimeter. Average the results for the two strips of each type of metal, rounding to the nearest 0.05 mg. per square centimeter. If only one of the duplicates fails for any reason, run a second set of duplicate samples. Both repeat samples shall meet all requirements of S5.1.11.

S6.12 *Effect on SBR cups.* The effects of a brake fluid in swelling, softening, and otherwise affecting standard SBR WC cups shall be evaluated by the following procedure.

S6.12.1 *Summary of the procedure.* Four standard SAE SBR WC cups are measured and their hardnesses determined. The cups, two to a jar, are immersed in the test brake fluid. One jar is heated for 120 hours at 70° C (158° F.), and the other for 70 hours at 120° C. (248° F.). Afterwards, the cups are washed, examined for disintegration, remeasured and their hardnesses redetermined.

S6.12.2 *Equipment and supplies.*

(a) *Oven.* See S6.6.2(c).

(b) *Glass jars and lids.* Two screw-top, straight-sided round glass jars, each having a capacity of approximately 250 ml. and inner dimensions of approximately 125 mm. in height and 50 mm. in diameter, and a tinned steel lid (no insert or organic coating).

(c) *SBR cups.* See S7.6.

S6.12.3 *Preparation.* Measure the base diameters of the SBR cups as described in S6.6.4(b); and the hardness of each as described in S7.4.

S6.12.4 *Procedure.* Wash the cups in 90 percent ethanol (see S7.3), for not longer than 30 seconds and quickly dry with a clean, lint-free cloth. Using forceps, place two cups into each of the two jars; add 75 ml. of brake fluid to each jar and cap tightly. Place one jar in an oven held at 70°±2° C. (158±3.6° F.) for 70±2 hours. Place the other jar in an oven held at 120°±2° C. (248°±3.6° F.) for 70±2 hours. Allow each jar to cool for 60 to 90 minutes at 23°±5° C. (73.4°±9° F.). Remove cups, wash with ethanol for not longer than 30 seconds, and quickly dry. Examine the cups for disintegration as evidenced by stickiness, blisters, or sloughing. Measure the base diameter and hardness of each cup within 15 minutes after removal from the fluid.

S6.12.5 *Calculation.*

(a) Calculate the change in base diameter for each cup. If the two values, at each temperature, do not differ by more than 0.10 mm. (0.004 inch) average them to the nearest 0.02 mm. (0.001 inch). If the two values differ by more than 0.10 mm., repeat the test at the appropriate temperature and average the four values as the change in base diameter.

(b) Calculate the change in hardness for each cup. The average of the two values for each pair is the change in hardness.

(c) Note disintegration as evidenced by stickiness, blisters, or sloughing.

S6.13 *Stroking properties.* Evaluate the lubricating properties, component compatibility, resistance to leakage, and related qualities of a brake fluid by running one sample according to the following procedures.

S6.13.1 *Summary of the procedure.* Brake fluid is stroked under controlled conditions at an elevated temperature in a simulated motor vehicle hydraulic braking system consisting of four slave wheel cylinders and an actuating master cylinder connected by steel tubing. Referee standard parts are used. All parts are carefully cleaned, examined, and certain measurements made immediately prior to assembly for test. During the test, temperature, rate of pressure rise, maximum pressure, and rate of stroking, are specified and controlled. The system is examined periodically during stroking to assure that excessive leakage of fluid is not occurring. Afterwards, the system is torn down. Metal parts and SBR cups are examined and remeasured. The brake fluid and any resultant sludge and debris are collected, examined, and tested.

S6.13.2 *Apparatus and equipment.* Either the drum and shoe type of stroking apparatus (see Figure 1 of SAE Standard J1703b), or the stroking fixture type (see Figure 3 of SAE J1703b) arranged as shown in Figure 2 of J1703b. The following components are required.

(a) *Brake assemblies.* With the drum and shoe apparatus: four drum and shoe assembly units (SAE RM-29a) consisting of four forward brake shoes and four reverse brake shoes with linings and four front wheel brake drum assemblies with assembly component parts. With stroking fixture type apparatus: four fixture units including appropriate adapter mounting plates to hold brake wheel cylinder assemblies.

(b) *Braking pressure actuation mechanism.* An actuating mechanism for applying a force to the master cylinder pushrod without side thrust. The amount of force applied by the actuating mechanism shall be adjustable and capable of applying sufficient thrust to the master cylinder to create a pressure of at least 70 kg./sq. cm. (1,000 p.s.i.) in the simulated brake system. A hydraulic gage or pressure recorder, having a range of at least 0 to 70 kg./sq. cm. (0 to 1,000 p.s.i.), shall be installed between the master cylinder and the brake assemblies and shall be provided with a shutoff valve and with a bleeding valve for removing air from the connecting tubing. The actuating mechanism shall be designed to permit adjustable stroking rates of approximately 1,000 strokes per hour. Use a mechanical or electrical counter to record the total number of strokes.

(c) *Heated air bath cabinet.* An insulated cabinet or oven having sufficient capacity to house the four mounted brake assemblies or stroking fixture assemblies, master cylinder, and necessary connections. A thermostatically controlled heating system is required to maintain a temperature of 70°±5° C. (158°±9° F.) or 120°±5° C. (248°±9° F.). Heaters shall be shielded to prevent direct radiation to wheel or master cylinder.

(d) *Master cylinder (MC) assembly (SAE RM-15a).* One cast iron housing hydraulic brake system cylinder having a diameter of approximately 28 mm. (1⅛ inch) and fitted for a filler cap and standpipe (see S6.13.2(e)). The MC piston shall be made from SAE CA360 copperbase alloy (half hard). A new MC assembly is required for each test.

(e) *Filler cap and standpipe.* MC filler cap provided with a glass or uncoated steel standpipe. Standpipe must provide adequate volume for thermal expansion, yet permit measurement and adjustment of the fluid level in the system to ±3 ml. Cap and standpipe may be cleaned and reused.

(f) *Wheel cylinder (WC) assemblies (SAE RM-14a).* Four unused cast iron housing straight bore hydraulic brake WC assemblies having diameters of approximately 28 mm. (1⅛ inch) for each test. Pistons shall be made from unanodized SAE AA2024 aluminum alloy.

(g) *Micrometer.* Same as S6.6.2(d).

S6.13.3 *Materials.*

(a) *Standard SBR brake cups.* Eight standard SAE SBR wheel cylinder test cups, one primary MC test cup, and one secondary MC test cup, all as described in S7.6, for each test.

(b) *Steel tubing.* Double wall steel tubing meeting SAE specification J527. A complete replacement of tubing is essential when visual inspection indicates any corrosion or deposits on inner surface of tubing. Tubing from master cylinder to one wheel cylinder shall be replaced for each test (minimum length 3 feet). Uniformity in tubing size is required between master cylinder and wheel cylinder. The standard master cylinder has two outlets for tubing, both of which must be used.

S6.13.4 *Preparation of test apparatus.*

(a) *Wheel cylinder assemblies.* Use unused wheel cylinder assemblies. Disassemble cylinders and discard cups. Clean all metal parts with ethanol. Inspect the working surfaces of all metal parts for scoring, galling, or pitting and cylinder bore roughness, and discard all defective parts. Remove any stains on cylinder walls with crocus cloth and ethanol. If stains cannot be removed, discard the cylinder. Measure the internal diameter of each cylinder at a location approximately 19 mm. (0.75 inch) from each end of the cylinder bore, taking measurements in line with the hydraulic inlet opening and at right angles to this centerline. Discard the cylinder if any of these four readings exceeds the maximum or minimum limits of 28.66 to 28.60 mm. (1.128 to 1.126 inch). Measure the outside diameter of each piston at two points approximately 90° apart. Discard any piston if either reading exceeds the maximum or minimum limits of 28.55 to 28.52 mm. (1.124 to 1.123 inch). Select parts to insure that the clearance between each piston and mating cylinder is within 0.08 to 0.13 mm. (0.003 to 0.005 inch). Use unused SBR cups. To remove dirt and debris, rinse the cups in 90 percent ethyl alcohol for not more than 30 seconds and wipe dry with a clean lint-free cloth. Discard any cups showing defects such as cuts, molding flaws, or blisters. Measure the lip and base diameters of all cups with an optical comparator or micrometer to the nearest 0.02 mm. (0.001 inch) along the centerline of the SAE and rubber-type identifications and at right angles to this centerline. Determine base diameter measurements at least 0.4 mm. (0.015 inch) above the bottom edge and parallel to the base of the cup. Discard any cup if the two measured lip or base diameters differ by more than 0.08 mm. (0.003 inch). Average the lip and base diameters of each cup. Determine the hardness of all cups according to S7.4. Dip the rubber and metal parts of wheel cylinders, except housing and rubber boots, in the fluid to be tested and install them in accordance with the manufacturer's instructions. Manually stroke the cylinders to insure that they operate easily. Install cylinders in the simulated brake system.

(b) *Master cylinder assembly.* Use an unused master cylinder and unused standard SBR primary and secondary MC cups which have been inspected, measured and cleaned in the manner specified in S6.13.4(a), omitting hardness of the secondary MC cup. However, prior to determining the lip and base diameters of the secondary cup, dip the cup in test brake fluid, assemble on the MC piston, and maintain the assembly in a vertical position at 23°±5° C. (73.4°±9° F.) for at least 12 hours. Inspect the relief and supply ports of the master cylinder; discard the cylinder if ports have burrs or wire edges. Measure the internal diameter of the cylinder at two locations (approximately midway between the relief and supply ports and approximately 19 mm. (0.75 inch) beyond the relief port toward the bottom or discharge end of the bore), taking measurements at each location on the vertical and horizontal centerline of the bore. Discard the cylinder if any reading exceeds the maximum or minimum limits of 28.65 to 28.57 mm. (1.128 to 1.125 inch). Measure the outside diameter of each end of the master cylinder piston at two points approximately 90° apart. Discard the piston if any of these four readings exceed the maximum or minimum limits of 28.55 to 28.52 mm. (1.124 to 1.123 inch). Dip the rubber and metal parts of the master cylinder, except the housing and push rod-boot assembly, in the brake fluid and install in accordance with manufacturer's instructions. Manually stroke the master cylinder to insure that it operates easily. Install the master cylinder in the simulated brake system.

(c) *Assembly and adjustment of test apparatus.* When using a shoe and drum type apparatus, adjust the brake shoe toe clearances to 1±0.1 mm. (0.040±0.004 inch). Fill the system with brake fluid, bleeding all wheel cylinders and the pressure gage to remove entrapped air. Operate the actuator manually to apply a pressure greater than the required operating pressure and inspect the system for leaks. Adjust the actuator and/or pressure relief valve to obtain a pressure of 70±3.5 kg./sq. cm. (1,000±50 p.s.i.). A smooth pressure-stroke pattern is required when using a shoe and drum type apparatus. (Figure 4 of SAE J1703b illustrates the approximate pressure buildup versus the master cylinder piston movement with the stroking fixture apparatus.) The pressure is relatively low during the first part of the stroke and then builds up smoothly to the maximum stroking pressure at the end of the stroke. The stroke length is about 23 mm. (0.9 inch). This permits the primary cup to pass the compensating hole at a relatively low pressure. Using stroking fixtures, the WC piston travel is about 2.5±0.25 mm. (0.100±0.010 inch) when a pressure of 70 kg./sq. cm. is reached. Adjust the stroking rate to 1,000±100 strokes per hour. Record the fluid level in the master cylinder standpipe.

S6.13.5 *Procedure.* Operate the system for 16,000±1,000 cycles at 23°±5° C. (73.4°±9° F.). Repair any leakage, readjust the brake shoe clearances, and add fluid to the master cylinder standpipe to bring to the level originally recorded, if necessary. Start the test again and raise the temperature of the cabinet within 6±2 hours to 120°±5° C. (248°±9° F.). During the test observe operation of wheel cylinders for improper functioning and record the amount of fluid required to replenish any loss, at intervals of 24,000 strokes. Stop the test at the end of 85,000 total recorded strokes. These totals shall include the number of strokes during operation at 23°±5° C. (73.4°±9° F.) and the number of strokes required to bring the system to the operating temperature. Allow equipment to cool to room temperature. Examine the wheel cylinders for leakage. Stroke the assembly an additional 100 strokes, examine wheel cylinders for leakage and record volume loss of fluid. Within 16 hours after stopping the test, remove the master and wheel cylinders from the system, retaining the fluid in the cylinders by immediately capping or plugging the ports. Disassemble the cylinders, collecting the fluid from the master cylinder and wheel cylinders in a glass jar. When collecting the stroked fluid, remove all residue which has deposited on rubber and metal internal parts by rinsing and agitating such parts in the stroked fluid and using a soft brush to assure that all loose adhering sediment is collected. Clean SBR cups in ethanol and dry. Inspect the cups for stickiness, scuffing, blistering, cracking, chipping, and change in shape from original appearance. Within 1 hour after disassembly, measure the lip and base diameters of each cylinder cup by the procedures specified in S6.13.4 (a) and (b) with the exception that lip or base diameters of cups may now differ by more than 0.08 mm. (0.003 inch). Determine the hardness of each cup according to S7.4. Note any sludge or gel present in the test fluid. Within 1 hour after draining the cylinders, agitate the fluid in a glass jar to suspend and uniformly disperse sediment and transfer a 100 ml. portion of this fluid to a centrifuge tube and determine percent sediment as described in S7.5. Allow the tube and fluid to stand for 24 hours, recentrifuge and record any additional sediment recovered. Inspect cylinder parts, note any gumming or any pitting on pistons and cylinder walls. Disregard staining or discoloration. Rub any deposits adhering to cylinder walls with a clean soft cloth wetted with ethanol to determine abrasiveness and removability. Clean cylinder parts in ethanol and dry. Measure and record diameters of pistons and cylinders according to S6.13.4 (a) and (b). Repeat the test if mechanical failure occurs that may affect the evaluation of the brake fluid.

S6.13.6 *Calculation.*

(a) Calculate the changes in diameters of cylinders and pistons (see S5.1.13(b)).

(b) Calculate the average decrease in hardness of the nine cups tested, as well as the individual values (see S5.1.13(c)).

(c) Calculate the increases in base diameters of the ten cups (see S5.1.13(e)).

(d) Calculate the lip diameter interference set for each of the ten cups by the following formula and average the ten values (see S5.1.13(f)).

$$\frac{D_1-D_2}{D_1-D_3}\times 100 = \text{percentage Lip Diameter Interference Set}$$

Where:

$D_1$ = Original lip diameter.
$D_2$ = Final lip diameter.
$D_3$ = Original cylinder bore diameter.

S7. *Auxiliary test methods and reagent standards.*

S7.1 *Distilled water.* Nonreferee reagent water as specified in ASTM D1193–70, "Standard Specifications for Reagent Water," or water of equal purity.

S7.2 *Water content of motor vehicle brake fluids.* Use analytical methods based on ASTM D1123–59, "Standard Method of Test for Water in Concentrated Engine Antifreezes by the Iodine Reagent Method," for determining the water content of brake fluids, or other methods of analysis yielding comparable results. To be acceptable for use, such other method must measure the weight of water added to samples of the SAE RM–1 Compatability Fluid within ±15 percent of the water added for additions up to 0.8 percent by weight, and within ±5 percent of the water added for additions greater than 0.8 percent by weight. The SAE RM–1 Compatability Fluid used to prepare the samples must have an original ERBP of not less than 182° C. (360° F.) when tested in accordance with S6.1.

S7.3 *Ethanol.* 95 percent (190 proof) ethyl alcohol, USP or ACS, or Formula 3-A Specially Denatured Alcohol of the same concentration (see Part 212 of Title 26, Code of Federal Regulations—U.S. Treasury Department, I.R.S. Publication No. 368). For pretest washings of equipment use approximately 90 percent ethyl alcohol, obtained by adding 5 parts of distilled water to 95 parts of ethanol.

S7.4 *Measuring the hardness of SBR brake cups.* Hardness measurements on SBR wheel cylinder cups and master cylinder primary cups shall be made by using the following apparatus and the following procedure.

S7.4.1 *Apparatus.*

(a) *Anvil.* A rubber anvil having a flat circular top 20±1 mm. ($^{13}/_{16}$±$^{1}/_{16}$ inch) in diameter, a thickness of at least 9 mm. ($^{3}/_{8}$ inch) and a hardness within 5 IRHDs of the SBR test cup.

(b) *Hardness tester.* A hardness tester meeting the requirements for the standard instrument as described in ASTM D1415–68, "Standard Method of Test for International Hardness of Vulcanized Natural and Synthetic Rubbers," and graduated directly in IRHD units.

S7.4.2 *Procedure.* Make hardness measurements at 23°±2° C. (73.4°±3.6° F.). Equilibrate the tester and anvils at this temperature prior to use. Center brake cups lip side down on an anvil of appropriate hardness. Following the manufacturer's operating instructions for the hardness tester, make one measurement at each of four points one-fourth inch from the center of the cup and spaced 90° apart. Average the four values, and round off to the nearest IRHD.

S7.5 *Sediment by centrifuging.* The amount of sediment in the test fluid shall be determined by the following procedure.

S7.5.1 *Apparatus.*

(a) *Centrifuge tube.* Cone-shaped centrifuge tubes conforming to the dimensions given in Figure 6, and made of thoroughly annealed glass. The graduations shall be numbered as shown in Figure 6, and shall be clear and distinct. Scale-error tolerances and smallest graduations between various calibration marks are given in Table V and apply to calibrations made with air-free water at 20° C. (68° F.).

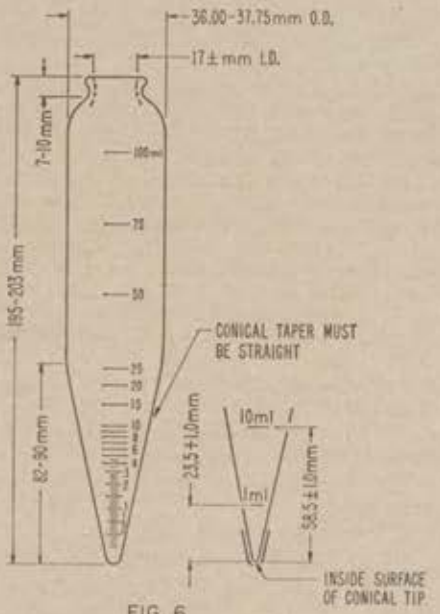



FIG. 6
ASTM 8-in CENTRIFUGE TUBE

TABLE V—CALIBRATION TOLERANCES FOR 8-INCH CENTRIFUGE TUBE

| Range, ml | Subdivision, ml | Volume tolerance, ml |
|---|---|---|
| 0 to 0.1 | 0.05 | ±0.02 |
| Above 0.1 to 0.3 | 0.05 | ±0.03 |
| Above 0.3 to 0.5 | 0.05 | ±0.05 |
| Above 0.5 to 1 | 0.10 | ±0.05 |
| Above 1 to 2 | 0.10 | ±0.10 |
| Above 2 to 3 | 0.20 | ±0.10 |
| Above 3 to 5 | 0.5 | ±0.20 |
| Above 5 to 10 | 1. | ±0.50 |
| Above 10 to 25 | 5. | ±1.00 |
| Above 25 to 100 | 25. | ±1.00 |

(b) *Centrifuge.* A centrifuge capable of whirling two or more filled centrifuge tubes at a speed which can be controlled to give a relative centrifugal force (r.c.f.) between 600 and 700 at the tip of the tubes. The revolving head, trunnion rings, and trunnion cups, including the rubber cushion, shall withstand the maximum centrifugal force capable of being delivered by the power source. The trunnion cups and cushions shall firmly support the tubes when the centrifuge is in motion. Calculate the speed of the rotating head using this equation:

$$\text{r.p.m.} = 265\sqrt{\frac{\text{r.c.f.}}{d}}$$

where:

r.c.f. = Relative centrifugal force, and
$d$ = Diameter of swing, in inches, measured between tips of opposite tubes when in rotating position.

Table VI shows the relationship between diameter, swing, relative centrifugal force (r.c.f.), and revolutions per minute.

TABLE VI—ROTATION SPEEDS FOR CENTRIFUGES OF VARIOUS DIAMETERS

| Diameter of swing, inches [a] | R.p.m. at 600 r.c.f. | R.p.m. at 700 r.c.f. |
|---|---|---|
| 19 | 1490 | 1610 |
| 20 | 1450 | 1570 |
| 21 | 1420 | 1530 |
| 22 | 1390 | 1500 |

[a] Measured in inches between tips of opposite tubes when in rotating position.

S7.5.2 *Procedure.* Balance the corked centrifuge tubes with their respective trunnion cups in pairs by weight on a scale, according to the centrifuge manufacturer's instructions, and place them on opposite sides of the centrifuge head. Use a dummy assembly when one sample is tested. Then whirl them for 10 minutes, at a rate sufficient to produce a r.c.f. between 600 and 700 at the tips of the whirling tubes. Repeat until the volume of sediment in each tube remains constant for three consecutive readings.

S7.5.3 *Calculation.* Read the volume of the solid sediment at the bottom of the centrifuge tube and report the percent sediment by volume. Where replicate determinations are specified, report the average value.

S7.6 *Standard styrene-butadiene rubber (SBR) brake cups.* SBR brake cups for testing motor vehicle brake fluids shall be manufactured using the following formulation:

FORMULATION OF RUBBER COMPOUND

| *Ingredient* | *Parts by weight* |
|---|---|
| SBR type 1503 [a] | 100 |
| Oil furnace black (NBS 378) | 40 |
| Zinc oxide (NBS 370) | 5 |
| Sulfur (NBS 371) | 0.25 |
| Stearic Acid (NBS 372) | 1 |
| n-tertiary butyl-2-benzothiazole sulfenamide (NBS 384) | 1 |
| Symmetrical dibetanaphthyl-p-phenylenediamine | 1.5 |
| Dicumyl peroxide (40 percent on precipitated $CaCO_3$) [b] | 4.5 |
| Total | 153.25 |

[a] Philprene 1503 has been found suitable.
[b] Use only within 90 days of manufacture and store at temperature below 27° C. (80° F.).

NOTE: The ingredients labeled (NBS_____) must have properties identical with those supplied by the National Bureau of Standards.

Compounding, vulcanization, physical properties, size of the finished cups, and other details shall be as specified in Appendix B of SAE J1703b. The cups shall be used in testing brake fluids either within 6 months from date of manufacture when stored at room temperature below 30° C. (86° F.) or within 36 months from date of manufacture when stored at temperatures below minus 15° C. (+5° F.). After removal of cups from refrigeration they shall be conditioned base down on a flat surface for at least 12 hours at room temperature in order to allow cups to reach their true configuration before measurement.

**§ 571.117 Standard No. 117; Retreaded pneumatic tires.**

S1. *Scope.* This standard specifies performance, labeling, and certification requirements for retreaded pneumatic passenger car tires.

S2. *Purpose.* The purpose of this standard is to require retreaded pneumatic passenger car tires to meet safety criteria similar to those for new pneumatic passenger car tires.

S3. *Application.* This standard applies to retreaded pneumatic tires for use on passenger cars manufactured after 1948.

S4. *Definitions.*

S4.1 "Casing" means a used tire to which additional tread may be attached for the purpose of retreading.

"Retreaded" means manufactured by a process in which a tread is attached to a casing.

S4.2 All terms defined in §§ 571.109 and 571.110 are used as defined therein.

S5. *Requirements.*

S5.1 *Retreaded tires.*

S5.1.1 Except as specified in S5.1.3, each retreaded tire, when mounted on a test rim of the width specified for the tire's size designation in Appendix A of § 571.109, shall comply with the following requirements of § 571.109:

(a) S4.1 (Size and construction).

(b) S4.2.1 (General).

(c) S4.2.2.3 (Tubeless tire resistance to bead unseating).

(d) S4.2.2.4 (Tire strength).

(e) S4.2.2.5 (Tire endurance).

(f) S4.2.2.6 (High speed performance).

S5.1.2 Except as specified in S5.1.3, each retreaded tire, when mounted on a test rim of the width specified for the tire's size designation in Appendix A of § 571.109, shall comply with the requirements of S4.2.2.2 of § 571.109, except that the section width shall be not less than 3 percent, nor more than 10 percent, of the section width specified for its size designation and type in Appendix A of § 571.109.

S5.1.3 Each retreaded tire shall be capable of meeting the requirement of S5.1.1. and S5.1.2 when mounted on any rim in accordance with those sections. However, a particular tire need not meet further requirements after having been subjected to, and having met the requirements of, one of the following test groups:

(a) The physical dimension (S5.1.2), bead unseating (S5.1.1(c)), and strength (S5.1.1(d)) tests; or

(b) The endurance test (S5.1.1(e)); or

(c) The high speed performance test (S5.1.1(f)).

S5.1.4 No retreaded tire shall have a recommended maximum load rating or maximum permissible inflation pressure that is greater than that originally specified on the casing pursuant to S4.3 of § 571.109, or specified for the casing in Figure 1.

S5.2 *Casings.*

S5.2.1 No retreaded tire shall be manufactured with a casing—

(a) On which bead wire or cord fabric is exposed before processing, or

(b) On which bead wire or cord fabric, except for belt material, is exposed during processing.

S5.2.2 No retreaded tire shall be manufactured with a casing—

(a) From which a belt or ply, or part thereof, is removed during processing; or

(b) On which a belt or ply, or part thereof, is added or replaced during processing.

S5.2.3 Except as specified in S5.2.4, each retreaded tire shall be manufactured with a casing that has been labeled pursuant to S4.3 of § 571.109.

S5.2.4 Until January 1, 1974, a retreaded tire may be manufactured with a casing that is for use on rims having diameters of 14 or 15 inches, that has a size designation of either 6.45, 6.85, 6.95, 7.35, 7.75, 8.15, 8.25, 8.45, 8.55, 8.90, 9.00, or 9.15, and that has been permanently labeled on the sidewall with each of the following:

(a) The generic name of the cord material used in the plies of the tire;

(b) The actual number of plies;

(c) The size of the tire; and

(d) Whether the tire is tubeless or tube type.

S6. *Certification and labeling.*

S6.1 Except as specified in S6.2, each manufacturer of a retreaded tire shall certify that his product complies with this standard, pursuant to section 114 of the National Traffic and Motor Vehicle Safety Act of 1966, by labeling the tire with the symbol DOT in the location specified by § 574.5 of this chapter.

S6.2 From January 1, 1972, to February 29, 1972, inclusive, a manufacturer may certify compliance by affixing to the tread of the tire, in such a manner that it is not easily removable, a label that states in letters not less than three thirty-seconds of an inch high:

This retreaded tire was manufactured after January 1, 1972, and conforms to all applicable Federal motor vehicle safety standards.

S6.3 *Permanent labeling.*

S6.3.2 Each retreaded tire manufactured with a casing that has been labeled pursuant to S4.3 of § 571.109 shall retain enough of its original labeling that each item of information required by § 571.109 is clearly legible in at least one location on the completed retreaded tire.

E6.3.2 Each retreaded tire manufactured with a casing that meets the requirements of S5.2.4 shall—

(a) Retain enough of its original labeling that each item of information specified in S5.2.4 is clearly legible in at least one location on the completed retreaded tire; and

(b) Be permanently labeled during the retreading process with its maximum permissible inflation pressure and maximum load rating as specified in Figure 1, in the location specified in § 574.5 of this chapter for the placement of the tire identification number, in letters not less than one-fourth of an inch high, in the following form:

Max. inflation_____p.s.i.
Max. load_____lbs.

| Tire size | Plies | | | | | |
|---|---|---|---|---|---|---|
| | 2 ply-4 ply (4 ply rating) | | 4 ply (6 ply rating) | | 4 ply (8 ply rating) | |
| | Maximum load | Maximum inflation pressure | Maximum load | Maximum inflation pressure | Maximum load | Maximum inflation pressure |
| 6.45-14 | 1,120 | 32 | 1,200 | 36 | 1,270 | 40 |
| 6.95-14 | 1,230 | 32 | 1,310 | 36 | 1,390 | 40 |
| 7.35-14 | 1,360 | 32 | 1,450 | 36 | 1,540 | 40 |
| 7.75-14 | 1,500 | 32 | 1,600 | 36 | 1,690 | 40 |
| 8.25-14 | 1,620 | 32 | 1,730 | 36 | 1,830 | 40 |
| 8.55-14 | 1,770 | 32 | 1,890 | 36 | 2,000 | 40 |
| 8.85-14 | 1,860 | 32 | 1,990 | 36 | 2,100 | 40 |
| 6.85-15 | 1,230 | 32 | 1,320 | 36 | 1,390 | 40 |
| 7.35-15 | 1,390 | 32 | 1,480 | 36 | 1,570 | 40 |
| 7.75-15 | 1,490 | 32 | 1,590 | 36 | 1,690 | 40 |
| 8.15-15 | 1,610 | 32 | 1,720 | 36 | 1,820 | 40 |
| 8.25-15 | 1,620 | 32 | 1,730 | 36 | 1,830 | 40 |
| 8.45-15 | 1,740 | 32 | 1,860 | 36 | 1,970 | 40 |
| 8.55-15 | 1,770 | 32 | 1,890 | 36 | 2,000 | 40 |
| 8.85-15 | 1,860 | 32 | 1,980 | 36 | 2,100 | 40 |
| 9.00-15 | 1,900 | 32 | 2,030 | 36 | 2,150 | 40 |
| 9.15-15 | 1,970 | 32 | 2,100 | 36 | 2,230 | 40 |
| 8.90-15 | 2,210 | 32 | 2,360 | 36 | 2,500 | 40 |

FIGURE 1

**§ 571.118 Standard No. 118; Power-operated window systems.**

S1. *Purpose and scope.* This standard specifies requirements for power-operated window and partition systems to minimize the likelihood of death or injury from their accidental operation.

S2. *Application.* This standard applies to passenger cars and multipurpose passenger vehicles.

S3. *Requirements.* When the key that controls activation of the vehicle's engine is in an off position or is removed from the lock, no power-operated window or partition shall be movable except—

(a) By muscular force, unassisted by a power source within the vehicle; or

(b) Upon activation by a key-locking system on the exterior of the vehicle.

**§ 571.121 Standard No. 121; Air brake systems. (Effective Jan. 1, 1973)**

S1. *Scope.* This standard establishes performance and equipment requirements for braking systems on vehicles equipped with air brake systems.

S2. *Purpose.* The purpose of this standard is to insure safe braking performance under normal and emergency conditions.

S3. *Application.* This standard applies to trucks, buses, and trailers equipped with air brake systems.

S4. *Definitions.*

"Air brake system" means a system that uses air as a medium for transmitting pressure or force from the driver control to the service brake, but does not include a system that uses compressed air or vacuum only to assist the driver in applying muscular force to hydraulic or mechanical components.

"Antilock system" means a portion of a service brake system that automatically controls the degree of wheel slip at one or more road wheels of the vehicle during braking.

"Gross axle weight rating" (GAWR) means the value specified by the vehicle

manufacturer as the loaded weight on a single axle measured at the tire-ground interfaces.

"Gross vehicle weight rating" (GVWR) means the value specified by the manufacturer as the loaded weight of a single vehicle.

"Skid number" means the frictional resistance of a pavement measured in accordance with American Society for Testing and Materials Method E–274–65T at 40 m.p.h., omitting water delivery as specified in paragraph 7.1 of that method.

"Unloaded vehicle weight" means the weight of a vehicle with maximum capacity of all fluids necessary for operation of the vehicle, but without cargo or occupants.

S5. *Requirements.* Each vehicle shall meet the following requirements under the conditions specified in S6. All test requirements shall be met without failure of any part of the brake or suspension systems.

S5.1 *Required equipment—trucks and buses.* Each truck and bus shall have the following equipment:

S5.1.1 *Air compressor.* An air compressor of sufficient capacity to increase air pressure in the service reservoirs from 85 pounds per square inch (p.s.i.) to 100 p.s.i. in not more than 25 seconds when the engine is operating at the manufacturer's maximum recommended r.p.m.

S5.1.2 *Reservoirs.* One or more service reservoirs, from which air is delivered to the brake chambers, and either an automatic condensate drain valve for each service reservoir or one or more supply reservoirs between the service reservoir and the source of air pressure.

S5.1.2.1 The combined volume of all service reservoirs and supply reservoirs shall be at least twelve times greater than the combined volume of all service brake chambers at maximum travel of the pistons or diaphragms.

S5.1.2.2 Each reservoir shall be capable of withstanding an internal hydrostatic pressure five times the compressor cut-out pressure.

S5.1.2.3 Each service reservoir shall be protected against loss of air pressure due to failure or leakage in the system between the reservoir and the source of air pressure by check valves or equivalent devices whose proper functioning can be checked without disconnecting any air line or fitting.

S5.1.2.4 Each reservoir shall have a condensate drain valve that can be manually operated.

S5.1.3 *Towing vehicle protection valve.* If the vehicle is intended to tow another vehicle equipped with air brakes, a valve to protect the air pressure in the towing vehicle from the effects of a loss of air pressure in the towed vehicle.

S5.1.3.1 The protection valve shall automatically close the air lines to the towed vehicle when the air pressure in the towing vehicle's service reservoir is less than the automatic closing pressure level. The automatic closing pressure level shall be between 20 and 45 p.s.i.

S5.1.4 *Pressure gauge.* A pressure gauge for a service reservoir in each service brake system, readily visible to a person seated in the normal driving position, that indicates the reservoir air pressure within ±7 percent of the compressor cut-out pressure.

S5.1.5 *Warning signal.* A signal that gives a continuous warning to a person in the normal driving position when the air pressure in a service reservoir is below 60 p.s.i. The signal shall be either visible within the driver's forward field of view, or both audible and visible.

S5.1.6 *Antilock warning signal.* A signal on each vehicle equipped with an antilock system that gives a person seated in the normal driving position a continuous audible and visible warning in the event of a total failure of the antilock system.

S5.1.7 *Service brake stop lamp switch.* A switch that lights the stop lamps when the service brake control is statically depressed to a point that produces a pressure of 6 p.s.i. or less in the service brake chambers.

S5.2 *Required equipment—trailers.* Each trailer shall have the following equipment:

S5.2.1 *Reservoirs.* One or more reservoirs to which the air is delivered from the towing vehicle.

S5.2.1.1 Total reservoir capacity shall be at least eight times greater than the combined volume of all service brake chambers at maximum travel of the pistons or diaphragms.

S5.2.1.2 Each reservoir shall be capable of withstanding an internal hydrostatic pressure of 500 p.s.i.

S5.2.1.3 Each reservoir shall have a condensate drain valve that can be manually operated.

S5.3 *Service brakes.* The service brake system on each truck and bus shall, under the conditions of S6.1, meet the requirements of S5.3.1, S5.3.3, and S5.3.4 when tested in sequence and without adjustments other than those specified in this standard. The service brake system on each trailer shall, under the conditions of S6.1, meet the requirements of S5.3.2, S5.3.3, and S5.3.4 when tested in sequence and without adjustments other than those specified in this standard. Each vehicle shall be capable of meeting the requirements of S5.3.1 or S5.3.2 both (a) when loaded to its gross vehicle weight rating, and (b) at its unloaded vehicle weight plus 500 pounds (including driver and instrumentation). Under the conditions of S6.2, each brake assembly shall meet the requirements of S5.3.5, S5.3.6, and S5.3.7 when tested in sequence and without adjustments other than those specified in this standard. A brake assembly on a vehicle that has undergone a road test need not meet the requirements of S5.3.5, S5.3.6, and S5.3.7.

S5.3.1 *Stopping distance—trucks and buses.* The service brakes shall be capable of stopping the vehicle from 60 m.p.h. and 20 m.p.h. on a surface with a skid number of 75 and from 20 m.p.h on a wet surface with a skid number of 30 in not more than the distances specified in Table I, measured from the point at which movement of the service brake control begins, without any part of the vehicle leaving the roadway and without lockup of any wheel at speeds above 10 m.p.h. except for momentary lockup allowed by an antilock system and except for lockup of wheels on nonsteerable axles other than the two rearmost nonsteerable axles. If the speed attainable in 5 miles is less than 60 m.p.h., the vehicle shall be capable of stopping from a speed in Table I that is 4 to 8 m.p.h. less than the speed attainable in 5 miles, in not more than the distance specified in Table I.

S5.3.2 *Stopping capability — trailers.* With a service line air pressure of 90 p.s.i., the service brakes shall be capable of stopping the vehicle from 20 and 60 m.p.h. on a surface with a skid number of 75 and from 20 m.p.h. on a wet surface with a skid number of 30, without any part of the vehicle leaving the roadway and without lockup of any wheel at speeds above 10 m.p.h., except for momentary lockup allowed by an antilock system and except for lockup of wheels on nonsteerable axles other than the two rearmost nonsteerable axles.

S5.3.3 *Brake actuation time.* With an initial service reservoir air pressure of 100 p.s.i., the air pressure in each brake chamber shall reach 60 p.s.i. in not more than 0.25 second measured from the first movement of the service brake control. A vehicle designed to tow a vehicle equipped with air brakes shall be capable of meeting the above actuation time requirement with a 50-cubic-inch test reservoir connected to the service line coupling. A trailer shall meet the above actuation time requirement with its brake system connected to the test rig shown in Figure 1.

S5.3.4 *Brake release time.* With an initial brake chamber air pressure of 95 p.s.i., the air pressure in each brake chamber shall fall to 5 p.s.i. in not more than 0.50 second measured from the first movement of the service brake control. A vehicle designed to tow another vehicle equipped with air brakes shall be capable of meeting the above release time requirement with a 50-cubic-inch test reservoir connected to the service line coupling. A trailer shall meet the above release time requirement with its brake system connected to the test rig shown in Figure 1.

S5.3.5 *Brake retardation force.* The retardation force exerted by the brakes on each axle shall be such that the quotient

$$\frac{\text{brake retardation force}}{\text{GAWR}}$$

relative to brake chamber air pressure, shall have values not less than those shown in Table II. Retardation force shall be determined as follows:

S5.3.5.1 After burnishing the brake pursuant to S6.2.6, retain the brake assembly on the inertia dynamometer. With an initial brake temperature between 125° F. and 200° F., conduct a stop from 50 m.p.h., maintaining brake chamber air pressure at a constant 20 p.s.i. Measure the average torque exerted by the brake, and divide by the static

loaded tire radius specified by the tire manufacturer to determine the retardation force. Repeat the procedure six times, increasing the brake chamber air pressure by 10 p.s.i. each time. After each stop, rotate the brake drum until the surface temperature of the brake falls to between 125° F. and 200° F.

S5.3.6 *Brake power.* When mounted on an interia dynamometer, each brake shall be capable of making 10 consecutive decelerations at a rate of at least 9 f.p.s.p.s. from 50 m.p.h. to 15 m.p.h., at equal intervals of 72 seconds, and shall be capable of decelerating to a stop from 20 m.p.h. at an average deceleration rate of 14 f.p.s.p.s. one minute after the 10th deceleration. The series of decelerations shall be conducted as follows:

S.5.3.6.1 With the brake temperature between 150° F. and 200° F. and the drum rotating at a speed equivalent to 50 m.p.h., apply the brake and decelerate at a minimum deceleration rate of 9 f.p.s.p.s. to 15 m.p.h. Upon reaching 15 m.p.h., accelerate to 50 m.p.h. and apply the brake for a second time 72 seconds after the start of the first application. Repeat the cycle until 10 decelerations have been made. The service line air pressure shall not exceed 90 p.s.i. during any deceleration.

S5.3.6.2 One minute after the end of the last deceleration required by S5.3.6.1 and with the drum rotating at a speed of 20 m.p.h., decelerate to a stop at an average deceleration rate of 14 f.p.s.p.s. The service brake line air pressure shall not exceed 108 p.s.i.

S5.3.7 *Brake recovery.* Two minutes after completing the tests required by S5.3.6, the brake shall be capable of making 20 consecutive stops from 30 m.p.h. at an average rate of 12 f.p.s.p.s., at equal intervals of 1 minute measured from the start of each brake application. The service line air pressure needed to attain a rate of 12 f.p.s.p.s. shall not be less than 40 p.s.i. nor more than 75 p.s.i.

S5.3.8 *Antilock system failure.* On a vehicle equipped with an antilock system, the failure of any part of the antilock system shall not increase the actuation and release times of the service brakes.

S5.3.9 *Antilock system power—trailers.* On a trailer equipped with an antilock system that requires electrical power for operation, the power shall be obtained from the stop lamp circuit. Additional circuits may also be used to obtain redundant sources of electrical power.

S5.4 *Parking brake system.* Each vehicle shall have a parking brake system acting on each axle except steerable front axles that under the conditions of S6.1 meets the following requirements:

S5.4.1 *Static retardation force.* With all other brakes rendered inoperative, the static retardation force produced by the application of the parking brakes on an axle during a static draw bar pull in a forward direction shall be such that the quotient

$$\frac{\text{static retardation force}}{\text{GAWR}}$$

is between 0.28 and 0.40.

S5.4.2 *Application and holding.* The parking brakes shall be applied by an energy source that is not affected by air pressure loss in the service brake system. Once applied, the parking brakes shall be held in the applied position solely by mechanical means.

S5.4.3 *Automatic application.* The parking brakes shall be automatically applied when the air pressure in all service reservoirs is less than the automatic application pressure level. The automatic application pressure level shall be between 20 and 45 p.s.i.

S5.4.4 *Release after automatic application.* After automatic application, the parking brakes shall be releasable at least once by means of a parking brake control. The parking brakes shall be releasable only if they can be automatically reapplied and exert the force required by S5.4.1 immediately after release.

S5.4.5 *Manual operation.* The parking brakes shall be manually operable and releasable by a parking brake control when the air pressure is greater than the automatic application pressure.

S5.4.6 *Parking brake control—trucks and buses.* The parking brake control shall be located to the right of a vertical longitudinal plane tangent to the rightmost edge of the steering wheel and shall be operable by a person seated in the normal driving position. The control shall have a flat red octagonal knob with the word Stop in white letters on its face. The control shall further be identified by the following legend on its escutcheon plate Pull to Apply—Push to Release. The control shall apply the parking brakes when pulled and shall hold the brakes in the applied position until pushed. It shall release the parking brakes after automatic application when pushed and held and shall reapply the parking brakes when released if the air pressure is below the automatic application pressure.

S6. *Conditions.* The requirements of S5 shall be met under the following conditions. Where a range of conditions is specified, the vehicle must be capable of meeting the requirements at all points within the range.

S6.1 *Road test conditions.*

S6.1.1 Except as specified in S5.3, the vehicle is loaded to its gross vehicle weight rating, distributed proportionally to its gross axle weight ratings.

S6.1.2 Tire inflation pressure is as specified by the vehicle manufacturer for the gross vehicle weight rating.

S6.1.3 Unless otherwise specified, the transmission selector control is in neutral or the clutch is disengaged during all decelerations.

S6.1.4 All vehicle openings (doors, windows, hood, trunk, cargo doors, etc.) are in a closed position except as required for instrumentation purposes.

S6.1.5 The ambient temperature is between 32° F. and 100° F.

S6.1.6 The wind velocity is zero.

S6.1.7 Road tests are conducted on a 12-foot wide, level roadway having a skid number of 75, unless otherwise specified. The vehicle is aligned in the center of the roadway at the beginning of a stop.

S6.1.8 Brakes are burnished before testing as follows: With the transmission in the highest gear range, make 400 applications from 40 m.p.h. to 20 m.p.h. at 10 f.p.s.p.s. After each brake application accelerate to 40 m.p.h. and maintain that speed until making the next application at a point 1.5 miles from the point of the previous brake application. After burnishing, adjust the brakes as recommended by the brake manufacturer.

S6.2 *Dynamometer test conditions.*

S.6.2.1 The dynamometer inertia for each wheel is equivalent to the load on the wheel with the axle loaded to its gross axle weight rating.

S6.2.2 The ambient temperature is between 85° F. and 95° F.

S6.2.3 Air at ambient temperature is directed uniformly and continuously over the brake drum at a rate of 2,200 feet per minute.

S5.2.4 The brake temperature is measured by plug-type thermocouples installed according to SAE Recommended Practice J843a, June 1966.

S6.2.5 The rate of brake rotation on a dynamometer corresponding to the rate of rotation on a vehicle at a given speed is calculated by assuming a tire radius equal to the static loaded radius specified by the tire manufacturer.

S6.2.6 Brakes are burnished before testing as follows: Place the brake assembly on an inertia dynamometer and adjust the brake as recommended by the brake manufacturer. Make 200 stops from 40 m.p.h. at a deceleration of 10 f.p.s.p.s., maintaining a brake temperature on each stop of not less than 315° F. and not more than 385° F. Make 200 additional stops from 40 m.p.h. at a deceleration of 10 f.p.s.p.s. maintaining a brake temperature on each stop of not less than 450° F. and not more than 550° F. After burnishing, the brakes are adjusted as recommended by the brake manufacturer.

S6.2.7 The brake temperature is increased to a specified level by conducting one or more stops from 40 m.p.h. at a deceleration rate of 10 f.p.s.p.s. The brake temperature is decreased to a specified level by rotating the drum at a constant 30 m.p.h.

TABLE I—STOPPING DISTANCES IN FEET

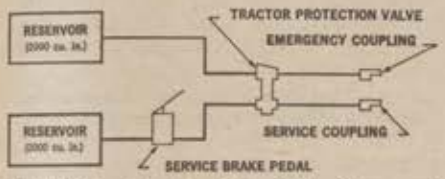
| Vehicle speed (MPH) | Stopping distance | |
|---|---|---|
| | Skid No. 75 | Wet skid No. 30 |
| 20 | 33 | 54 |
| 25 | 49 | |
| 30 | 68 | |
| 35 | 90 | |
| 40 | 108 | |
| 45 | 143 | |
| 50 | 174 | |
| 55 | 208 | |
| 60 | 245 | |

TABLE II—BRAKE RETARDATION FORCE

| Brake Retardation Force GAWR | Brake chamber pressure p.s.i. |
|---|---|
| 0.100 | 20 |
| 0.175 | 30 |
| 0.250 | 40 |
| 0.325 | 50 |
| 0.400 | 60 |
| 0.475 | 70 |
| 0.550 | 80 |
| 0.625 | 90 |

FIGURE 1

TRAILER TEST RIG




§ 571.201 Standard No. 201; Occupant protection in interior impact.

S1. *Purpose and scope.* This standard specifies requirements to afford impact protection for occupants.

S2. *Application.* This standard applies to passenger cars.

S3. *Requirements.*

S3.1 *Instrument panels.* Except as provided in S3.1.1, when that area of the instrument panel that is within the head impact area is impacted in accordance with S3.1.2 by a 15-pound, 6.5-inch diameter head form at a relative velocity of 15 miles per hour, the deceleration of the head form shall not exceed 80g continuously for more than 3 milliseconds.

S3.1.1 The requirements of S3.1 do not apply to—

(a) Console assemblies;

(b) Areas less than 5 inches inboard from the juncture of the instrument panel attachment to the body side inner structure;

(c) Areas closer to the windshield juncture than those statically contactable by the head form with the windshield in place;

(d) Areas outboard of any point of tangency on the instrument panel of a 6.5-inch diameter head form tangent to and inboard of a vertical longitudinal plane tangent to the inboard edge of the steering wheel; or

(e) Areas below any point at which a vertical line is tangent to the rearmost surface of the panel.

S3.1.2 *Demonstration procedures.* Tests shall be performed as described in Society of Automotive Engineers Recommended Practice J921, "Instrument Panel Laboratory Impact Test Procedure," June 1965, using the specified instrumentation or instrumentation that meets the performance requirements specified in Society of Automotive Engineers Recommended Practice J977, "Instrumentation for Laboratory Impact Tests," November 1966, except that—

(a) The origin of the line tangent to the instrument panel surface shall be a point on a transverse horizontal line through a point 5 inches horizontally forward of the seating reference point of the front outboard passenger designated seating position, displaced vertically an amount equal to the rise which results from a 5-inch forward adjustment of the seat or 0.75 inches; and

(b) Direction of impact shall be either—

(1) In a vertical plane parallel to the vehicle longitudinal axis; or

(2) In a plane normal to the surface at the point of contact.

S3.2 *Seat Backs.* Except as provided in S3.2.1, when that area of the seat back that is within the head impact area is impacted in accordance with S3.2.2 by a 15-pound, 6.5-inch diameter head form at a relative velocity of 15 miles per hour, the deceleration of the head form shall not exceed 80g continuously for more than 3 milliseconds.

S3.2.1 The requirements of S3.2 do not apply to rearmost, side-facing, back-to-back, folding auxiliary jump, and temporary seats.

S3.2.2 *Demonstration procedures.* Tests shall be performed as described in Society of Automotive Engineers Recommended Practice J921, "Instrument Panel Laboratory Impact Test Procedure," June 1965, using the specified instrumentation or instrumentation that meets the performance requirements specified in Society of Automotive Engineers Recommended Practice J977, "Instrumenation for Laboratory Impact Tests," November 1966, except that—

(a) The origin of the line tangent to the uppermost seat back frame component shall be a point on a transverse horizontal line through the seating reference point of the right rear designated seating position, with adjustable forward seats in their rearmost design driving position and reclinable forward seat backs in their nominal design driving position;

(b) The direction of impact shall be either—

(1) In a vertical plane parallel to the vehicle longitudinal axis; or

(2) In a plane normal to the surface at the point of contact;

(c) For seats without head restraints installed, tests shall be performed for each individual split or bucket seat back at points within 4 inches left and right of its centerline, and for each bench seat back between points 4 inches outboard of the centerline of each outboard designated seating position;

(d) For seats having head restraints installed, each test shall be conducted with the head restraint in place at its lowest adjusted position, at a point on the head restraint centerline; and

(e) For a seat that is installed in more than one body style, tests conducted at the fore and aft extremes identified by application of subparagraph (a) shall be deemed to have demonstrated all intermediate conditions.

S3.3 *Interior compartment doors.* Each interior compartment door assembly located in an instrument panel, console assembly, seat back, or side panel adjacent to a designated seating position shall remain closed when tested in accordance with either S3.3.1(a) and S3.3.1(b) or S3.3.1(a) and S3.3.1(c). Additionally, any interior compartment door located in an instrument panel or seat back shall remain closed when the instrument panel or seat back is tested in accordance with S3.1 and S3.2. All interior compartment door assemblies with a locking device must be tested with the locking device in an unlocked position.

S3.3.1 *Demonstration procedures.* (a) Subject the interior compartment door latch system to an inertia load of 10g in a horizontal transverse direction and an inertia load of 10g in a vertical direction in accordance with the procedure described in section 5 of SAE Recommended Practice J839b, "Passenger Car Side Door Latch Systems," May 1965, or an approved equivalent.

(b) Impact the vehicle perpendicularly into a fixed collision barrier at a forward longitudinal velocity of 30 miles per hour.

(c) Subject the interior compartment door latch system to a horizontal inertia load of 30g in a longitudinal direction in accordance with the procedure described in section 5 of SAE Recommended Practice J839b, "Passenger Car Side Door Latch Systems," May 1965, or an approved equivalent.

S3.4 *Sun visors.*

S3.4.1 Two sun visors shall be provided that are constructed of or covered with energy-absorbing material.

S3.4.2 Each sun visor mounting shall present no rigid material edge radius of less than 0.125 inch that is statically contactable by a spherical 6.5-inch diameter head form.

S3.5 *Armrests.*

S3.5.1 *General.* Each installed armrest shall conform to at least one of the following:

(a) It shall be constructed with energy-absorbing material and shall deflect or collapse laterally at least 2 inches without permitting contact with any underlying rigid material.

(b) It shall be constructed with energy-absorbing material that deflects or collapses to within 1.25 inches of a rigid test panel surface without permitting contact with any rigid material. Any rigid material between 0.5 and 1.25 inches from the panel surface shall have a minimum vertical height of not less than 1 inch.

(c) Along not less than 2 continuous inches of its length, the armrest shall, when measured vertically in side elevation, provide at least 2 inches of coverage within the pelvic impact area.

S3.5.2 *Folding armrests.* Each armrest that folds into the seat back or between two seat backs shall either—

(a) Meet the requirement of S3.5.1; or

(b) Be constructed of or covered with energy-absorbing material.

§ 571.202 Standard No. 202; Head restraints.

S1 *Purpose and scope.* This standard specifies requirements for head restraints to reduce the frequency and severity of

neck injury in rear-end and other collisions.

S2. *Application.* This standard applies to passenger cars.

S3. *Definitions.* "Head restraint" means a device that limits rearward angular displacement of the occupant's head relative to his torso line.

S4. *Requirements.* A head restraint that conforms to either (a) or (b) shall be provided at each outboard front designated seating position—

(a) It shall, when tested in accordance with S5.1, during a forward acceleration of at least 8g on the seat supporting structure, limit rearward angular displacement of the head reference line to 45° from the torso reference line; or

(b) It shall, when adjusted to its fully extended design position, conform to each of the following—

(1) When measured parallel to torso line, the top of the head restraint shall not be less than 27.5 inches above the seating reference point;

(2) When measured either 2.5 inches below the top of head restraint or 25 inches above the seating reference point, the lateral width of the head restraint shall be not less than—

(i) 10 inches for use with bench-type seats; and

(ii) 6.75 inches for use with individual seats;

(3) When tested in accordance with S5.2, the rearmost portion of the head form shall not be displaced to more than 4 inches perpendicularly rearward of the displaced extended torso reference line during the application of the load specified in S5.2(c); and

(4) When tested in accordance with S5.2, the head restraint shall withstand an increasing load until one of the following occurs—

(i) Failure of the seat or seat back; or

(ii) Application of a load of 200 pounds.

S5. *Demonstration procedures.*

S5.1 Compliance with S4.(a) shall be demonstrated in accordance with the following with the head restraint in its fully extended design position:

(a) On the exterior profile of the head and torso of a dummy having the weight and seated height of a 95th percentile adult male with an approved representation of a human, articulated neck structure, or an approved equivalent test device, establish reference lines by the following method:

(1) Position the dummy's back on a horizonal flat surface with the lumbar joints in a straight line.

(2) Rotate the head of the dummy rearward until the back of the head contacts the same flat horizontal surface in (1).

(3) Position the SAE J-826 two-dimensional manikin's back against the flat surface in (1), alongside the dummy with the h-point of the manikin aligned with the h-point of the dummy.

(4) Establish the torso line of the manikin as defined in SAE Aerospace-Automotive Drawing Standards, sec. 2.3.6, P. E1.01, September 1963.

(5) Establish the dummy torso reference line by superimposing the torso line of the manikin on the torso of the dummy.

(6) Establish the head reference line by extending the dummy torso reference line onto the head.

(b) At each designated seating position having a head restraint, place the dummy, snugly restrained by a Type 1 seat belt, in the manufacturer's recommended design seated position.

(c) During a forward acceleration applied to the structure supporting the seat as described below, measure the maximum rearward angular displacement between the dummy torso reference line and the head reference line. When graphically depicted, the magnitude of the acceleration curve shall not be less than that of a half-sine wave having the amplitude of 8g and a duration of 80 milliseconds and not more than that of a half-sine wave curve having an amplitude of 9.6g and a duration of 96 milliseconds.

S5.2 Compliance with S4.(b) shall be demonstrated in accordance with the following with the head restraint in its fully extended design position:

(a) Place a test device, having the back pan dimensions and torso line (centerline of the head room probe in full back position), of the three dimensional SAE J826 manikin, at the manufacturer's recommended design seated position.

(b) Establish the displaced torso reference line by applying a rearward moment of 3,300 in. lb. about the seating reference point to the seat back through the test device back pan located in (a).

(c) After removing the back pan, using a 6.5 inch diameter spherical head form or a cylindrical head form having a 6.5 inch diameter in plan view and a 6-inch height in profile view, apply, perpendicular to the displaced torso reference line, a rearward initial load 2.5 inches below the top of the head restraint that will produce a 3,300 in. lb. moment about the seating reference point.

(d) Gradually increase this initial load to 200 pounds or until the seat or seat back fails, whichever occurs first.

### § 571.203 Standard No. 203; Impact protection for the driver from the steering control system.

S1. *Purpose and scope.* This standard specifies requirements for steering control systems that will minimize chest, neck, and facial injuries to the driver as a result of impact.

S2. *Application.* This standard applies to passenger cars.

S3. *Definitions.* "Steering control system" means the basic steering mechanism and its associated trim hardware, including any portion of a steering column assembly that provides energy absorption upon impact.

S4. *Requirements.*

S4.1 Except as provided in S4.2, when the steering control system is impacted by a body block in accordance with Society of Automotive Engineers Recommended Practice J944, "Steering Wheel Assembly Laboratory Test Procedure," December 1965, or an approved equivalent, at a relative velocity of 15 miles per hour, the impact force developed on the chest of the body block transmitted to the steering control system shall not exceed 2,500 pounds.

S4.2 A Type 2 seat belt assembly that conforms to § 571.209 shall be installed for the driver of any vehicle with forward control configuration that does not meet the requirements of S4.1.

S4.3 The steering control system shall be so constructed that no components or attachments, including horn actuating mechanisms and trim hardware, can catch the driver's clothing or jewelry during normal driving maneuvers.

NOTE: The term jewelry refers to watches, rings, and bracelets without loosely attached or dangling members.

### § 571.204 Standard No. 204; Steering control rearward displacement.

S1. *Purpose and scope.* This standard specifies requirements limiting the rearward displacement of the steering control into the passenger compartment to reduce the likelihood of chest, neck, or head injury.

S2. *Application.* This standard applies to passenger cars.

S3. *Definitions.*

"Steering column" means a structural housing that surrounds a steering shaft.

"Steering shaft" means a component that transmits steering torque from the steering wheel to the steering gear.

S4. *Requirements.*

S4.1 Except as provided in S4.2, the upper end of the steering column and shaft shall not be displaced horizontally rearward parallel to the longitudinal axis of the vehicle relative to an undisturbed point on the vehicle more than 5 inches, determined by dynamic measurement, when the vehicle is impacted perpendicularly into a fixed collision barrier at a forward longitudinal velocity of 30 miles per hour.

S4.2 A Type 2 seat belt assembly that conforms to § 571.209 shall be installed for the driver of any vehicle with forward control configuration that does not meet the requirements of S4.1.

NOTE: When conducting the barrier collision test, a driver dummy may be used without measuring the impact force developed on the chest.

In the event that the vehicle impacts the barrier at a velocity not less than 30 miles per hour nor more than 33 miles per hour, the displacement of the steering column may be corrected to 30 miles per hour by means of the following formula:

$$\frac{D_1}{D_2} = \frac{V_1^2}{V_2^2}$$

### § 571.205 Standard No. 205; Glazing materials.

S1. *Purpose and scope.* This standard specifies requirements for glazing materials to reduce lacerations to the face, scalp, and neck, and to minimize the possibility of occupants being thrown

through the vehicle windows in collisions.

S2. *Application.* This standard applies to glazing materials for use in passenger cars, multipurpose passenger vehicles, motorcycles, trucks, and buses.

S3. *Requirements.*

S3.1 *Materials.* Except as provided in S3.2, glazing materials used in windshields, windows, and interior partitions shall conform to United States of America Standards Institute "American Standard Safety Code for Safety Glazing Materials for Glazing Motor Vehicles Operating on Land Highways,", ASA Standard Z26.1—1966, July 15, 1966, (hereinafter referred to in this standard as Z26.1—1966).

S3.3 *Edges.* In vehicles, except school buses, exposed edges shall be treated in accordance with Society of Automotive Engineers Recommended Practice J673a "Automotive Glazing," August 1967. In school buses, exposed edges shall be banded.

S3.4 *Certification alternative.* As an alternative to the certification requirements under section 114 of the National Traffic and Motor Vehicle Safety Act of 1966, a prime glazing material manufacturer may use the marking requirements of section 6 of Z26.1—1966 if the symbol "DOT" and an approved manufacturer's code mark, in letters and numbers at least 0.070 inch in height, is included in the marking. The approved manufacturer's code mark is a two-digit number assigned upon request to a prime glazing material manufacturer. A prime glazing material manufacturer, for the purpose of this standard, is one who fabricates, laminates or tempers the glazing material.

### § 571.206 Standard No. 206; Door locks and door retention components.

S1. *Purpose and scope.* This standard specifies requirements for side door locks and side door retention components including latches, hinges, and other supporting means, to minimize the likelihood of occupants being thrown from the vehicle as a result of impact.

S2. *Application.* This standard applies to passenger cars, multipurpose passenger vehicles, and trucks.

S3. *Definitions.* "Cargo-Type Door" means a door designed primarily to accommodate cargo loading including, but not limited to, a two-part door that latches to itself.

S4. *Requirements.* Side door components referred to herein shall conform to this standard if any portion of a 90-percentile two-dimensional manikin as described in SAE Practice J826, when positioned at any seating reference point, projects into the door opening area on the side elevation or profile view. Components on folding doors, roll-up doors, and doors that are designed to be easily attached to or removed from motor vehicles manufactured for operation without doors need not conform to this standard.

S4.1 *Hinged Doors, Except Cargo-Type Doors.*

S4.1.1 *Door Latches.* Each door latch and striker assembly shall be provided with two positions consisting of—

(a) A fully latched position; and

(b) A secondary latched position.

S4.1.1.1 *Longitudinal Load.* The door latch and striker assembly, when in the fully latched position, shall not separate when a longitudinal load of 2,500 pounds is applied. When in the secondary latched position, the door latch and striker assembly shall not separate when a longitudinal load of 1,000 pounds is applied.

S4.1.1.2 *Transverse Load.* The door latch and striker assembly, when in the fully latched position, shall not separate when a transverse load of 2,000 pounds is applied. When in the secondary latched position, the door latch and striker assembly shall not separate when a transverse load of 1,000 pounds is applied.

S4.1.1.3 *Inertia Load.* The door latch shall not disengage from the fully latched position when a longitudinal or transverse inertia load of 30g is applied to the door latch system (including the latch and its actuating mechanism with the locking mechanism disengaged).

S4.1.2 *Door Hinges.* Each door hinge system shall support the door and shall not separate when a longitudinal load of 2,500 pounds is applied. Similarly, each door hinge system shall not separate when a transverse load of 2,000 pounds is applied.

S4.1.3 *Door Locks.* Each door shall be equipped with a locking mechanism with an operating means in the interior of the vehicle.

S4.1.3.1 *Front Door Locks.* When the locking mechanism is engaged, the outside door handle or other outside latch release control shall be inoperative.

S4.1.3.2 *Rear Door Locks.* In passenger cars and multipurpose passenger vehicles, when the locking mechanism is engaged, both the outside and inside door handles or other latch release controls shall be inoperative.

S4.2 *Hinged Cargo-Type Doors.*

S4.2.1 *Door Latches.*

S4.2.1.1 *Longitudinal Load.* Each latch system, when in the latched position, shall not separate when a longitudinal load of 2,500 pounds is applied.

S4.2.1.2 *Transverse Load.* Each latch system, when in the latched position, shall not separate when a transverse load of 2,000 pounds is applied. When more than one latch system is used on a single door, the load requirement may be divided among the total number of latch systems.

S4.2.2 *Door Hinges.* Each door hinge system shall support the door and shall not separate when a longitudinal load of 2,500 pounds is applied, and when a transverse load of 2,000 pounds is applied.

S4.3 *Sliding Doors.* The track and slide combination or other supporting means for each sliding door shall not separate when a total transverse load of 4,000 pounds is applied, with the door in the closed position.

S5. *Demonstration Procedures.*

S5.1 *Hinged Doors, Except Cargo-Type Doors.*

S5.1.1 *Door Latches.*

S5.1.1.1 *Longitudinal and Transverse Loads.* Compliance with paragraphs S4.1.1.1 and S4.1.1.2 shall be demonstrated in accordance with paragraph 4 of Society of Automotive Engineers Recommended Practice J839b, "Passenger Car Side Door Latch Systems," May 1965.

S5.1.1.2 *Inertia Load.* Compliance with S4.1.1.3 shall be demonstrated by approved tests or in accordance with paragraph 5 of SAE Recommended Practice J839b, May 1965.

S5.1.2 *Door Hinges.* Compliance with S4.1.2 shall be demonstrated in accordance with paragraph 4 of SAE Recommended Practice J934, "Vehicle Passenger Door Hinge Systems," July 1965. For piano-type hinges, the hinge spacing requirements of SAE J934 shall not be applicable and arrangement of the test fixture shall be altered as required so that the test load will be applied to the complete hinge.

S5.2 *Hinged Cargo-Type Doors.*

S5.2.1 *Door Latches.* Compliance with S4.2.1 shall be demonstrated in accordance with paragraphs 4.1 and 4.3 of SAE Recommended Practice J839b, "Passenger Car Side Door Latch Systems," May 1965. An equivalent static test fixture may be substituted for that shown in Figure 2 of SAE J839b, if required.

S5.2.2 *Door Hinges.* Compliance with S4.2.2 shall be demonstrated in accordance with paragraph 4 of SAE Recommended Practice J934, "Vehicle Passenger Door Hinge Systems," July 1965. For piano-type hinges, the hinge spacing requirement of SAE J934 shall not be applicable and arrangement of the test fixture shall be altered as required so that the test load will be applied to the complete hinge.

S5.3 *Sliding Doors.* Compliance with S4.3 shall be demonstrated by applying an outward transverse load of 2,000 pounds to the load bearing members at the opposite edges of the door (4,000 pounds total). The demonstration may be performed either in the vehicle or with the door retention components in a bench test fixture.

EDITORIAL NOTE: The provisions of § 571.206 become effective for trucks on Jan. 1, 1972.

### § 571.207 Standard No. 207; Seating systems. (Effective Jan. 1, 1972)

NOTE: The standard that appears below is a revision that is effective with respect to vehicles manufactured on or after January 1, 1972. The standard that is effective before that date appears at 32 F.R. 2415, Feb. 3, 1967 and 33 F.R. 19723, Dec. 25, 1968.

S1. *Purpose and scope.* This standard establishes requirements for seats, their attachment assemblies, and their installation to minimize the possibility of their failure by forces acting on them as a result of vehicle impact.

S2. *Application.* This standard applies to passenger cars, multipurpose passenger vehicles, trucks and buses.

S3. *Definition.* "Occupant seat" means a seat that provides at least one designated seating position.

S4. *Requirements.*

S4.1 *Driver's seat.* Each vehicle shall have an occupant seat for the driver.

S4.2 *General performance requirements.* When tested in accordance with S5, each occupant seat, other than a side-facing seat or a passenger seat on a bus, shall withstand the following forces:

(a) In any position to which it can be adjusted—20 times the weight of the seat applied in a forward longitudinal direction;

(b) In any position to which it can be adjusted—20 times the weight of the seat applied in a rearward longitudinal direction;

(c) For a seat belt assembly attached to the seat—the force specified in subparagraph (a), if it is a forward facing seat, or subparagraph (b), if it is a rearward facing seat, in each case applied simultaneously with the forces imposed on the seat by the seat belt assembly when it is loaded in accordance with section S4.2 of § 571.210; and

(d) In its rearmost position—a force that produces a 3,300 inch-pound moment about the seating reference point for each designated seating position that the seat provides, applied to the upper cross-member of the seat back or the upper seat back, in a rearward longitudinal direction for forward-facing seats and in a forward longitudinal direction for rearward-facing seats.

S4.2.1 *Seat adjustment.* Except for vertical movement of nonlocking suspension type occupant seats in trucks or buses, the seat shall remain in its adjusted position during the application of each force specified in S4.2.

S4.3 *Restraining device for hinged or folding seats or seat backs.* Except for a passenger seat in a bus or a seat having a back that is adjustable only for the comfort of its occupants, a hinged or folding occupant seat or occupant seat back shall be equipped with a self-locking device for restraining the hinged or folding seat or seat back and a control for releasing that restraining device.

S4.3.1 *Accessibility of release control.* If there is a designated seating position immediately behind a seat equipped with a restraining device, the control for releasing the device shall be readily accessible to the occupant of the seat equipped with the device and, if access to the control is required in order to exit from the vehicle, to the occupant of the designated seating position immediately behind the seat.

S4.3.2 *Performance of restraining device.*

S4.3.2.1 *Static force.*

(a) Once engaged, the restraining device for forward-facing seat shall not release or fail when a forward longitudinal force equal to 20 times the weight of the hinged or folding portion of the seat is applied through the center of gravity of that portion of the seat.

(b) Once engaged, the restraining device for a rearward facing seat shall not release or fail when a rearward longitudinal force equal to 8 times the weight of the hinged or folding portion of the seat is applied to the center of gravity of that portion of the seat.

S4.3.2.2 *Acceleration.* Once engaged, the restraining device shall not release or fail when the device is subjected to an acceleration of 20 g. in the longitudinal direction opposite to that in which the seat folds.

S4.4 *Labeling.* Seats not designated for occupancy while the vehicle is in motion shall be conspicuously labeled to that effect.

S5. *Test procedures.*

S5.1 Apply the forces specified in S4.2 (a) and S4.2(b) as follows:

S5.1.1 If the seat back and the seat bench are attached to the vehicle by the same attachments, secure a strut on each side of the seat from a point on the outside of the seat frame in the horizontal plane of the seat's center of gravity to a point on the frame as far forward as possible of the seat anchorages. Between the upper ends of the struts place a rigid cross-member, in front of the seat back frame for rearward loading and behind the seat back frame for forward loading. Apply the force specified by S4.2(a) or S4.2(b) horizontally through the rigid cross-member as shown in figure 1.

S5.1.2 If the seat back and the seat bench are attached to the vehicle by different attachments, attach to each component a fixture capable of transmitting a force to that component. Apply forces equal to 20 times the weight of the seat back horizontally through the center of gravity of the seat back, as shown in figure 2, and apply forces equal to 20 times the weight of the seat bench horizontally through the center of gravity of the seat bench, as shown in figure 3.

S5.2 Develop the moment specified in S4.2(d) as shown in figure 4.

S5.3 Apply the forces specified in S4.3.2.1 (a) and (b) to a hinged or folding seat as shown in figure 1 and to a hinged or folding seat back as shown in figure 5.

S5.4 Determine the center of gravity of a seat or seat component with all cushions and upholstery in place and with the head restraint in its fully extended design position.

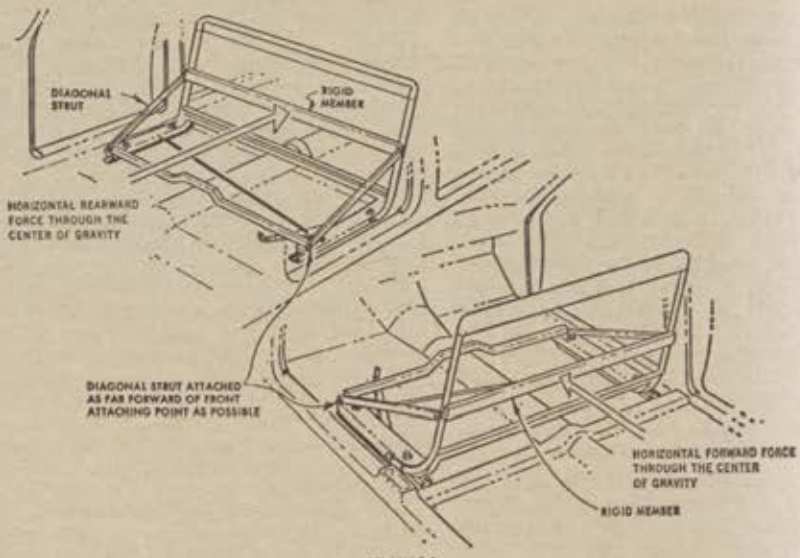



FIGURE 1

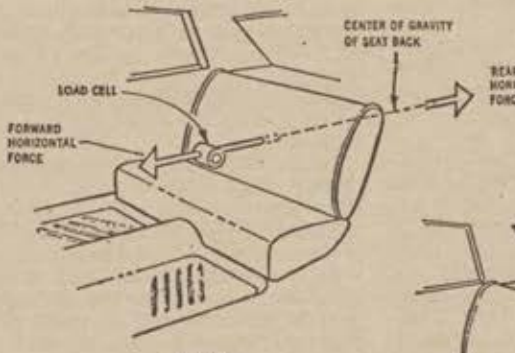



FIGURE 2

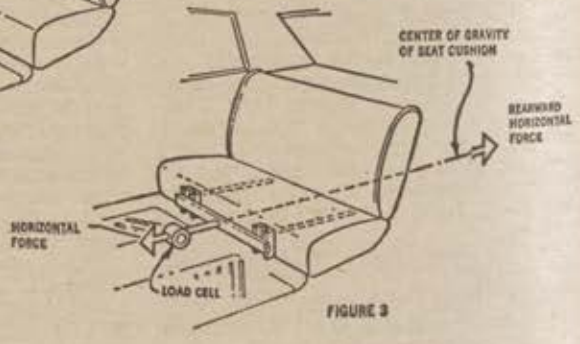



FIGURE 3

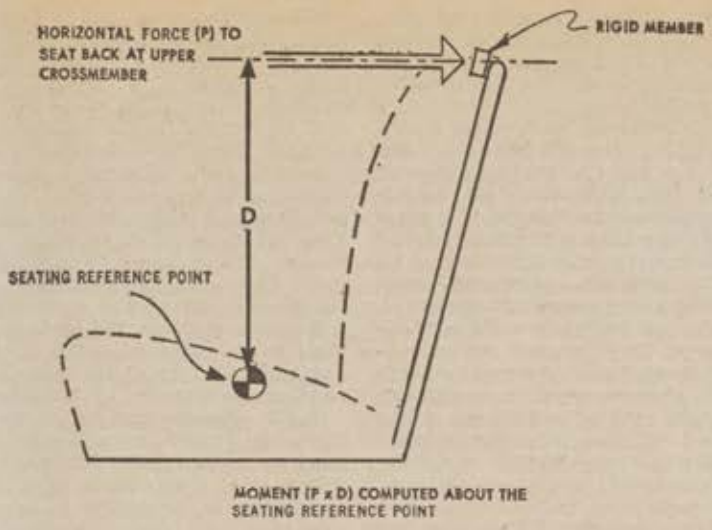



FIGURE 4

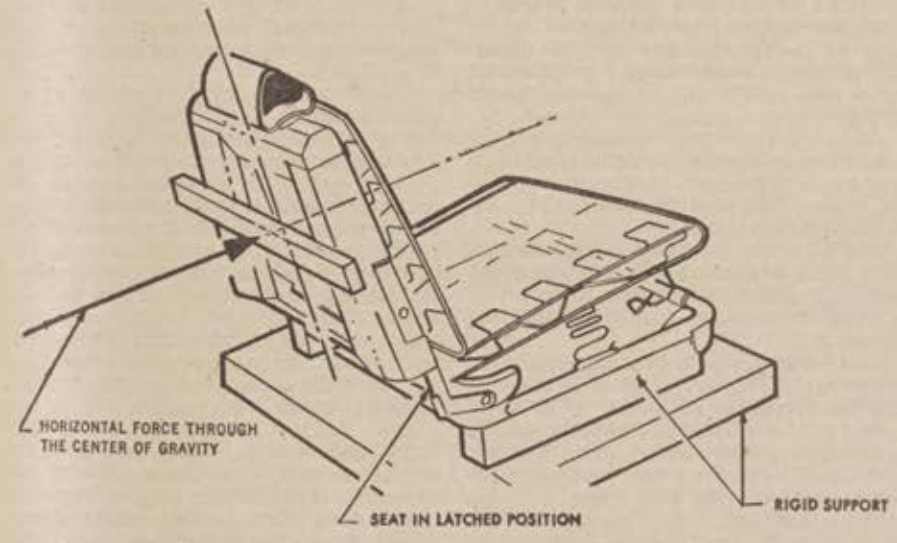



FIGURE 5

§ 571.208 **Standard No. 208; Occupant crash protection. (Effective Jan. 1, 1972)**

NOTE: The standard that appears below is a revision that is effective with respect to vehicles manufactured on or after January 1, 1972. The standard that is effective before that date appears at 32 F.R. 2415 Feb. 3, 1967 and 33 F.R. 19723, Dec. 25, 1968.

S1. *Scope.* This standard specifies performance requirements for the protection of vehicle occupants in crashes.

S2. *Purpose.* The purpose of this standard is to reduce the number of deaths of vehicle occupants, and the severity of injuries, by specifying vehicle crashworthiness requirements in terms of forces and accelerations measured on anthropomorphic dummies in test crashes, and by specifying equipment requirements for active and passive restraint systems.

S3. *Application.* This standard applies to passenger cars, multipurpose passenger vehicles, trucks, and buses.

S4. *General requirements.*

S4.1 *Passenger cars.*

S4.1.1 *Passenger cars manufactured from January 1, 1972, to August 14, 1973.* Each passenger car manufactured from January 1, 1972, to August 14, 1973, inclusive, shall meet the requirements of S4.1.1.1, S4.1.1.2, or S4.1.1.3. A protection system that meets the requirements of S4.1.1.1 or S4.1.1.2 may be installed at one or more designated seating positions of a vehicle that otherwise meets the requirements of S4.1.1.3.

S4.1.1.1 *First option—complete passive protection system.* The vehicle shall meet the crash protection requirements of S5 by means that require no action by vehicle occupants.

S4.1.1.2 *Second option—lap belt protection system with belt warning.* The vehicle shall—

(a) At each designated seating position have a Type 1 seat belt assembly or a Type 2 seat belt assembly with a detachable upper torso portion that conforms to § 571.209 and to S7.1 and S7.2 of this standard.

(b) At each front outboard designated seating position, have a seat belt warning system that conforms to S7.3; and

(c) Meet the frontal crash protection requirements of S5.1, in a perpendicular impact, with respect to anthropomorphic test devices in each front outboard designated seating position restrained only by Type 1 seat belt assemblies.

S4.1.1.3 *Third option—lap and shoulder belt protection system with belt warning.*

S4.1.1.3.1 Except for convertibles and open-body vehicles, the vehicle shall—

(a) At each front outboard designated seating position have a Type 2 seatbelt assembly that conforms to § 571.209 and S7.1 and S7.2 of this standard, with either an integral or detachable upper torso portion, and a seatbelt warning system that conforms to S7.3;

(b) At each designated seating position other than the front outboard positions, have a Type 1 or Type 2 seat belt assembly that conforms to § 571.209 and to S7.1 and S7.2 of this standard; and

(c) When it perpendicularly impacts a fixed collision barrier, while moving longitudinally forward at any speed up to and including 30 m.p.h., under the test conditions of S8.1 with anthropomorphic test devices at each front outboard position restrained by Type 2 seatbelt assemblies, experience no complete separation of any load-bearing element of a seatbelt assembly or anchorage.

S4.1.1.3.2 Convertibles and open-body type vehicles shall at each designated seating position have a Type 1 or Type 2 seatbelt assembly that conforms to § 571.209 and to S7.1 and S7.2 of this standard, and at each front outboard designated seating position have a seatbelt warning system that conforms to S7.3.

S4.1.2 *Passenger cars manufactured from August 15, 1973 to August 14, 1975.* Passenger cars manufactured from August 15, 1973, to August 14, 1975, inclusive, shall meet the requirements of S4.1.2.1 or S4.1.2.2. A protection system that meets the requirements of S4.1.2.1 may be installed at one or more designated seating positions of a vehicle that otherwise meets the requirements of S4.1.2.2.

S4.1.2.1 *First option—complete passive protection system.* The vehicle shall meet the crash protection requirements of S5 by means that require no action by vehicle occupants.

S4.1.2.2 *Second option—head-on passive protection system.* The vehicle shall—

(a) At each designated seating position, have a Type 1 seat belt assembly or

a Type 2 seat belt assembly with a detachable upper torso portion that conforms to § 571.209 and to S7.1 and S7.2 of this standard.

(b) At each front designated seating position, meet the frontal crash protection requirements of S5.1, in a perpendicular impact, by means that require no action by vehicle occupants;

(c) At each front designated seating position, meet the frontal crash protection requirements of S5.1, in a perpendicular impact, with a test device restrained by a Type 1 seatbelt assembly; and

(d) At each front outboard designated seating position, have a seatbelt warning system that conforms to S7.3.

S4.1.3 *Passenger cars manufactured on or after August 15, 1975.* Each passenger car manufactured on or after August 15, 1975, shall meet the occupant crash protection requirements of S5 by means that require no action by vehicle occupants.

S4.2 *Trucks and multipurpose passenger vehicles with GVWR of 10,000 pounds or less.*

S4.2.1 *Trucks and multipurpose passenger vehicles, with GVWR of 10,000 pounds or less, manufactured from January 1, 1972, to August 14, 1975.* Each truck and multipurpose passenger vehicle with a gross vehicle weight rating of 10,000 pounds or less, manufactured from January 1, 1972, to August 14, 1975, inclusive, shall meet the requirements of S4.2.1.1 or S4.2.1.2. A protection system that meets the requirements of S4.2.1.1 may be installed at one or more designated seating positions of a vehicle that otherwise meets the requirements of S4.2.1.2.

S4.2.1.1 *First option—complete passive protection system.* The vehicle shall meet the crash protection requirements of S5 by means that require no action by vehicle occupants.

S4.2.1.2 *Second option—belt system.* The vehicle shall have seat belt assemblies that conform to Standard 209 installed as follows:

(a) A Type 1 or Type 2 seat belt assembly shall be installed for each designated seating position in convertibles, open-body type vehicles, and walk-in van-type trucks.

(b) In all vehicles except those for which requirements are specified in S4.2.1.2(a), a Type 2 seat belt assembly shall be installed for each outboard designated seating position that includes the windshield header within the head impact area, and a Type 1 or Type 2 seat belt assembly shall be installed for each other designated seating position.

S4.2.2 *Trucks and multipurpose passenger vehicles, with GVWR of 10,000 pounds or less, manufactured from August 15, 1975, to August 14, 1977.* Each truck and multipurpose passenger vehicle, with a gross vehicle weight rating of 10,000 pounds or less, manufactured from August 15, 1975, to August 14, 1977, inclusive, shall meet the requirements of S4.1.2 (as specified for passenger cars), except that forward control vehicles, convertibles, open-body type vehicles, walk-in van-type trucks, motor homes, and vehicles carrying chassis-mount campers may instead meet the requirements of S4.2.1.2.

S4.2.3 *Trucks and multipurpose passenger vehicles, with GVWR of 10,000 pounds or less, manufactured on or after August 15, 1977.* Each truck and multipurpose passenger vehicle, with a gross vehicle weight rating of 10,000 pounds or less, manufactured on or after August 15, 1977, shall meet the occupant crash protection requirements of S5 by means that require no action by vehicle occupants, except that forward control vehicles may instead meet the requirements of S4.2.1.2, and convertibles, open-body vehicles, walk-in van-type trucks, motor homes, and vehicles carrying chassis-mount campers may instead meet the requirements of S4.1.2.2.

S4.3 *Trucks and multipurpose passenger vehicles, with GVWR of more than 10,000 pounds.* Each truck and multipurpose passenger vehicle, with a gross vehicle weight rating of more than 10,000 pounds, manufactured on or after January 1, 1972, shall meet the requirements of S4.3.1 or S4.3.2. A protection system that meets the requirements of S4.3.1 may be installed at one or more designated seating positions of a vehicle that otherwise meets the requirements of S4.3.2.

S4.3.1 *First option—complete passive protection system.* The vehicle shall meet the crash protecton requirements of S5 by means that require no action by vehicle occupants.

S4.3.2 *Second option—belt system.* The vehicle shall, at each designated seating position, have either a Type 1 or a Type 2 seat belt assembly that conforms to § 571.209.

S4.4 *Buses.* Each bus manufactured on or after January 1, 1972, shall meet the requirements of S4.4.1 or S4.4.2.

S4.4.1 *First option—complete passive protection system—driver only.* The vehicle shall meet the crash protection requirements of S5, with respect to an anthropomorphic test device in the driver's designated seating position, by means that require no action by vehicle occupants.

S4.4.2 *Second option—belt system—driver only.* The vehicle shall, at the driver's designated seating position, have either a Type 1 or a Type 2 seatbelt assembly that conforms to § 571.209.

S4.5 *Other general requirements.*

S4.5.1. *Labeling and driver's manual information.* Each vehicle shall have a label setting forth the manufacturer's recommended schedule, specified by month and year, for the maintenance or replacement, necessary to retain the performance required by this standard, of any crash-deployed occupant protection system. The label shall be permanently affixed to the vehicle within the passenger compartment and lettered in English in block capitals and numerals not less than three thirty-seconds of an inch high. Instructions concerning maintenance or replacement of the system and a description of the functional operation of the system shall be provided with each vehicle, with an appropriate reference on the label. If a vehicle owner's manual is provided, this information shall be included in the manual.

S4.5.2 *Readiness indicator.* An occupant protection system that deploys in the event of a crash shall have a monitoring system with a readiness indicator. The indicator shall monitor its own readiness and shall be clearly visible from the driver's designated seating position. A list of the elements of the system being monitored by the indicator shall be included with the information furnished in accordance with S4.5.1 but need not be included on the label.

S4.5.3 *Passive seat belt assemblies.* A Type 1 or Type 2 seat belt assembly that requires no action by vehicle occupants may be used under S4 to meet the crash protection requirements of any option that requires a seat belt assembly, and in place of a seat belt assembly required to conform to S7.2 and S7.3 of this standard, if:

(a) The seat belt assembly conforms to S7.1 of this standard; and

(b) The seat belt assembly conforms to the webbing, attachment hardware, and assembly performance requirements of § 571.209.

S5. *Occupant crash protection requirements.*

S5.1 *Frontal barrier crash.* When the vehicle, traveling longitudinally forward at any speed up to and including 30 m.p.h., impacts a fixed collision barrier that is perpendicular to the line of travel of the vehicle, or at any angle up to 30° in either direction from the perpendicular to the line of travel of the vehicle, under the applicable conditions of S8, with anthropomorphic test devices at each designated seating position except as otherwise prescribed in S4, it shall meet the injury criteria of S6.

S5.2 *Lateral moving barrier crash.* When the vehicle is impacted laterally on either side by a barrier moving at 20 m.p.h., with test devices at the outboard designated seating positions adjacent to the impacted side, under the applicable conditions of S8, it shall meet the injury criteria of S6.

S5.3 *Rollover.* When the vehicle is subjected to a rollover test in either lateral direction at 30 m.p.h. with test devices in the outboard designated seating positions on its lower side as mounted on the test platform, under the applicable conditions of S8, it shall meet the injury criteria of S6.1.

S.6 *Injury criteria.*

S6.1 All portions of the test device shall be contained within the outer surfaces of the vehicle passenger compartment throughout the test.

S6.2 The resultant acceleration at the center of gravity of the head shall not exceed a severity index of 1,000, calculated by the method described in SAE Information Report J885a, October 1966.

S6.3 The resultant accleration at the center of gravity of the upper thorax

shall not exceed 60g, except for intervals whose cumulative duration is not more than 3 milliseconds.

S6.4 The force transmitted axially through each upper leg shall not exceed 1,400 pounds.

S7.1 *Adjustment.*

S7.1.1 Except as specified in S7.1.1.1 and S7.1.1.2, the lap belt of any seat belt assembly furnished in accordance with S4.1.1 and S4.1.2 shall adjust by means of an emergency-locking or automatic-locking retractor that conforms to § 571.209 to fit persons whose dimensions range from those of a 50th-percentile 6-year-old child to those of a 95th-percentile adult male and the upper torso restraint shall adjust by means of an emergency-locking retractor or a manual adjusting device that conforms to § 571.209 to fit persons whose dimensions range from those of a 5th-percentile adult female to those of a 95th-percentile adult male, with the seat in any position and the seat back in the manufacturer's nominal design riding position.

S7.1.1.1 A seat belt assembly installed at the driver's seating position shall adjust to fit persons whose dimensions range from those of a 5th-percentile adult female to those of a 95th-percentile adult male.

S7.1.1.2 A seat belt assembly installed at any designated seating position other than the outboard positions of the front and second seats shall adjust either by a retractor as specified in S7.1.1 or by a manual adjusting device that conforms to § 571.209.

S7.1.2 The intersection of the upper torso belt with the lap belt in any Type 2 seat belt assembly furnished in accordance with S4.1.1 or S4.1.2, with the upper torso manual adjusting device, if provided, adjusted in accordance with the manufacturer's instructions, shall be at least 6 inches from the front vertical centerline of a 50th-percentile adult male occupant, measured along the centerline of the lap belt, with the seat in its rearmost and lowest adjustable position and with the seat back in the manufacturer's nominal design riding position.

S7.2 *Latch mechanism.* A seat belt assembly installed in a passenger car shall have a latch mechanism—

(a) Whose components are accessible to a seated occupant in both the stowed and operational positions;

(b) That releases both the upper torso restraint and the lap belt simultaneously, if the assembly has an upper torso restraint that requires unlatching for release of the occupant; and

(c) That releases at a single point by a pushbutton action.

S7.3 *Seat belt warning system.*

S7.3.1 Seat belt assemblies provided at the front outboard seating positions in accordance with S4.1.1 or S4.1.2 shall have a warning system that activates, for at least 1 minute, a continuous or intermittent audible signal and continuous or flashing warning light, visible to the driver, displaying the words "Fasten Seat Belts" or "Fasten Belts" when condition (a) exists simultaneously with either of conditions (b) or (c).

(a) The vehicle ignition switch is in the "on" position and the transmission gear selector is in any forward position.

(b) The driver's lap belt is not extended at least 4 inches from its normally stowed position.

(c) A person of at least the weight of a 50th-percentile 6-year-old child is seated in the right front designated seating position and the lap belt for that position is not extended at least 4 inches from its normally stowed position.

S7.3.2 The warning system shall either—

(a) Not activate when the lap belt at each occupied front outboard seating position is extended to any length greater than the length necessary to fit a 50th-percentile 6-year-old child when the seat is in the rearmost and lowest adjustment position; or

(b) Not activate when the lap belt at each occupied front outboard position is buckled.

S7.3.3 The warning system shall not activate if the vehicle has an automatic transmission and the gear selector is in the "Park" position.

S7.3.4 Notwithstanding the provisions of S7.3.1, the warning system on a vehicle that has a manual transmission shall either—

(a) Not activate when the transmission is in neutral; or

(b) Not activate when the parking brake is engaged.

S8. *Test conditions.*

S8.1 *General conditions.* The following conditions apply to the frontal, lateral, and rollover tests.

S8.1.1 The vehicle, including test devices and instrumentation, is loaded as follows:

(a) *Passenger cars.* A passenger car is loaded to its unloaded vehicle weight plus its rated cargo and luggage capacity weight, secured in the luggage area, plus the weight of the necessary anthropomorphic test devices.

S8.1.1(b) *Multipurpose passenger vehicles, trucks, and buses.* A multipurpose passenger vehicle, truck, or bus is loaded to its unloaded vehicle weight plus 300 pounds or its rated cargo and luggage capacity weight, whichever is less, secured in the load carrying area and distributed as nearly as possible in proportion to its gross axle weight ratings, plus the weight of the necessary anthropomorphic test devices.

S8.1.2 Adjustable seats are in the adjustment position midway between the forwardmost and rearmost positions, and if separately adjustable in a vertical direction, are at the lowest position.

S8.1.3 Adjustable seat backs are in the manufacturer's nominal design riding position.

S8.1.4 Adjustable steering controls are adjusted so that the steering wheel hub is at the geometric center of the locus it describes when it is moved through its full range of driving positions.

S8.1.5 Movable vehicle windows and vents are in the fully closed position.

S8.1.6 Convertibles and open-body type vehicles have the top, if any, in place in the closed passenger compartment configuration.

S8.1.7 Doors are fully closed and latched but not locked.

S8.1.8 Anthropomorphic test devices conform to the requirements of SAE Recommended Practice J963, June 1968, and have a pelvic structure that conforms to Figure 1. The weights, dimensions and centers of gravity specified in SAE J963 for the test device segments are determined with all instrumentation in place.

S8.1.9 Each test device is clothed in form-fitting cotton stretch garments.

S8.1.10 Limb joints are set at 1g, barely restraining the weight of the limb when extended horizontally. Leg joints are adjusted with the torso in the supine position. Articulated head, neck, and torso joints do not move at a horizontal acceleration load of 1g, in the test position, but move at a horizontal acceleration load of 2g.

S8.1.11 Each test device is firmly placed in a designated seating position in the following manner.

(a) The head is aligned by placing the test device on its back on a rigid, level surface and by adjusting the head so that it touches the level surface and is laterally centered with respect to the device's axis of symmetry.

(b) The test device is placed in the vehicle in the normal upright sitting posture, and a rigid roller, 6 inches in diameter and 24 inches long, is placed transversely as low as possible against the front of the torso.

(c) The roller is pressed horizontally against the torso with a force of 50 pounds.

(d) Force is applied at the shoulder level to bend the torso forward over the roller, flexing the lower back, and to return the test device to the upright sitting posture.

(e) The roller is slowly released.

S8.1.12 Except as otherwise herein specified, the test devices are not restrained during impacts by any means that require occupant action.

S8.1.13 The hands of the test device in the driver's designated seating position are on the steering wheel rim at the horizontal centerline. The right foot rests on the undepressed accelerator pedal, with the heel in contact with the point where the centerline of the upper surface of the undepressed accelerator pedal intersects the upper surface of the floor covering. The left leg is placed as in S8.1.14.

S8.1.14 The hands of each other test device are resting on the seat with the palms touching the legs, and the upper arms are resting against the seat back and flush with the body. Where possible, the legs are outstretched, with the thighs on the seat and the heels touching the floor with the foot at 90° to the tibia. Otherwise, the tibia are vertical with the feet resting on the floor. The left leg of a test device in the center front designated seating position is on the vehicle centerline, and the right leg is in the

right footwell. The left and right legs of a test device in the center rear designated seating position are in the left and right footwells, respectively.

S8.1.15 A load sensing device is installed in each upper leg, 4.25 inches from the knee's axis of rotation, so that all force transmitted from the knee to the upper leg is measured.

S8.1.16 Acceleration sensing devices are installed in each test device to measure orthogonal accelerations at the centers of gravity of the head and upper thorax.

S8.1.17 The output of acceleration and load sensing devices is recorded in individual data channels that conform to the requirements of SAE Recommended Practice J211, October 1970, with channel classes as follows:

(a) Head acceleration—1,000 Hz.

(b) Upper thorax acceleration—180 Hz.

(c) Upper leg force—600 Hz.

S8.1.18 The sensing devices are rigidly attached to the test devices by mountings that have no resonance frequency within the frequency-range of the specified channel class.

S8.1.19 Instrumentation does not affect the motion of test devices during impact or rollover.

S8.2 *Lateral moving barrier crash test conditions.* The following conditions apply to the lateral moving barrier crash test.

S8.2.1 The moving barrier, including the impact surface, supporting structure, and carriage, weighs 4,000 pounds.

S8.2.2 The impact surface of the barrier is a vertical, rigid, flat rectangle, 78 inches wide and 60 inches high, perpendicular to its direction of movement, with its lower edge horizontal and 5 inches above the ground surface.

S8.2.3 During the entire impact sequence the barrier undergoes no significant amount of dynamic or static deformation, and absorbs no significant portion of the energy resulting from the impact, except for energy that results in translational rebound movement of the barrier.

S8.2.4 During the entire impact sequence the barrier is guided so that it travels in a straight line, with no significant lateral, vertical or rotational movement.

S8.2.5 The concrete surface upon which the vehicle is tested is level, rigid and of uniform construction, with a skid number of 75 when measured in accordance with American Society for Testing and Materials Method E–274–65T at 40 m.p.h., omitting water delivery as specified in paragraph 7.1 of that method.

S8.2.6 The tested vehicle's brakes are disengaged and the transmission is in neutral.

S8.2.7 The barrier and the test vehicle are positioned so that at impact—

(a) The vehicle is at rest in its normal attitude;

(b) The barrier is traveling in a direction perpendicular to the longitudinal axis of the vehicle at 20 m.p.h.; and

(c) A vertical plane through the geometric center of the barrier impact surface and perpendicular to that surface passes through the driver's seating reference point in the tested vehicle.

S8.3 *Rollover test conditions.* The following conditions apply to the rollover test.

S8.3.1 The tested vehicle's brakes are disengaged and the transmission is in neutral.

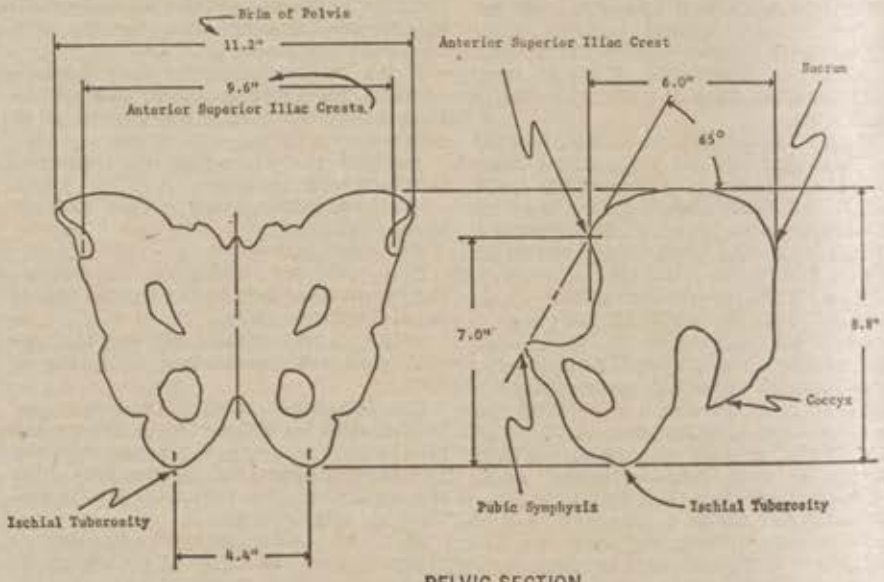
S8.3.2 The concrete surface on which the test is conducted is level, rigid, of uniform construction, and of a sufficient size that the vehicle remains on it throughout the entire rollover cycle. It has a skid number of 75 when measured in accordance with American Society of Testing and Materials Method E–274–65T at 40 m.p.h. omitting water delivery as specified in paragraph 7.1 of that method.

S8.3.3 The vehicle is placed on a device, similar to that illustrated in Figure 2, having a platform in the form of a flat, rigid plane at an angle of 23° from the horizontal. At the lower edge of the platform is an unyielding flange, perpendicular to the platform with a height of 4 inches and a length sufficient to hold in place the tires that rest against it. The intersection of the inner face of the flange with the upper face of the platform is 9 inches above the rollover surface. No other restraints are used to hold the vehicle in position during the deceleration of the platform and the departure of the vehicle.

S8.3.4 With the vehicle on the test platform, the test devices remain as nearly as possible in the posture specified in S8.1.

S8.3.5 Before the deceleration pulse, the platform is moving horizontally, and perpendicularly to the longitudinal axis of the vehicle, at a constant speed of 30 m.p.h. for a sufficient period of time for the vehicle to become motionless relative to the platform.

S8.3.6 The platform is decelerated from 30 to 0 m.p.h. in a distance of not more than 3 feet, without change of direction and without transverse or rotational movement during the deceleration of the platform and the departure of the vehicle. The deceleration rate is at least 20g for a minimum of 0.04 seconds.




PELVIC SECTION

50TH PERCENTILE MALE ANTHROPOMORPHIC TEST DEVICE

FIGURE I

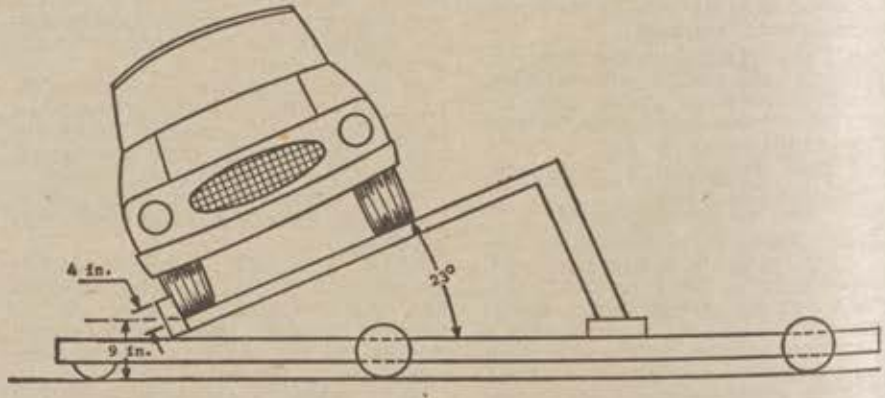



FIGURE 2 - TYPICAL DEVICE FOR ROLLOVER TEST

NOTE: The concept of an occupant protection system that requires "no action by vehicle occupants" as used in Standard No. 208 is intended to designate a system that requires no action other than would be required if the protective system were not present in the vehicle. Under this interpretation the concept does not include "forced action" systems as described above.

This interpretation is not intended to rule out the possibility that further rulemaking action may be taken in the future to permit such systems in certain cases.

§ 571.209 Standard No. 209; Seat belt assemblies.

S1. *Purpose and Scope.* This standard specifies requirements for seat belt assemblies.

S2. *Application.* This standard applies to seat belt assemblies for use in passenger cars, multipurpose passenger vehicles, trucks, and buses.

S3. *Definitions.* "Seat belt assembly" means any strap, webbing, or similar device designed to secure a person in a motor vehicle in order to mitigate the results of any accident, including all necessary buckles and other fasteners, and all hardware designed for installing such seat belt assembly in a motor vehicle.

"Pelvic restraint" means a seat belt assembly or portion thereof intended to restrain movement of the pelvis.

"Upper torso restraint" means a portion of a seat belt assembly intended to restrain movement of the chest and shoulder regions.

"Hardware" means any metal or rigid plastic part of a seat belt assembly.

"Buckle" means a quick release connector which fastens a person in a seat belt assembly.

"Attachment hardware" means any or all hardware designed for securing the webbing of a seat belt assembly to a motor vehicle.

"Adjustment hardware" means any or all hardware designed for adjusting the size of a seat belt assembly to fit the user, including such hardware that may be integral with a buckle, attachment hardware, or retractor.

"Retractor" means a device for storing part or all of the webbing in a seat belt assembly.

"Nonlocking retractor" means a retractor from which the webbing is extended to essentially its full length by a small external force, which provides no adjustment for assembly length, and which may or may not be capable of sustaining restraint forces at maximum webbing extension.

"Automatic-locking retractor" means a retractor incorporating adjustment hardware by means of a positive self-locking mechanism which is capable when locked of withstanding restraint forces.

"Emergency-locking retractor" means a retractor incorporating adjustment hardware by means of a locking mechanism that is activated by vehicle acceleration, webbing movement relative to the vehicle, or other automatic action during an emergency and is capable when locked of withstanding restraint forces.

"Seat back retainer" means the portion of some seat belt assemblies designed to restrict forward movement of a seat back.

"Webbing" means a narrow fabric woven with continuous filling yarns and finished selvages.

"Strap" means a narrow nonwoven material used in a seat belt assembly in place of webbing.

"Type 1 seat belt assembly" is a lap belt for pelvic restraint.

"Type 2 seat belt assembly" is a combination of pelvic and upper torso restraints.

"Type 2a shoulder belt" is an upper torso restraint for use only in conjunction with a lap belt as a Type 2 seat belt assembly.

"Type 3 seat belt assembly" is a combination pelvic and upper torso restraint for persons weighing not more than 50 pounds or 23 kilograms and capable of sitting upright by themselves, that is children in the approximate age range of 8 months to 6 years.

S4 *Requirements.*

S4.1 (a) *Single occupancy.* A seat belt assembly shall be designed for use by one, and only one, person at any one time.

(b) *Pelvic restraint.* A seat belt assembly shall provide pelvic restraint whether or not upper torso restraint is provided, and the pelvic restraint shall be designed to remain on the pelvis under all conditions, including collision or rollover of the motor vehicle. Pelvic restraint of a Type 2 seat belt assembly that can be used without upper torso restraint shall comply with requirement for Type 1 seat belt assembly in S4.1 to S4.4.

(c) *Upper torso restraint.* A Type 2 or type 3 seat belt assembly shall provide upper torso restraint without shifting the pelvic restraint into the abdominal region. An upper torso restraint shall be designed to minimize vertical forces on the shoulders and spine. Hardware for upper torso restraint shall be so designed and located in the seat belt assembly that the possibility of injury to the occupant is minimized.

A Type 2a shoulder belt shall comply with applicable requirements for a Type 2 seat belt assembly in S4.1 to S4.4, inclusive.

(d) *Hardware.* All hardware parts which contact under normal usage a person, clothing, or webbing shall be free from burrs and sharp edges.

(e) *Release.* A Type 1 or Type 2 seat belt assembly shall be provided with a buckle or buckles readily accessible to the occupant to permit his easy and rapid removal from the assembly. A Type 3 seat belt assembly shall be provided with a quickly recognizable and easily operated release arrangement, readily accessible to an adult. Buckle release mechanism shall be designed to minimize the possibility of accidental release. A buckle with release mechanism in the latched position shall have only one opening in which the tongue can be inserted on the end of the buckle designed to receive and latch the tongue.

(f) *Attachment hardware.* A seat belt assembly shall include all hardware necessary for installation in a motor vehicle in accordance with SAE Recommended Practice J800B, Motor Vehicle Seat Belt Installations, September 1965. However, seat belt assemblies designed for installation in motor vehicles equipped with seat belt assembly anchorages that do not require anchorage nuts, plates, or washers, need not have such hardware, but shall have 7/16–20 UNF–2A or 1/2–13UNC–2A attachment bolts or equivalent hardware. The hardware shall be designed to prevent attachment bolts and other parts from becoming disengaged from the vehicle while in service. Reinforcing plates or washers furnished for universal floor installations shall be of steel, free from burrs and sharp edges on the peripheral edges adjacent to the vehicle, at least 0.06 inch in thickness and at least 4 square inches in projected area. The distance between any edge of the plate and the edge of the bolt hole shall be at least 0.6 inch. Any corner shall be rounded to a radius of not less than 0.25 inch or cut so that no corner angle is less than 135° and no side is less than 0.25 inch in length.

(g) *Adjustment.* (1) A Type 1 or Type 2 seat belt assembly shall be capable of adjustment to fit occupants whose dimensions and weight range from those of a 5th-percentile adult female to those of a 95th-percentile adult male. The seat belt assembly shall have either an automatic-locking retractor, an emergency-locking retractor, or an adjusting device that is within the reach of the occupant. A Type 3 seat belt assembly shall be capable of adjustment to fit any child capable of sitting upright and weighing not more than 50 pounds, unless it is specifically labeled for use on a child in a smaller weight range.

(2) A Type 1 or Type 2 seat belt assembly for use in a vehicle having seats that are adjustable shall conform to the requirements of S4.1(g)(1) regardless of seat position. However, if a seat has a back that is separately adjustable, the requirements of S4.1(g)(1) need be met only with the seat back in the manufacturer's nominal design riding position.

(3) The adult occupants referred to in S4.1(g)(1) shall have the following measurements:

| | 5th-percentile adult female | 95th-percentile adult male |
|---|---|---|
| Weight | 102 pounds | 215 pounds. |
| Erect sitting height | 30.9 inches | 38 inches. |
| Hip breadth (sitting) | 12.8 inches | 16.4 inches. |
| Hip circumference (sitting) | 36.4 inches | 47.2 inches. |
| Waist circumference (sitting) | 23.6 inches | 42.5 inches. |
| Chest depth | 7.5 inches | 10.5 inches. |
| Chest circumference: (nipple) | 30.5 inches | 44.5 inches. |
| (upper) | 29.8 inches | |
| (lower) | 26.6 inches | |

(h) *Seat back retainer.* A Type 3 seat belt assembly designed for attachment to a seat back or for use in a seat with a hinged back shall include a seat back retainer unless such assembly is designed

and labeled for use in specific models of motor vehicles in which the vehicle manufacturer has provided other adequate restraint for the seat back.

(i) *Webbing.* The ends of webbing in a seat belt assembly shall be protected or treated to prevent raveling. The end of webbing in a seat belt assembly having a metal-to-metal buckle that is used by the occupant to adjust the size of the assembly shall not pull out of the adjustment hardware at maximum size adjustment. Provision shall be made for essentially unimpeded movement of webbing routed between a seat back and seat cushion and attached to a retractor located behind the seat.

(j) *Strap.* A strap used in a seat belt assembly to sustain restraint forces shall comply with the requirements for webbing in S4.2, and if the strap is made from a rigid material, it shall comply with applicable requirements in S4.2, S4.3, and S4.4.

(k) *Marking.* Each seat belt assembly shall be permanently and legibly marked or labeled with year of manufacture, model, and name or trademark of manufacturer or distributor, or of importer if manufactured outside the United States. A model shall consist of a single combination of webbing having a specific type of fiber weave and construction, and hardware having a specific design. Webbings of various colors may be included under the same model, but webbing of each color shall comply with the requirements for webbing in S4.2.

(l) *Installation instructions.* A seat belt assembly or retractor shall be accompanied by an instruction sheet providing sufficient information for installing the assembly in a motor vehicle except for a seat belt assembly installed in a motor vehicle by an automobile manufacturer. The installation instructions shall state whether the assembly is for universal installation or for installation only in specifically stated motor vehicles, and shall include at least those items in SAE Recommended Practice, Motor Vehicle Seat Belt Installations—SAE J800b, published by the Society of Automotive Engineers.

(m) *Usage and maintenance instructions.* A seat belt assembly or retractor shall be accompanied by written instructions for the proper use of the assembly, stressing particularly the importance of wearing the assembly snugly and properly located on the body, and on the maintenance of the assembly and periodic inspection of all components. The instructions shall show the proper manner of threading webbing in the hardware of seat belt assemblies in which the webbing is not permanently fastened. Instructions for a nonlocking retractor shall include a caution that the webbing must be fully extended from the retractor during use of the seat belt assembly unless the retractor is attached to the free end of webbing which is not subjected to any tension during restraint of an occupant by the assembly. Instructions for Type 2a shoulder belt shall include a warning that the shoulder belt is not to be used without a lap belt.

(n) *Workmanship.* Seat belt assemblies shall have good workmanship in accordance with good commercial practice.

S4.2 *Requirements for webbing.*

(a) *Width.* The webbing in a seat belt assembly shall be not less in width than the followings dimensions when measured under conditions prescribed in S5.1(a): Type 1 seat belt assembly—1.8 inches or 46 millimeters; Type 2 seat belt assembly—1.8 inches or 46 millimeters; Type 3 seat belt assembly—0.9 inch or 23 millimeters.

(b) *Breaking strength.* The webbing in a seat belt assembly shall have not less than the following breaking strength when tested by the procedures specified in S5.1(b): Type 1 seat belt assembly—6,000 pounds or 2,720 kilograms; Type 2 seat belt assembly—5,000 pounds or 2,270 kilograms for webbing in pelvic restraint and 4,000 pounds or 1,810 kilograms for webbing in upper torso restraint; Type 3 seat belt assembly—1,500 pounds or 680 kilograms for webbing in pelvic and upper torso restraints, 4,000 pounds or 1,810 kilograms for webbing in seat back retainer and for webbing connecting pelvic and upper torso restraints to attachment hardware when assembly has single webbing connection, or 3,000 pounds or 1,360 kilograms for webbing connecting pelvic and upper torso restraint to attachment hardware when assembly has two or more webbing connections.

(c) *Elongation.* The webbing in a seat belt assembly shall not extend to more than the following elongations when subjected to the specified forces in accordance with the procedure specified in S5.1(c): Type 1 seat belt assembly—20 percent at 2,500 pounds or 1,130 kilograms; Type 2 seat belt assembly—30 percent at 2,500 pounds or 1,130 kilograms for webbing in pelvic restraint and 40 percent at 2,500 pounds or 1,130 kilograms for webbing in upper torso restraint; Type 3 seat belt assembly—20 percent at 700 pounds or 320 kilograms for webbing in pelvic and upper torso restraints, and 25 percent at 2,500 pounds or 1,130 kilograms for webbing in seat back retainer and for webbing connecting pelvic and upper torso restraints to attachment hardware when assembly has single webbing connection, or 25 percent at 1,800 pounds or 820 kilograms for webbing connecting pelvic and upper torso restraints to attachment hardware when assembly has two or more webbing connections.

(d) *Resistance to abrasion.* The webbing of a seatbelt assembly, after being subjected to abrasion as specified in either S5.1(d) or S5.3(d), shall have a breaking strength of not less than 75 percent of the breaking strength listed in S4.2(b) for that type of belt assembly.

(e) *Resistance to light.* The webbing in a seat belt assembly after exposure to the light of a carbon arc and tested by the procedure specified in S5.1(e) shall have a breaking strength not less than 60 percent of the strength before exposure to the carbon arc and shall have a color retention not less than No. 2 on the Geometric Gray Scale published by the American Association of Textile Chemists and Colorists, Post Office Box 886, Durham, N.C.

(f) *Resistance to micro-organisms.* The webbing in a seat belt assembly after being subjected to micro-organisms and tested by the procedures specified in S5.1(f) shall have a breaking strength not less than 85 percent of the strength before subjection to micro-organisms.

(g) *Colorfastness to crocking.* The webbing in a seat belt assembly shall not transfer color to a crock cloth either wet or dry to a greater degree than Class 3 on the AATCC Chart for Measuring Transference of Color published by the American Association of Textile Chemists and Colorists, when tested by the procedure specified in S5.1(g).

(h) *Colorfastness to staining.* The webbing in a seat belt assembly shall not stain to a greater degree than Class 3 on the AATCC Chart for Measuring Transference of Color published by the American Association of Textile Chemists and Colorists, when tested by the procedure specified in S5.1(h).

S4.3 *Requirements for hardware.*

(a) *Corrosion resistance.* (1) Attachment hardware of a seat belt assembly after being subjected to the conditions specified in S5.2(a) shall be free of ferrous corrosion on significant surfaces except for permissible ferrous corrosion at peripheral edges or edges of holes on underfloor reinforcing plates and washers. Alternatively, such hardware at or near the floor shall be protected against corrosion by at least a Type KS electrodeposited coating of nickel, or copper and nickel, and other attachment hardware shall be protected by a Type QS electrodeposited coating of nickel or copper and nickel, in accordance with Tentative Specifications for Electrodeposited Coatings of Nickel and Chromium on Steel, ASTM Designation: A166–61T, published by the American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pa. 19103, but such hardware shall not be racked for electroplating in locations subjected to maximum stresses.

(2) Surfaces of buckles, retractors and metallic parts, other than attachment hardware, of a seat belt assembly after subjection to the conditions specified in S5.2(a) shall be free of ferrous or nonferrous corrosion which may be transferred, either directly or by means of the webbing, to the occupant or his clothing when the assembly is worn. After test, buckles shall conform to applicable requirements in paragraphs (d) to (g) of this section.

(b) *Temperature resistance.* Plastic or other nonmetallic hardware parts of a seat belt assembly when subjected to the conditions specified in S5.2(b) shall not warp or otherwise deteriorate to cause the assembly to operate improperly or fail to comply with applicable requirements in this section and S4.4.

(c) *Attachment hardware.* (1) Eye bolts, shoulder bolts, or other bolts used to secure the pelvic restraint of a seat belt assembly to a motor vehicle shall

withstand a force of 9,000 pounds or 4,080 kilograms when tested by the procedure specified in S5.2(c)(1), except that attachment bolts of a seat belt assembly designed for installation in specific models of motor vehicles in which the ends of two or more seat belt assemblies can not be attached to the vehicle by a single bolt shall have a breaking strength of not less than 5,000 pounds or 2,270 kilograms.

(2) Other attachment hardware designed to receive the ends of two seat belt assemblies shall withstand a tensile force of at least 6,000 pounds or 2,720 kilograms without fracture of any section when tested by the procedure specified in S5.2(c)(2).

(3) A seat belt assembly having single attachment hooks of the quick-disconnect type for connecting webbing to an eye bolt shall be provided with a retaining latch or keeper which shall not move more than 0.08 inch or 2 millimeters in either the vertical or horizontal direction when tested by the procedure specified in S5.2(c)(3).

(d) *Buckle release.* (1) The buckle of a Type 1 or Type 2 seat belt assembly shall release when a force of not more than 30 pounds or 14 kilograms is applied, and the buckle of a Type 3 seat belt assembly shall release when a force of not more than 20 pounds or 9 kilograms is applied as prescribed in S5.2.

(2) A buckle designed for pushbutton application of buckle release force shall have a minimum area of 0.7 square inch or 4.5 square centimeters with a minimum linear dimension of 0.4 inch or 10 millimeters for applying the release force, or a buckle designed for lever application of buckle release force shall permit the insertion of a cylinder 0.4 inch or 10 millimeters in diameter and 1.5 inches or 38 millimeters in length to at least the midpoint of the cylinder along the cylinder's entire length in the actuation portion of the buckle release. A buckle having other design for release shall have adequate access for two or more fingers to actuate release.

(3) The buckle of a Type 1 or Type 2 seat belt assembly shall not release under a compressive force of 400 pounds applied as prescribed in paragraph S5.2(d)(3). The buckle shall be operable and shall meet the applicable requirements of paragraph S4.4 after the compressive force has been removed.

(e) *Adjustment force.* The force required to decrease the size of a seat belt assembly shall not exceed 11 pounds or 5 kilograms when measured by the procedure specified in S5.2(e).

(f) *Tilt-lock adjustment.* The buckle of a seat belt assembly having tilt-lock adjustment shall lock the webbing when tested by the procedure specified in S5.2(f) at an angle of not less than 30 degrees between the base of the buckle and the anchor webbing.

(g) *Buckle latch.* The buckle latch of a seat belt assembly when tested by the procedure specified in S5.2(g) shall not fail, nor gall or wear to an extent that normal latching and unlatching is impaired, and a metal-to-metal buckle shall separate when in any position of partial engagement by a force of not more than 5 pounds or 2.3 kilograms.

(h) *Nonlocking retractor.* The webbing of a seat belt assembly shall extend from a nonlocking retractor within 0.25 inch or 6 millimeters of maximum length when a tension is applied as prescribed in S5.2(h). A nonlocking retractor on upper-torso restraint shall be attached to the nonadjustable end of the assembly, the reel of the retractor shall be easily visible to an occupant while wearing the assembly, and the maximum retraction force shall not exceed 1.1 pounds or 0.5 kilogram in any strap or webbing that contacts the shoulder when measured by the procedure specified in S5.2(h), unless the retractor is attached to the free end of webbing which is not subjected to any tension during restraint of an occupant by the assembly.

(i) *Automatic-locking retractor.* The webbing of a seat belt assembly equipped with an automatic locking retractor, when tested by the procedure specified in S5.2(i), shall not move more than 1 inch or 25 millimeters between locking positions of the retractor, and shall be retracted with a force under zero acceleration of not less than 0.6 pound or 0.27 kilogram when attached to pelvic restraint, and not less than 0.45 pound or 0.2 kilogram nor more than 1.1 pounds or 0.5 kilogram in any strap or webbing that contacts the shoulders of an occupant when the retractor is attached to upper torso restraint. An automatic locking retractor attached to upper torso restraint shall not increase the restraint on the occupant of the seat belt assembly during use in a vehicle traveling over rough roads as prescribed in S5.2(i).

(j) *Emergency-locking retractor.* An emergency-locking retractor of a Type 1 or Type 2 seat belt assembly, when tested in accordance with the procedures specified in paragraph S5.2(j)—

(i) Shall lock before the webbing extends 1 inch when the retractor is subjected to an acceleration of 0.7g;

(ii) Shall not lock before the webbing extends 2 inches when the retractor is subjected to an acceleration of 0.3 g. or less;

(iii) shall exert a retractive force of at least 1.5 pounds under zero acceleration when attached only to the pelvic restraint;

(iv) Shall exert a retractive force of not less than 0.45 pound and not more than 1.1 pounds under zero acceleration upon any strap or webbing that contacts the shoulder when the retractor is attached only to an upper torso restraint; and

(v) Shall exert a retractive force of not less than 0.45 pound and not more than 1.5 pounds under zero acceleration when attached to a strap or webbing that restrains both the upper torso and the pelvis.

(k) *Performance of retractor.* A retractor used on a seat belt assembly after subjection to the tests specified in S5.2(k) shall comply with applicable requirements in paragraphs (h) to (j) of this section and S4.4, except that the retraction force shall be not less than 50 percent of its original retraction force.

S4.4 Requirements for assembly performance.

(a) *Type 1 seat belt assembly.* The complete seat belt assembly including webbing, straps, buckles, adjustment and attachment hardware, and retractors shall comply with the following requirements when tested by the procedures specified in S5.3(a):

(1) The assembly loop shall withstand a force of not less than 5,000 pounds or 2,270 kilograms; that is, each structural component of the assembly shall withstand a force or not less than 2,500 pounds or 1,130 kilograms.

(2) The assembly loop shall extend not more than 7 inches or 18 centimeters when subjected to a force of 5,000 pounds or 2,270 kilograms; that is, the length of the assembly between anchorages shall not increase more than 14 inches or 36 centimeters.

(3) Any webbing cut by the hardware during test shall have a breaking strength at the cut of not less than 4,200 pounds or 1,910 kilograms.

(4) Complete fracture through any solid section of metal attachment hardware shall not occur during test.

(b) *Type 2 seat belt assembly.* The components of a Type 2 seat belt assembly including webbing, straps, buckles, adjustment and attachment hardware, and retractors shall comply with the following requirements when tested by the procedure specified in S5.3(b):

(1) The structural components in the pelvic restraint shall withstand a force of not less than 2,500 pounds or 1,130 kilograms.

(2) The structural components in the upper torso restraint shall withstand a force of not less than 1,500 pounds or 680 kilograms.

(3) The structural components in the assembly that are common to pelvic and upper torso restraints shall withstand a force of not less than 3,000 pounds or 1,360 kilograms.

(4) The length of the pelvic restraint between anchorages shall not increase more than 20 inches or 50 centimeters when subjected to a force of 2,500 pounds or 1,130 kilograms.

(5) The length of the upper torso restraint between anchorages shall not increase more than 20 inches or 50 centimeters when subjected to a force of 1,500 pounds or 680 kilograms.

(6) Any webbing cut by the hardware during test shall have a breaking strength of not less than 3,500 pounds or 1,590 kilograms at a cut in webbing of the pelvic restraint, or not less than 2,800 pounds or 1,270 kilograms at a cut in webbing of the upper torso restraint.

(7) Complete fracture through any solid section of metal attachment hardware shall not occur during test.

(c) *Type 3 seat belt assembly.* The complete seat belt assembly including webbing, straps, buckles, adjustment and attachment hardware, and retractors shall comply with the following requirements when tested by the procedures specified in S5.3(c):

(1) The complete assembly shall withstand a force of 2,000 pounds or 900 kilograms.

(2) The complete assembly shall extend not more than 12 inches or 30 centimeters when subjected to a force of 2,000 pounds or 900 kilograms.

(3) Any webbing cut by the hardware during test shall have a breaking strength of not less than 1,050 pounds or 480 kilograms at a cut in webbing of pelvic or upper torso restraints, or not less than 2,800 pounds or 1,270 kilograms at a cut in webbing of seat back retainer or in webbing connecting pelvic and upper torso restraint at attachment hardware.

(4) Complete fracture through any solid section of metal attachment hardware shall not occur during test.

S5 *Demonstration Procedures.*

S5.1 *Webbing.* (a) *Width.* The width of webbing from three seat belt assemblies shall be measured after conditioning for at least 24 hours in an atmosphere having relative humidity between 48 and 67 percent and a temperature of 23°± 2° C. or 73.4±3.6° F. The tension during measurement of width shall be not more than 5 pounds or 2 kilograms on webbing from a Type 1 or Type 3 seat belt assembly, and 2,200±100 pounds or 1,000±50 kilograms on webbing from a Type 2 seat belt assembly. The width of webbing from a Type 2 seat belt assembly may be measured during the breaking strength test described in paragraph (b) of this section.

(b) *Breaking strength.* Webbing from three seat belt assemblies shall be conditioned in accordance with paragraph (a) of this section and tested for breaking strength in a testing machine of suitable capacity verified to have an error of not more than 1 percent in the range of the breaking strength of the webbing by the Tentative Methods of Verification of Testing Machines, ASTM Designation: E4–64, published by the American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pa. 19103.

The machine shall be equipped with split drum grips illustrated in Figure 1, having a diameter between 2 and 4 inches or 5 and 10 centimeters. The rate of grip separation shall be between 2 and 4 inches per minute or 5 and 10 centimeters per minute. The distance between the centers of the grips at the start of the test shall be between 4 and 10 inches or 10 and 25 centimeters. After placing the specimen in the grips, the webbing shall be stretched continuously at a uniform rate to failure. Each value shall be not less than the applicable breaking strength requirement in S4.2(b), but the median value shall be used for determining the retention of breaking strength in paragraphs (d), (e), and (f) of this section.

(c) *Elongation.* Elongation shall be measured during the breaking strength test described in paragraph (b) of this section by the following procedure: A preload between 44 and 55 pounds or 20 and 25 kilograms shall be placed on the webbing mounted in the grips of the testing machine and the needle points of an extensometer, in which the points remain parallel during test, are inserted in the center of the specimen. Initially the points shall be set at a known distance apart between 4 and 8 inches or 10 and 20 centimeters. When the force on the webbing reaches the value specified in S4.2(c), the increase in separation of the points of the extensometer shall be measured and the percent elongation shall be calculated to the nearest 0.5 percent. Each value shall be not more than the appropriate elongation requirement in S4.2(c).

(d) *Resistance to abrasion.* The webbing from three seat belt assemblies shall be tested for resistance to abrasion by rubbing over the hexagon bar prescribed in Figure 2 in the following manner: The webbing shall be mounted in the apparatus shown schematically in Figure 2. One end of the webbing (A) shall be attached to a weight (B) which has a mass of 5.2±0.1 pounds or 2.35 ±0.05 kilograms, except that a mass of 3.3±0.1 pounds or 1.50±0.05 kilograms shall be used for webbing in pelvic and upper torso restraint of Type 3 seat belt assembly. The webbing shall be passed over the two new abrading edges of the hexagon bar (C) and the other end attached to an oscillating drum (D) which has a stroke of 13 inches or 33 centimeters. Suitable guides shall be used to prevent movement of the webbing along the axis of hexagonal bar C. Drum D shall be oscillated for 5,000 strokes or 2,500 cycles at a rate of 60±2 strokes per minute or 30±1 cycles per minute. The abraded webbing shall be conditioned as prescribed in paragraph (a) of this section and tested for breaking strength by the procedure described in paragraph (b) of this section. The median values for the breaking strengths determined on abraded and unabraded specimens shall be used to calculate the percentage of breaking strength retained.

(e) *Resistance to light.* Webbing at least 20 inches or 50 centimeters in length from three seat belt assemblies shall be suspended vertically on the inside of the specimen rack in a Type E carbon-arc light-exposure apparatus described in recommended Practice for Operation of Light- and Water-Exposure Apparatus (Carbon-Arc Type) for Artificial Weathering Test, ASTM Designation: E42–64, published by the American Society for Testing and Materials. The apparatus shall be operated without water spray at an air temperature of 60°±2° C. or 140°±3.6° F. measured at a point 1±0.2 inch or 25±5 millimeters outside the specimen rack and midway in height. The temperature sensing element shall be shielded from radiation. The specimens shall be exposed to the light from the carbon arc for 100 hours and then conditioned as prescribed in paragraph (a) of this section. The colorfastness of the exposed and conditioned specimens shall be determined on the Geometric Gray Scale issued by the American Association of Textile Chemists and Colorists. The breaking strength of the specimens shall be determined by the procedure prescribed in paragraph (b) of this section. The median values for the breaking strengths determined on exposed and unexposed specimens shall be used to calculate the percentage of breaking strength retained.

(f) *Resistance to micro-organisms.* Webbing at least 20 inches or 50 centimeters in length from three seat belt assemblies shall be subjected successively to the procedures prescribed in Section 1C1—Water Leaching, Section 1C2—Volatilization, and Section 1B3—Soil Burial Test of AATCC Tentative Test Method 30—1957T, Fungicides, Evaluation of Textiles; Mildew and Rot Resistance of Textiles, published by American Association of Textile Chemists and Colorists. After soil-burial for a period of 2 weeks, the specimen shall be washed in water, dried and conditioned as prescribed in paragraph (a) of this section. The breaking strengths of the specimens shall be determined by the procedure prescribed in paragraph (b) of this section. The median values for the breaking strengths determined on exposed and unexposed specimens shall be used to calculate the percentage of breaking strength retained.

NOTE: This test shall not be required on webbing made from material which is inherently resistant to micro-organisms.

(g) *Colorfastness to crocking.* Webbing from three seat belt assemblies shall be tested by the procedure specified in Standard Test Method 8—1961, Colorfastness to Crocking (Rubbing) published by the American Association of Textile Chemists and Colorists.

(h) *Colorfastness to staining.* Webbing from three seat belt assemblies shall be tested by the procedure specified in Standard Test Method 107—1962, Colorfastness to Water, published by the American Association of Textile Chemists and Colorists, with the following modifications: Distilled water shall be used, perspiration tester shall be used, the drying time in paragraph 4 of procedures shall be 4 hours, and section entitled "Evaluation Method for Staining (3)" shall be used to determine colorfastness to staining on the AATCC Chart for Measuring Transference of Colors.

S5.2 *Hardware*—(a) *Corrosion resistance.* Three seat belt assemblies shall be tested by Standard Method of Salt Spray (Fog) Testing, ASTM Designation: B 117–64, published by the American Society for Testing and Materials. The period of test shall be 50 hours for all attachment hardware at or near the floor, consisting of two periods of 24 hours exposure to salt spray followed by 1 hour drying and 25 hours for all other hardware, consisting of one period of 24 hours exposure to salt spray followed by 1 hour drying. In the salt spray test chamber, the parts from the three assemblies shall be oriented differently, selecting those orientations most likely to develop corrosion on the larger areas. At the end of test, the seat belt assembly shall be washed thoroughly with water to remove the salt. After drying for at least 24 hours under standard laboratory conditions specified in S5.1(a) attachment hard-

ware shall be examined for ferrous corrosion on significant surfaces, that is, all surfaces that can be contacted by a sphere 0.75 inch or 2 centimeters in diameter, and other hardware shall be examined for ferrous and nonferrous corrosion which may be transferred, either directly or by means of the webbing, to a person or his clothing during use of a seat belt assembly incorporating the hardware.

NOTE: When attachment and other hardware are permanently fastened, by sewing or other means, to the same piece of webbing, separate assemblies shall be used to test the two types of hardware. The test for corrosion resistance shall not be required for attachment hardware made from corrosion-resistant steel containing at least 11.5 percent chromium or for attachment hardware protected with an electrodeposited coating of nickel, or copper and nickel, as prescribed in S4.3(a). The assembly that has been used to test the corrosion resistance of the buckle shall be used to measure adjustment force, tilt-lock adjustment, and buckle latch in paragraphs (e), (f), and (g), respectively, of this section, assembly performance in S5.3 and buckle release force in paragraph (d) of this section.

(b) *Temperature resistance.* Three seat belt assemblies having plastic or nonmetallic hardware or having retractors shall be subjected to the conditions prescribed in Procedure IV of Standard Methods of Test for Resistance of Plastics to Accelerated Service Conditions published by the American Society for Testing and Materials, under designation D 756–56. The dimension and weight measurement shall be omitted. Buckles shall be unlatched and retractors shall be fully retracted during conditioning. The hardware parts after conditioning shall be used for all applicable tests in S4.3 and S4.4.

(c) *Attachment hardware.* (1) Attachment bolts used to secure the pelvic restraint of a seat belt assembly to a motor vehicle shall be tested in a manner similar to that shown in Figure 3. The load shall be applied at an angle of 45° to the axis of the bolt through attachment hardware from the seat belt assembly, or through a special fixture which simulates the loading applied by the attachment hardware. The attachment hardware or simulated fixture shall be fastened by the bolt to the anchorage shown in Figure 3, which has a standard $\frac{7}{16}$–20 UNF–2B or $\frac{1}{2}$–13 UNC–2B threaded hole in a hardened steel plate at least 0.4 inch or 1 centimeter in thickness. The bolt shall be installed with two full threads exposed from the fully seated position. The appropriate force required by S4.3(c)(1) shall be applied. A bolt from each of three seat belt assemblies shall be tested.

(2) Attachment hardware, other than bolts, designed to receive the ends of two seat belt assemblies shall be subjected to a tensile force of 6,000 pounds or 2,720 kilograms in a manner simulating use. The hardware shall be examined for fracture after the force is released. Attachment hardware from three seat belt assemblies shall be tested.

(3) Single attachment hook for connecting webbing to any eye bolt shall be tested in the following manner: The hook shall be held rigidly so that the retainer latch or keeper, with cotter pin or other locking device in place, is in a horizontal position as shown in Figure 4. A force of 150±2 pounds or 68±1 kilograms shall be applied vertically as near as possible to the free end of the retainer latch, and the movement of the latch by this force at the point of application shall be measured. The vertical force shall be released, and a force of 150±2 pounds or 68±1 kilograms shall be applied horizontally as near as possible to the free end of the retainer latch. The movement of the latch by this force at the point of load application shall be measured. Alternatively, the hook may be held in other positions, provided the forces are applied and the movements of the latch are measured at the points indicated in Figure 4. A single attachment hook from each of three seat belt assemblies shall be tested.

(d) *Buckle release.* (1) Three seatbelt assemblies shall be tested to determine compliance with the maximum buckle release force requirements, following the assembly test in S5.3. After subjection to the force applicable for the assembly being tested, the force shall be reduced and maintained at 150 pounds on the assembly loop of a Type 1 seatbelt assembly, 75 pounds on the components of a Type 2 seatbelt assembly, or 45 pounds on a Type 3 seatbelt assembly. The buckle release force shall be measured by applying a force on the buckle in a manner and direction typical of those which would be employed by a seatbelt occupant. For pushbutton-release buckles, the force shall be applied at least 0.125 inch from the edge of the pushbutton access opening of the buckle in a direction that produces maximum releasing effect. For lever-release buckles, the force shall be applied on the centerline of the buckle level or finger tab in a direction that produces maximum releasing effect.

(2) The area for application of release force on pushbutton actuated buckle shall be measured to the nearest 0.05 square inch or 0.3 square centimeter. The cylinder specified in S4.3(d) shall be inserted in the actuation portion of a lever released buckle for determination of compliance with the requirement. A buckle with other release actuation shall be examined for access of release by fingers.

(3) The buckle of a Type 1 or Type 2 seatbelt assembly shall be subjected to a compressive force of 400 pounds applied anywhere on a test line that is coincident with the centerline of the belt extended through the buckle or on any line that extends over the center of the release mechanism and intersects the extended centerline of the belt at an angle of 60°. The load shall be applied by using a curved cylindrical bar having a cross section diameter of 0.75 inch and a radius of curvature of 6 inches, placed with its longitudinal centerline along the test line and its center directly above the point on the buckle to which the load will be applied. The buckle shall be latched, and a tensile force of 75 pounds shall be applied to the connected webbing during the application of the compressive force. Buckles from three seatbelt assemblies shall be tested to determine compliance with paragraph S4.3(d)(3).

(e) *Adjustment force.* Three seat belt assemblies shall be tested for adjustment force on the webbing at the buckle, or other manual adjusting device normally used to adjust the size of the assembly. With no load on the anchor end, the webbing shall be drawn through the adjusting device at a rate of 20±2 inches per minute or 50±5 centimeters per minute and the maximum force shall be measured to the nearest 0.25 pound or 0.1 kilogram after the first 1 inch or 25 millimeters of webbing movement. The webbing shall be precycled 10 times prior to measurement.

(f) *Tilt-lock adjustment.* This test shall be made on buckles or other manual adjusting devices having tilt-lock adjustment normally used to adjust the size of the assembly. Three buckles or devices shall be tested. The base of the adjustment mechanism and the anchor end of the webbing shall be oriented in planes normal to each other. The webbing shall be drawn through the adjustment mechanism in a direction to increase belt length at a rate of 20±2 inches per minute or 50±5 centimeters per minute while the plane of the base is slowly rotated in a direction to lock the webbing. Rotation shall be stopped when the webbing locks, but the pull on the webbing shall be continued until there is a resistance of at least 20 pounds or 9 kilograms. The locking angle between the anchor end of the webbing and the base of the adjustment mechanism shall be measured to the nearest degree. The webbing shall be precycled 10 times prior to measurement.

(g) *Buckle latch.* The buckles from three seat belt assemblies shall be opened fully and closed at least 10 times. Then the buckles shall be clamped or firmly held against a flat surface so to to permit normal movement of buckle parts, but with the metal mating plate (metal-to-metal buckles) or webbing and (metal-to-webbing buckles) withdrawn from the buckle. The release mechanism shall be moved 200 times through the maximum possible travel against its stop with a force of 30±3 pounds or 14±1 kilograms at a rate not to exceed 30 cycles per minute. The buckle shall be examined to determine compliance with the performance requirements of S4.3(g). A metal-to-metal buckle shall be examined to determine whether partial engagement is possible by means of any technique representative of actual use. If partial engagement is possible, the maximum force of separation when in such partial engagement shall be determined.

(h) *Nonlocking retractor.* After the retractor is cycled 10 times by full extension and retraction of the webbing, the retractor and webbing shall be suspended vertically and a force of 4 pounds or 1.8 kilograms shall be applied to extend the webbing from the retractor.

The force shall be reduced to 3 pounds or 1.4 kilograms when attached to a pelvic restraint, or to 1.1 pounds or 0.5 kilogram per strap or webbing that contacts the shoulder of an occupant when retractor is attached to an upper torso restraint. The residual extension of the webbing shall be measured by manual rotation of the retractor drum or by disengaging the retraction mechanism. Measurements shall be made on three retractors. The location of the retractor attached to upper torso restraint shall be examined for visibility of reel during use of seat belt assembly in a vehicle.

NOTE: This test shall not be required on a nonlocking retractor attached to the free-end of webbing which is not subjected to any tension during restraint of an occupant by the assembly.

(i) *Automatic-locking retractor.* Three retractors shall be tested in a manner to permit the retraction force to be determined exclusive of the gravitational forces on hardware or webbing being retracted. The webbing shall be fully extended from the retractor. While the webbing is being retracted, the average force or retraction within plus or minus 2 inches or 5 centimeters of 75 percent extension (25 percent retraction) shall be determined and the webbing movement between adjacent locking segments shall be measured in the same region of extension. A seat belt assembly with automatic locking retractor in upper torso restraint shall be tested in a vehicle in a manner prescribed by the installation and usage instructions. The retraction force on the occupant of the seat belt assembly shall be determined before and after traveling for 10 minutes at a speed of 15 miles per hour or 24 kilometers per hour or more over a rough road (e.g., Belgian block road) where the occupant is subjected to displacement with respect to the vehicle in both horizontal and vertical directions. Measurements shall be made with the vehicle stopped and the occupant in the normal seated position.

(j) *Emergency-locking retractor.* A retractor shall be tested in a manner that permits the retraction force to be determined exclusive of the gravitational forces on hardware or webbing being retracted. The webbing shall be fully extended from the retractor, passing over or through any hardware or other material specified in the installation instructions. While the webbing is being retracted, the lowest force of retraction within plus or minus 2 inches of 75 percent extension shall be determined. The retractor shall be subjected to an acceleration of 0.3 g. within a period of 50 milliseconds, while the webbing is at 75 percent extension, to determine compliance with S4.3(j)(ii). The retractor shall be subjected to an acceleration of 0.7 g. within a period of 50 milliseconds, while the webbing is at 75 percent extension, and the webbing movement before locking shall be measured under the following conditions: For a retractor sensitive to webbing withdrawal, the retractor shall be accelerated in the direction of webbing retraction while the retractor drum's central axis is oriented horizontally and at angles of 45°, 90°, 135°, and 180° to the horizontal plane. For a retractor sensitive to vehicle acceleration, the retractor shall be—

(1) Accelerated in the horizontal plane in two directions normal to each other, while the retractor drum's central axis is oriented at the angle at which it is installed in the vehicle; and,

(2) Accelerated in three directions normal to each other while the retractor drum's central axis is oriented at angles of 45°, 90°, 135°, and 180° from the angle at which it is installed in the vehicle, unless the retractor locks by gravitational force when tilted in any direction to any angle greater than 45° from the angle at which it is installed in the vehicle.

(k) *Performance of retractor.* After completion of the corrosion-resistance test described in paragraph (a) of this section, the webbing shall be fully extended and allowed to dry for at least 24 hours under standard laboratory conditions specified in S5.1(a). The retractor shall be examined for ferrous and nonferrous corrosion which may be transferred, either directly or by means of the wedding, to a person or his clothing during use of a seat belt assembly incorporating the retractor, and for ferrous corrosion on significant surfaces if the retractor is part of the attachment hardware. The webbing shall be withdrawn manually and allowed to retract for 25 cycles. The retractor shall be mounted in an apparatus capable of extending the webbing fully, applying a force of 20 pounds or 9 kilograms at full extension, and allowing the webbing to retract freely and completely. The webbing shall be withdrawn from the retractor and allowed to retract repeatedly in this apparatus until 2,500 cycles are completed. The retractor and webbing shall then be subjected to the temperature resistance test prescribed in paragraph (b) of this section. The retractor shall be subjected to 2,500 additional cycles of webbing withdrawal and retraction. Then, the retractor and webbing shall be subjected to dust in a chamber similar to one illustrated in Figure 8 containing about 2 pounds or 0.9 kilogram of coarse grade dust conforming to the specification given in SAE Recommended Practice, Air Cleaner Test Code—SAE J726a, published by the Society of Automotive Engineers. The dust shall be agitated every 20 minutes for 5 seconds by compressed air, free of oil and moisture, at a gage pressure of 80±8 pounds per square inch or 5.6±0.6 kilograms per square centimeter entering through an orifice 0.060 ±0.004 inch or 1.5±0.1 millimeters in diameter. The webbing shall be extended to the top of the chamber and kept extended at all times except that the webbing shall be subjected to 10 cycles of complete retraction and extension within 1 to 2 minutes after each agitation of the dust. At the end of 5 hours, the assembly shall be removed from the chamber. The webbing shall be fully withdrawn from the retractor manually and allowed to retract completely for 25 cycles. An automatic-locking retractor or a nonlocking retractor attached to pelvic restraint shall be subjected to 5,000 additional cycles of webbing withdawal and retraction. An emergency-locking retractor or a nonlocking retractor attached to upper torso restraint shall be subjected to 45,000 additional cycles of webbing withdrawal and retraction between 50 and 100 percent extension. The locking mechanism of an emergency locking retractor shall be actuated at least 10,000 times within 50 to 100 percent extension of webbing during the 50,000 cycles. At the end of test, compliance of the retractors with applicable requirements in S4.3 (h), (i), and (j) shall be determined. Three retractors shall be tested for performance.

S5.3 *Assembly Performance* — (a) *Type 1 seat belt assembly.* Three complete seat belt assemblies, including webbing, straps, buckles, adjustment and attachment hardware, and retractors, arranged in the form of a loop as shown in Figure 5, shall be tested in the following manner:

(1) The testing machine shall conform to the requirements specified in S5.1(b). A double-roller block shall be attached to one head of the testing machine. This block shall consist of two rollers 4 inches or 10 centimeters in diameter and sufficiently long so that no part of the seat belt assembly touches parts of the block other than the rollers during test. The rollers shall be mounted on antifriction bearings and spaced 12 inches or 30 centimeters between centers, and shall have sufficient capacity so that there is no brinelling, bending or other distortion of parts which may affect the results. An anchorage bar shall be fastened to the other head of the testing machine.

(2) The attachment hardware furnished with the seat belt assembly shall be attached to the anchorage bar. The anchor points shall be spaced so that the webbing is parallel in the two sides of the loop. The attaching bolts shall be parallel to, or at an angle of 45° or 90° to the webbing, whichever results in an angle nearest to 90° between webbing and attachment hardware except that eye bolts shall be vertical, and attaching bolts or nonthreaded anchorages of a seat belt assembly designed for use in specific models of motor vehicles shall be installed to produce the maximum angle in use indicated by the installation instructions, utilizing special fixtures if necessary to simulate installation in the motor vehicle. Rigid adapters between anchorage bar and attachment hardware shall be used if necessary to locate and orient the adjustment hardware. The adapters shall have a flat support face perpendicular to the threaded hole for the attaching bolt and adequate in area to provide full support for the base of the attachment hardware connected to the webbing. If necessary, a washer shall be used under a swivel plate or other attachment hardware to prevent the webbing from being damaged as the attaching bolt is tightened.

(3) The length of the assembly loop from attaching bolt to attaching bolt shall be adjusted to about 51 inches or 130 centimeters, or as near thereto as possible. A force of 55 pounds or 25 kilograms shall be applied to the loop to remove any slack in webbing at hardware. The force shall be removed and the heads of the testing machine shall be adjusted for an assembly loop between 48 and 50 inches or 122 and 127 centimeters in length. The length of the assembly loop shall then be adjusted by applying a force between 20 and 22 pounds or 9 and 10 kilograms to the free end of the webbing at the buckle, or by the retraction force of an automatic-locking or emergency-locking retractor. A seat belt assembly that cannot be adjusted to this length shall be adjusted as closely as possible. An automatic-locking or emergency-locking retractor when included in a seat belt assembly shall be locked at the start of the test with a tension on the webbing slightly in excess of the retractive force in order to keep the retractor locked. The buckle shall be in a location so that it does not touch the rollers during test, but to facilitate making the buckle release test in S5.2(d) the buckle should be between the rollers or near a roller in one leg.

(4) The heads of the testing machine shall be separated at a rate between 2 and 4 inches per minute or 5 and 10 centimeters per minute until a force of 5,000±50 pounds or 2,270±20 kilograms is applied to the assembly loop. The extension of the loop shall be determined from measurements of head separation before and after the force is applied. The force shall be decreased to 150±10 pounds or 68±4 kilograms and the buckle release force measured as prescribed in S5.2(d).

(5) After the buckle is released, the webbing shall be examined for cutting by the hardware. If the yarns are partially or completely severed in a line for a distance of 10 percent or more of the webbing width, the cut webbing shall be tested for breaking strength as specified in S5.1(b) locating the cut in the free length between grips. If there is insufficient webbing on either side of the cut to make such a test for breaking strength, another seat belt assembly shall be used with the webbing repositioned in the hardware. A tensile force of 2,500±25 pounds or 1,135±10 kilograms shall be applied to the components or a force of 5,000±50 pounds or 2,270±20 kilograms shall be applied to an assembly loop. After the force is removed, the breaking strength of the cut webbing shall be determined as prescribed above.

(6) If a Type 1 seat belt assembly includes an automatic-locking retractor or an emergency-locking retractor, the webbing and retractor shall be subjected to a tensile force of 2,500±25 pounds or 1,135±10 kilograms with the webbing fully extended from the retractor.

(7) If a seat belt asembly has a buckle in which the tongue is capable of inverted insertion, one of the three assemblies shall be tested with the tongue inverted.

(b) *Type 2 seat belt assembly.* Components of three seat belt assemblies shall be tested in the following manner:

(1) The pelvic restraint between anchorages shall be adjusted to a length between 48 and 50 inches or 122 and 127 centimeters, or as near this length as possible if the design of the pelvic restraint does not permit its adjustment to this length. An automatic-locking or emergency-locking retractor when included in a seat belt assembly shall be locked at the start of the test with a tension on the webbing slightly in excess of the retractive force in order to keep the retractor locked. The attachment hardware shall be oriented to the webbing as specified in paragraph (a)(2) of this section and illustrated in Figure 5. A tensile force of 2,500±25 pounds or 1,135±10 kilograms shall be applied on the components in any convenient manner and the extension between anchorages under this force shall be measured. The force shall be reduced to 75±5 pounds or 34±2 kilograms and the buckle release force measured as prescribed in S5.2(d).

(2) The components of the upper torso restraint shall be subjected to a tensile force of 1,500±15 pounds or 680±5 kilograms following the procedure prescribed above for testing pelvic restraint and the extension between anchorages under this force shall be measured. If the testing apparatus permits, the pelvic and upper torso restraints may be tested simultaneously. The force shall be reduced to 75±5 pounds or 34±2 kilograms and the buckle release force measured as prescribed in S5.2(d).

(3) Any component of the seat belt assembly common to both pelvic and upper torso restraint shall be subjected to a tensile force of 3,000±30 pounds or 1,360±15 kilograms.

(4) After the buckle is released in tests of pelvic and upper torso restraints, the webbing shall be examined for cutting by the hardware. If the yarns are partially or completely severed in a line for a distance of 10 percent or more of the webbing width, the cut webbing shall be tested for breaking strength as specified in S5.1(b) locating the cut in the free length between grips. If there is insufficient webbing on either side of the cut to make such a test for breaking strength, another seat belt assembly shall be used with the webbing repositioned in the hardware. The force applied shall be 2,500±25 pounds or 1,135±10 kilograms for components of pelvic restraint, and 1,500±15 pounds or 680±5 kilograms for components of upper torso restraint. After the force is removed, the breaking strength of the cut webbing shall be determined as prescribed above.

(5) If a Type 2 seat belt assembly includes an automatic-locking retractor or an emergency-locking retractor, the webbing and retractor shall be subjected to a tensile force of 2,500±25 pounds or 1,135±10 kilograms with the webbing fully extended from the retractor, or to a tensile force of 1,500±15 pounds or 680±5 kilograms with the webbing fully extended from the retractor if the design of the assembly permits only upper torso restraint forces on the retractor.

(6) If a seat belt assembly has a buckle in which the tongue is capable of inverted insertion, one of the three assemblies shall be tested with the tongue inverted.

(c) *Type 3 seat belt assembly.* Three seat belt assemblies including webbing, straps, buckles, adjustment and attachment hardware, and retractors shall be tested in the following manner:

(1) The testing machine shall conform to the requirements specified in S5.1(b). A torso having the dimensions shown in Figure 6, configured so that it does not contact a buckle in such a way as to affect the buckle release force, shall be attached to one head of the testing machine through a universal joint which is guided in essentially a frictionless manner to minimize lateral forces on the testing machine. An anchorage and simulated seat back shall be attached to the other head as shown in Figure 7.

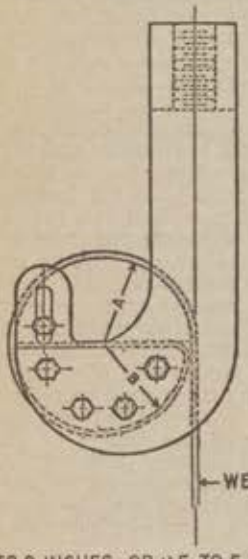
(2) Attachment hardware for an assembly having single webbing connection shall be fastened at the anchor hole shown in Figure 7 which is centered along the length of the anchorage bar. Attachment hardware for an assembly having two webbing connectors shall be fastened at anchor holes 16 inches or 40 centimeters apart on the anchorage bar, equidistant from the center. Attachment hardware for an assembly whose design precludes such attachment shall be fastened in accordance with the installation instructions. The back of the torso shall be positioned in a plane parallel to and at a distance of 4 inches or 10 centimeters from the plane of the simulated seat back. The seat belt assembly shall be installed on the torso in accordance with installation instructions and the webbing to the attachment hardware shall be adjusted with effectively no slack. The heads of the testing machine shall be separated at a rate of between 2 and 4 inches per minute or 5 and 10 centimeters per minute until a force of 2,000 pounds or 900 kilograms is applied. The extension of the seat belt assembly shall be determined from measurement of head separation in the testing machine before and after the force is applied. The force shall be reduced to 45±5 pounds or 20±2 kilograms and the release force of the buckle or buckles measured as prescribed in S5.2(d). A seat back retainer not connected to pelvic or upper torso restraint shall be subjected separately to a force of 2,000 pounds or 900 kilograms.

(3) After the buckle is released, the webbing shall be examined for cutting by the hardware. If the yarns are partially or completely severed in a line for a distance of 10 percent or more of the webbing width, the cut webbing shall be tested for breaking strength as specified in S5.1(b) locating the cut in the free length between grips. If there is insufficient webbing on either side of the cut to make such a test for breaking strength, another seat belt assembly shall be used with the webbing repositioned in the hardware. A tensile force shall be applied to the components as follows: Webbing in pelvic or upper torso restraint—700±7 pounds or 320±3 kilograms; webbing in seat back retainer or webbing connecting pelvic and upper torso restraint to attachment hard-

ware—1,500±15 pounds or 680±7 kilograms. After the force is removed, the breaking strength of the cut webbing shall be determined as prescribed above.

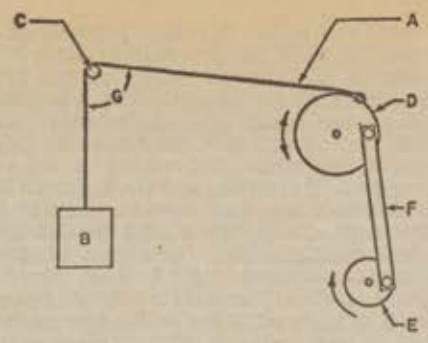
(4) If a seat belt assembly has a buckle in which the tongue is capable of inverted insertion, one of the three assemblies shall be tested with the tongue inverted.

(d) *Resistance to buckle abrasion.* Seatbelt assemblies shall be tested for resistance to abrasion by each buckle or manual adjusting device normally used to adjust the size of the assembly. The webbing of the assembly to be used in this test shall be exposed for 4 hours to an atmosphere having relative humidity of 65 percent and temperature of 70° F. The webbing shall be pulled back and forth through the buckle or manual adjusting device as shown schematically in Figure 9. The anchor end of the webbing (A) shall be attached to a weight (B) of 3 pounds. The webbing shall pass through the buckle (C), and the other end (D) shall be attached to a reciprocating device so that the webbing forms an angle of 8° with the hinge stop (E). The reciprocating device shall be operated for 2,500 cycles at a rate of 18 cycles per minute with a stroke length of 8 inches. The abraded webbing shall be tested for breaking strength by the procedure described in paragraph S5.1(b).




A 1 TO 2 INCHES OR 2.5 TO 5 CENTIMETERS
B A MINUS 0.06 INCH OR 0.15 CENTIMETER

FIGURE 1.




A – WEBBING
B – WEIGHT
C – HEXAGONAL ROD
STEEL – SAE 51416
ROCKWELL HARDNESS – B-97 TO B-101
SURFACE – COLD DRAWN FINISH
SIZE – 0.250 ± 0.001 INCH OR
6.35 ± 0.03 MILLIMETER
RADIUS ON EDGES – 0.020 ± 0.004 INCH OR
0.5 ± 0.1 MILLIMETER
D – DRUM DIAMETER – 16 INCHES OR
40 CENTIMETERS
E – CRANK
F – CRANK ARM
G – ANGLE BETWEEN WEBBING – 85 ± 2 DEGS.

FIGURE 2

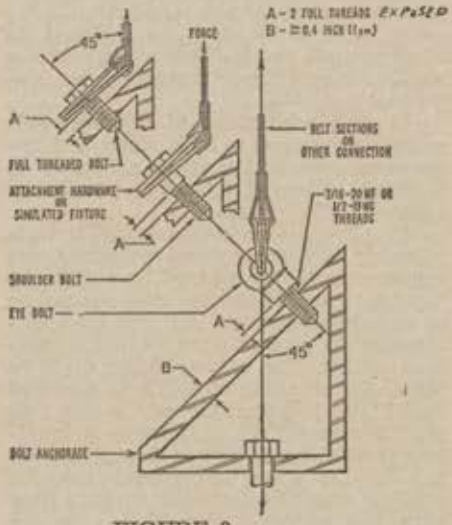



FIGURE 3

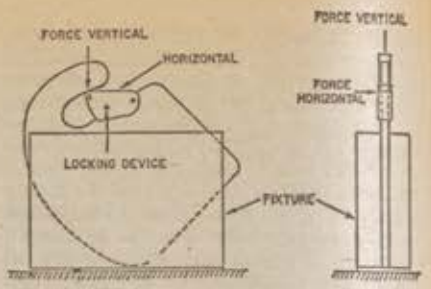
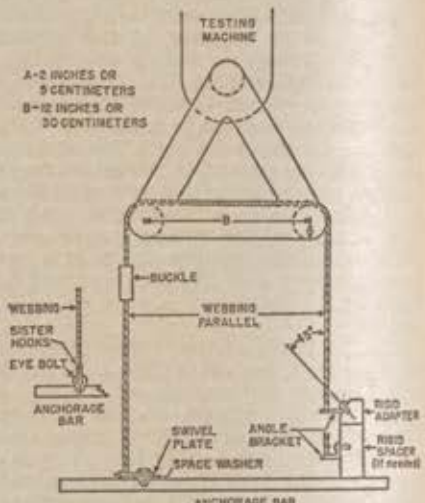
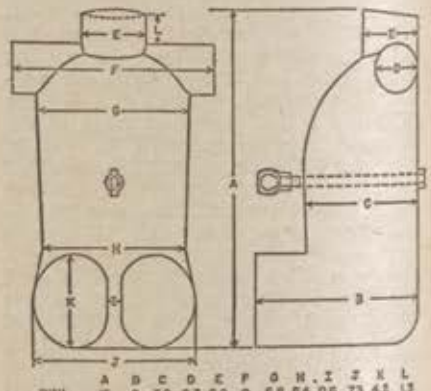



FIGURE 4
SINGLE ATTACHMENT HOOK




ANCHORAGE BAR
FIGURE 5.



| | A | B | C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| INCH | 15 | 8 | 5.9 | 2.3 | 2.9 | 9 | 6.8 | 6.4 | 0.6 | 7.3 | 4.5 | 1.5 |
| CENTIMETER | 38 | 20 | 14.5 | 5.9 | 7.3 | 23 | 17 | 16 | 1.5 | 18.5 | 10.7 | 3.5 |

FIGURE 6.

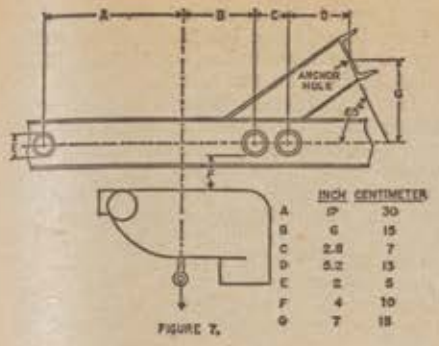
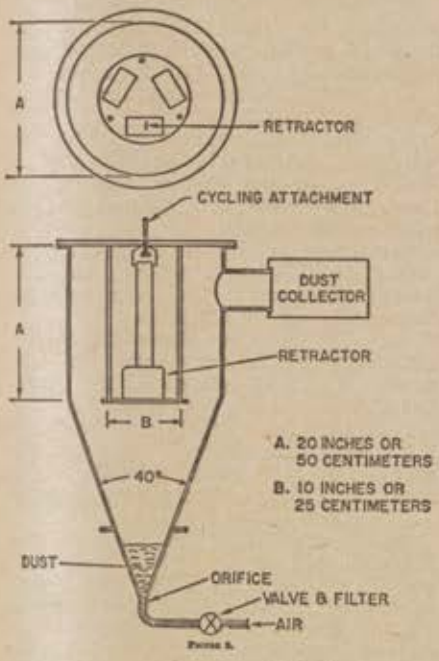



FIGURE 7.



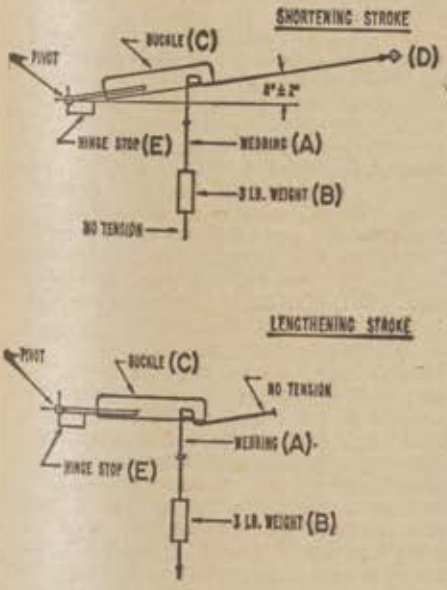




FIGURE 9

NOTE: This Standard applies to seat belt assemblies manufactured after February 28, 1967, for use in passenger cars, multipurpose passenger vehicles, trucks and buses. Since the effective date of § 571.206, which provides that a Type 1 or Type 2 seat belt assembly that conforms to § 571.209 shall be installed in each passenger car seat position, is January 1, 1968, seat belt assemblies installed in passenger cars until that date need not conform to § 571.209 unless the seat belt assemblies have been manufactured after February 28, 1967.

NOTE: The standard that appears below is a revision that is effective with respect to vehicles manufactured on or after January 1, 1972. The standard that is effective before that date appears at 32 F.R. 2408, Feb. 3, 1967, 36 F.R. 4291, March 4, 1971, and 36 F.R. 9869, May 29, 1971.

### § 571.210 Standard No. 210; Seat belt assembly anchorages.

S1. *Purpose and scope.* This standard establishes requirements for seat belt assembly anchorages to insure their proper location for effective occupant restraint and to reduce the likelihood of their failure.

S2. *Application.* This standard applies to passenger cars, multipurpose passenger vehicles, trucks, and buses.

S3. *Definition.* "Seat belt anchorage" means the provision for transferring seat belt assembly loads to the vehicle structure.

S4. *Requirements.*

S4.1 *Type.*

S4.1.1 Seat belt anchorages for a Type 2 seat belt assembly shall be installed for each forward-facing outboard designated seating position in passenger cars other than convertibles, and for each designated seating position for which a Type 2 seat belt assembly is required by § 571.208 in vehicles other than passenger cars.

S4.1.2 Seat belt anchorages for a Type 1 or a Type 2 seat belt assembly shall be installed for each designated seating position, except a passenger seat in a bus or a designated seating position for which seat belt anchorages for a Type 2 seat belt assembly are required by S4.1.1.

S4.2 *Strength.*

S4.2.1 Except for side-facing seats, the anchorage for a Type 1 seat belt assembly or the pelvic portion of a Type 2 seat belt assembly shall withstand a 5,000-pound force when tested in accordance with § 5.1.

S4.2.2 The anchorage for a Type 2 seat belt assembly shall withstand 3,000-pound forces when tested in accordance with S5.2.

S4.2.3 Permanent deformation or rupture of a seat belt anchorage or its surrounding area is not considered to be a failure, if the required force is sustained for the specified time.

S4.2.4 Except for common seat belt anchorages for forward-facing and rearward-facing seats, floor-mounted seat belt anchorages for adjacent designated seating positions shall be tested by simultaneously loading the seat belt assemblies attached to those anchorages.

S4.3 *Location.* As used in this section, "forward" means in the direction in which the seat faces, and other directional references are to be interpreted accordingly.

S4.3.1 *Seat belt anchorages for Type 1 seat belt assemblies and the pelvic portion of Type 2 seat belt assemblies.*

S4.3.1.1 In an installation in which the seat belt does not bear upon the seat frame, a line from the seating reference point to the nearest contact point of the belt with the hardware attaching it to the anchorage for a nonadjustable seat, or from a point 2.50 inches forward of and 0.375 inch above the seating reference point to the nearest contact point of the belt with the hardware attaching it to the anchorage for an adjustable seat in its rearmost position, shall extend forward from the anchorage at an angle with the horizontal of not less than 20° and not more than 75°.

S4.3.1.2 In an installation in which the belt bears upon the seat frame, the seat belt anchorage, if not on the seat structure, shall be aft of the rearmost belt contact point on the seat frame with the seat in the rearmost position. The line from the seating reference point to the nearest belt contact point on the seat frame shall extend forward from that contact point at an angle with the horizontal of not less than 20° and not more than 75°.

S4.3.1.3 In an installation in which the seat belt anchorage is on the seat structure, the line from the seating reference point to the nearest contact point of the belt with the hardware attaching it to the anchorage shall extend forward from that contact point at an angle with the horizontal of not less than 20° and not more than 75°.

S4.3.1.4 Anchorages for an individual seat belt assembly shall be located at least 6.50 inches apart laterally, measured between the vertical centerlines of the bolt holes.

S4.3.2 *Seat belt anchorages for the upper torso portion of Type 2 seat belt assemblies.* With the seat in its full rearward and downward position and the seat back in its most upright position, the seat belt anchorage for the upper end of the upper torso restraint shall be located within the acceptable range shown in Figure 1, with reference to a two dimensional manikin described in SAE Standard J826 (November 1962) whose "H" point is at the seating reference point and whose torso line is at the same angle from the vertical as the seat back.

S5. *Test procedures.* Each vehicle shall meet the requirements of S4.2 when tested according to the following procedures. Where a range of values is specified, the vehicle shall be able to meet the requirements at all points within the range.

S5.1 *Seats with Type 1 or Type 2 seat belt anchorages.* With the seat in its rearmost position, apply a force of 5,000 pounds in the direction in which the seat faces to a pelvic body block as described in Figure 2, restrained by a Type 1 or the pelvic portion of a Type 2 seat belt assembly, as applicable, in a plane parallel to the longitudinal centerline of the vehicle, with an initial force application angle of not less than 5° nor more than 15° above the horizontal. Apply the force at the onset rate of not more than 50,000 pounds per second. Attain the 5,000-pound force in not more than 30 seconds and maintain it for 10 seconds.

S5.2 *Seats with Type 2 seat belt anchorages.* With the seat in its rearmost position, apply forces of 3,000 pounds in the direction in which the seat faces simultaneously to pelvic and upper torso body blocks as described in Figures 2 and 3, restrained by a Type 2 seat belt assembly, in a plane parallel to the longitudinal centerline of the vehicle, with an initial force application angle of not less than 5° nor more than 15° above the horizontal. Apply the forces at the onset rate of not more than 30,000 pounds per second. Attain the 3,000-pound forces in not more than 30 seconds and maintain them for 10 seconds.

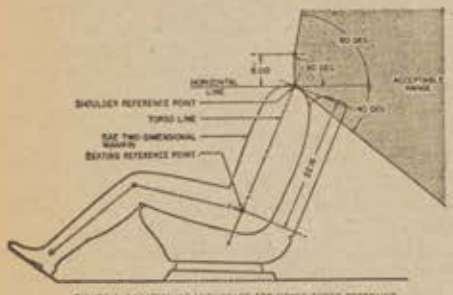


FIGURE 1—LOCATION OF ANCHORAGE FOR UPPER TORSO RESTRAINT

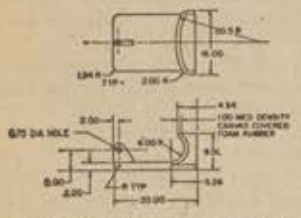


FIGURE 2—BODY BLOCK FOR LAP BELT ANCHORAGE

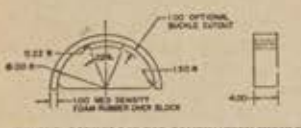


FIGURE 3—BODY BLOCK FOR COMBINATION SHOULDER AND LAP BELT ANCHORAGE

NOTE: The effective date for multipurpose passenger vehicles, trucks, and buses shall be January 1, 1972, except that the effective date for installation of anchorages for upper torso restraints for seating positions other than front outboard designated seating positions shall be January 1, 1972.

### § 571.211 Standard No. 211; Wheel nuts, wheel discs, and hub caps.

S1. *Purpose and scope.* This standard precludes the use of wheel nuts, wheel discs, and hub caps that constitute a hazard to pedestrians and cyclists.

S2. *Application.* This standard applies to passenger cars, multipurpose passenger vehicles, and passenger car and multipurpose passenger vehicle equipment.

S3. *Requirements.* Wheel nuts, hub caps, and wheel discs for use on passenger cars and multipurpose passenger vehicles shall not incorporate winged projections.

NOTE: A clarification of the term "wheel nuts" as used in the requirements section S3 of § 571.211 has been requested. This section states that "wheel nuts, hub caps, and wheel discs for use on passenger cars and multipurpose passenger vehicles shall not incorporate winged projections." A "wheel nut" is an exposed nut that is mounted at the center or hub of a wheel, and not the ordinary small hexagonal nut, one of several which secures a wheel to an axle, and which is normally covered by a hub cap or wheel disc.

### § 571.212 Standard No. 212; Windshield mounting.

S1. *Purpose and scope.* This standard establishes windshield retention requirements for windshield mountings.

S2. *Application.* This standard applies to passenger cars.

S3. *Requirements.* When tested in accordance with S4, each windshield mounting must retain either—

(a) Not less than 75 percent of the windshield periphery; or

(b) Not less than 50 percent of that portion of the windshield periphery on each side of the vehicle longitudinal centerline, if an unrestrained 95th percentile adult male manikin is seated in each outboard front seating position.

S4. *Demonstration procedures.* Impact the vehicle perpendicularly into a fixed collision barrier at a forward longitudinal velocity of 30 miles per hour.

### § 571.213 Standard No. 213; Child seating systems.

S1. *Purpose and scope.* This standard specifies requirements for child seating systems to minimize the likelihood of death and injury to children in vehicle crashes or sudden stops by ejection from the vehicle, contact with the vehicle interior, or contact with a child seating system.

S2. *Application.* This standard applies to child seating systems for use in passenger cars, multipurpose passenger vehicles, trucks and buses. This standard does not apply to Type 3 seat belt assemblies, as defined in § 571.209, or to systems for use only by recumbent or semirecumbent children.

S3. *Definition.* "Child seating system" means an item of motor vehicle equipment for seating and restraining a child being transported in a motor vehicle.

S4. *Requirements.*

S4.1 *Labeling.* Each child seating system shall have a label permanently affixed to it. The label shall contain the following information in the English language in letters and numerals not less than $\frac{3}{32}$-inch high:

(a) The manufacturer's name. However, a distributor's name may be placed on the label in place of the manufacturer's name if the distributor assumes responsibility for all duties and liabilities imposed on the manufacturer by the National Traffic and Motor Vehicle Safety Act with respect to the system.

(b) Model number or name.

(c) Month and year of manufacture.

(d) Place of manufacture (city and State or foreign country). However, if the label contains the distributor's name in place of the name of the manufacturer, the city and State or foreign country of the distributor's principal offices shall appear on the label.

(e) A statement describing in general terms both the types of motor vehicles and the designated seating positions in those vehicles in which the system is either recommended or not recommended for use. The following, either stated separately or in combination, are examples of acceptable statements:

(1) "Recommended for use only on bench seats of passenger cars manufactured after January 1, 1968, by the ---------- Motor Company."

(2) "Recommended for use only on seats that have head restraints on (make or model designation(s)) passenger cars manufactured after January 1, 1969."

(3) "Not recommended for use in trucks and buses."

(f) Except as provided in S4.1.1, the following statement: "Not for use on hinged or folding vehicle seats or seat backs unless the seat or seat back is equipped with a latch."

(g) Unless the system is a rearward-facing child seating system, the following statement: "For use only on forward-facing vehicle seats."

(h) The following statement, inserting in the blank spaces the manufacturer's recommendations of the maximum height and the minimum and maximum weight of children who can safely occupy the system: "For use only by children who weigh between ------ and ------ pounds and whose height is ------ inches or less."

S4.1.1 *Exemption.* A part of the warning required by S4.1(f) relating to use of a child seating system on a hinged or folding vehicle seat or on a vehicle seat having a hinged or folding back, or on both, may be omitted in the following circumstances:

(a) The part of the warning that relates to vehicle seats may be omitted if the child seating system includes a component to restrain a hinged or folding vehicle seat and if, when the system and the component are both installed in the seat in accordance with the recommendation required by S4.1(e) and the instructions required by S4.2, the component will not fail when a forward longitudinal force equal to 20 times the weight of the vehicle seat is applied through the seat's center of gravity and maintained for 10 seconds.

(b) The part of the warning that relates to seat backs may be omitted if the child seating system includes a component to restrain the hinged or folding seat back and if, when the system and the component are both installed in the vehicle seat in accordance with the recommendation required by S4.1(e) and the instructions required by S4.2, the component will not fail when a forward longitudinal force equal to 20 times the weight of the vehicle seat back is applied through the back's center of gravity and maintained for 10 seconds.

(c) The entire warning may be omitted if the child seating system in-

cludes the components for restraining the seat and seat back specified in (a) and (b).

S4.2 *Installation instructions.* Each child seating system shall be accompanied by an instruction sheet, providing a step-by-step procedure (which may include diagrams) for installing the system in the vehicles in which it is recommended for use in accordance with S4.1 (e), securing the system with a Type 1 or Type 2 seat belt assembly, positioning a child in the system, and adjusting the system to fit the child.

S4.3 *Adjustment.* The components of each child seating system that directly restrain the child shall be adjustable to fit any child whose weight and height are within the ranges recommended in accordance with S4.1(h) and who is positioned in the system in accordance with the instructions required by S4.2.

S4.4 *Attachment.* Each child seating system shall be designed and constructed so that—

(a) The system has no provision for attachment to a vehicle seat back other than by means of a component that is inserted between the vehicle seat back and the vehicle seat cushion; and

(b) When installed in accordance with the instructions required by S4.2, a system installed on a forward-facing vehicle seat shall be restrained against forward movement, and a system installed on a rearward-facing vehicle seat shall be restrained against rearward movement, by a Type 1 or Type 2 seat belt assembly as defined in § 571.209.

S4.5 *Distribution of restraint forces.*

S4.5.1 *Forward-facing systems.* When a forward-facing child seating system is installed in a vehicle and a child is positioned in the system in accordance with the instructions required by S4.2, components of the child seating system and the vehicle's seat belt assemblies that apply restraining forces directly to the child shall, during forward movement of the child relative to the vehicle in which the system is installed, distribute those forces on both the pelvis and thorax of the child. Restraint forces may also be distributed over other areas of the child's body as long as both the pelvis and thorax are restrained.

S4.5.2 *Rearward-facing systems.* When a rearward-facing child seating system is installed in a vehicle and a child is positioned in the system in accordance with the instructions required by S4.2, the components of the child seating system and the vehicle's seat belt assemblies that apply restraining forces directly to the child shall—

(a) During forward movement of the child relative to the vehicle in which the system is installed, distribute those forces on both the back of the child's torso and the back of the child's head; and

(b) During rearward movement of the child relative to the vehicle in which the system is installed, distribute those forces on both the pelvis and thorax of the child. Restraint forces may also be distributed over other areas of the child's body as long as both the back of the torso and head are restrained during forward movement and both the pelvis and thorax are restrained during rearward movement.

S4.6 *Head restraint.*

S4.6.1 Except as provided in S4.6.2, each forward-facing child seating system shall have a head restraint that limits rearward angular displacement of the child's head relative to the child's torso line. The height of the head restraint, measured as the straight-line distance between the highest point at the lateral center of the head restraint and the lowest point at the lateral center of the seating surface, shall be as follows:

| If the maximum weight of children for whom the system is recommended is: | *The height of the head restraint shall be at least: (inches)* |
|---|---|
| 20 pounds or less | 15 |
| More than 20 pounds but not more than 25 pounds | 16.3 |
| More than 25 pounds but not more than 30 pounds | 17.9 |
| More than 30 pounds but not more than 35 pounds | 18.9 |
| More than 35 pounds | 20 |

S4.6.2 Subparagraph S4.6.1 does not apply to a child seating system if—

(a) In accordance with S4.1(e), the system is recommended for use only at designated seating positions in makes and models of vehicles at which the vehicle's seat back or head restraint limits rearward angular displacement of the child's head relative to the child's torso line; and

(b) When the system is installed in accordance with the instructions required by S4.2, the distance from the lowest point at the lateral center of the child seating surface to a horizontal plane tangent to the highest point of the vehicle seat back or head restraint in its highest adjustable position, at the lateral center of the designated seating position, measured on a line parallel to the rear surface of the vehicle seat back, is at least equal to the seat back height specified for the seating system in S4.6.1.

S4.7 *Webbing.* If a child seating system has webbing to distribute restraint forces as required by S4.5—

(a) The webbing that directly contacts the child's body shall have a minimum width of 1½ inches; and

(b) The webbing that sustains restraint forces shall meet the requirements for webbing in a Type 3 seat belt assembly specified in paragraph S4.2(b) through paragraph S4.2(h) of § 571.209.

S4.8 *Hardware.* Attachment hardware of each child seating system that sustains restraint forces shall meet the corrosion resistance requirements for attachment hardware of a seat belt assembly specified in paragraph S4.3(a) of § 571.209. Buckles, retractors, and metallic parts other than attachment hardware that sustain restraint forces shall meet the corrosion resistance requirements for buckles, retractors, and metallic parts other than attachment hardware of a seat belt assembly specified in paragraph S4.3(a) of § 571.209.

S4.9 *Release mechanism.* The mechanism for releasing components of a child seating system that directly restrain the child shall—

(a) Meet the requirements for the buckle of a Type 3 seat belt assembly specified in S4.3(d) of § 571.209, except that the assembly test force specified in S5.3(c)(2) of § 571.209 shall be 1,000 pounds; or

(b) Release when a force of not more than 20 pounds is applied when tested in accordance with S5.3.

S4.10 *Impact protection.*

S4.10.1 *Head.* Each rigid component of a child seating system that, during forward, right-side, left-side or rearward impact, may contact the head of a child within the weight and height range recommended in accordance with S4.1(h) who is positioned in the system in accordance with the instructions required by S4.2, shall—

(a) Have no corner or edge with a radius of less than one-quarter inch; and

(b) Except as provided in S4.10.3, be covered with deformable, nonrecovery, or slow-recovery energy absorbing material having a thickness of at least one-half inch.

S4.10.2 *Torso.* Except as provided in S4.10.3, each rigid component of a child seating system (except restraint belt buckles) that, during forward, right-side, or left-side impact, may contact the torso of a child within the weight and height range recommended in accordance with S4.1(h) shall comply with the requirements of S4.10.1.

S4.10.3 *Exception.* S4.10.1(b) does not apply to a rigid side of a child seating system if the contactable area of the side that is higher than the system's seating surface is at least 24 square inches.

S4.11 *Performance.*

S4.11.1 *All child seating systems.*

(a) When tested in accordance with S5.1 each child seating system shall—

(1) Retain the torso block in the system;

(2) Sustain a static load of 1,000 pounds in the forward direction; and

(3) Restrict forward horizontal movement of the torso block reference point:

(i) When the vehicle seat is in its forwardmost adjustment position, to not more than 12 inches;

(ii) When the vehicle seat is rearward of its forwardmost adjustment position, to not more than 12 inches plus the distance, measured horizontally, that the vehicle seat is rearward of its forwardmost adjustment position.

(b) A child seating system in which the attitude of the child is adjustable pursuant to the instructions provided in accordance with paragraph S4.2 shall meet these requirements at each designed adjustment position.

S4.11.2 *Rearward-facing child seating systems.*

(a) When tested in accordance with S5.2, each rearward-facing child seating system shall—

(1) Retain the torso block in the system;

(2) Sustain a static load of 500 pounds in the rearward direction; and

(3) Restrict rearward horizontal movement of the torso block reference point to 12 inches or less.

(b) A child seating system in which the attitude of the child is adjustable pursuant to the instructions provided in accordance with paragraph S4.2 shall meet these requirements at each designed adjustment position.

S5. *Test procedures.*

S5.1 *All seating systems.* The child seating system shall be subjected to a static load, using the torso block shown in Figure 6 of Federal Motor Vehicle Safety Standard No. 209, as follows:

(a) Locate the torso block reference point, which is 2.9 inches above the bottom surface of the torso block and 2.1 inches forward of the back surface of the torso block.

(b) Install the system in accordance with the manufacturer's instructions required by S4.2 on a vehicle seat other than a seat on which the manufacturer does not recommend its installation in the recommendation required by S4.1(e).

(c) Position the torso block in the system in accordance with the manufacturer's instructions required by S4.2, and adjust the system in accordance with those instructions.

(d) Apply an increasing load to the torso block in a forward direction, not more than 15° and not less than 5° above the horizontal, until a load of 1,000 pounds is achieved. The intersection of the load application line and the back surface of the torso block, at the time that the force removes the slack from the load application system, shall not be more than 8 inches or less than 6 inches above the bottom surface of the torso block. Maintain the 1,000-pound load for 10 seconds.

(e) Measure the horizontal movement of the torso block reference point.

S5.2 *Rearward-facing child seating systems.* The rearward-facing child seating system shall be subjected to the test procedure specified in S5.1, except that—

(a) A load of 500 pounds shall be achieved; and

(b) The load shall be applied in a rearward direction.

S5.3 *Release mechanism.* Conduct the following tests for forward-facing and rearward-facing child seating systems, as appropriate, using a torso block configured so that it does not contact the buckle in a manner as to affect the buckle release force.

S5.3.1 For forward-facing child seating systems—

(a) Test the system with a 1,000-pound force as specified in S5.1;

(b) Reduce the force to 45 pounds; and

(c) Release the mechanism in a manner typical of that employed in actual use.

S5.3.2 For rearward-facing child seating systems—

(a) Test the system with a 500-pound force as specified in S5.2;

(b) Reduce the force to 45 pounds; and

(c) Release the mechanism in a manner typical of that employed in actual use.

### § 571.214 Standard No. 214; Side door strength.

S1. *Purpose and scope.* This standard specifies strength requirements for side doors of a motor vehicle to minimize the safety hazard caused by intrusion into the passenger compartment in a side impact accident.

S2. *Application.* This standard applies to passenger cars.

S3. *Requirements.* Each vehicle shall be able to meet the following requirements when any of its side doors that can be used for occupant egress are tested according to S4.

S3.1 *Initial crush resistance.* The initial crush resistance shall be not less than 2,250 pounds.

S3.2 *Intermediate crush resistance.* The intermediate crush resistance shall not be less than 3,500 pounds.

S3.3 *Peak crush resistance.* The peak crush resistance shall be not less than two times the curb weight of the vehicle or 7,000 pounds, whichever is less.

S4. *Test procedures.* The following procedures apply to determining compliance with section S3:

(a) Remove from the vehicle any seats that may affect load upon, or deflection of, the side of the vehicle. Place side windows in their uppermost position and all doors in locked position. Place the sill of the side of the vehicle opposite to the side being tested against a rigid unyielding vertical surface. Fix the vehicle rigidly in position by means of tiedown attachments located at or forward of the front wheel centerline and at or rearward of the rear wheel centerline.

(b) Prepare a loading device consisting of a rigid steel cylinder or semicylinder 12 inches in diameter with an edge radius of one-half inch. The length of the loading device shall be such that the top surface of the loading device is at least one-half inch above the bottom edge of the door window opening but not of a length that will cause contact with any structure above the bottom edge of the door window opening during the test.

(c) Locate the loading device as shown in Figure I (side view) of this section so that:

(1) Its longitudinal axis is vertical;

(2) Its longitudinal axis is laterally opposite the midpoint of a horizontal line drawn across the outer surface of the door 5 inches above the lowest point of the door;

(3) Its bottom surface is in the same horizontal plane as the horizontal line described in subdivision (2) of this subparagraph; and

(4) The cylindrical face of the device is in contact with the outer surface of the door.

(d) Using the loading device, apply a load to the outer surface of the door in an inboard direction normal to a vertical plane along the vehicle's longitudinal centerline. Apply the load continuously such that the loading device travel rate does not exceed one-half inch per second until the loading device travels 18 inches. Guide the loading device to prevent it from being rotated or displaced from its direction of travel. The test must be completed within 120 seconds.

(e) Record applied load versus displacement of the loading device, either continuously or in increments of not more than 1 inch or 200 pounds for the entire crush distance of 18 inches.

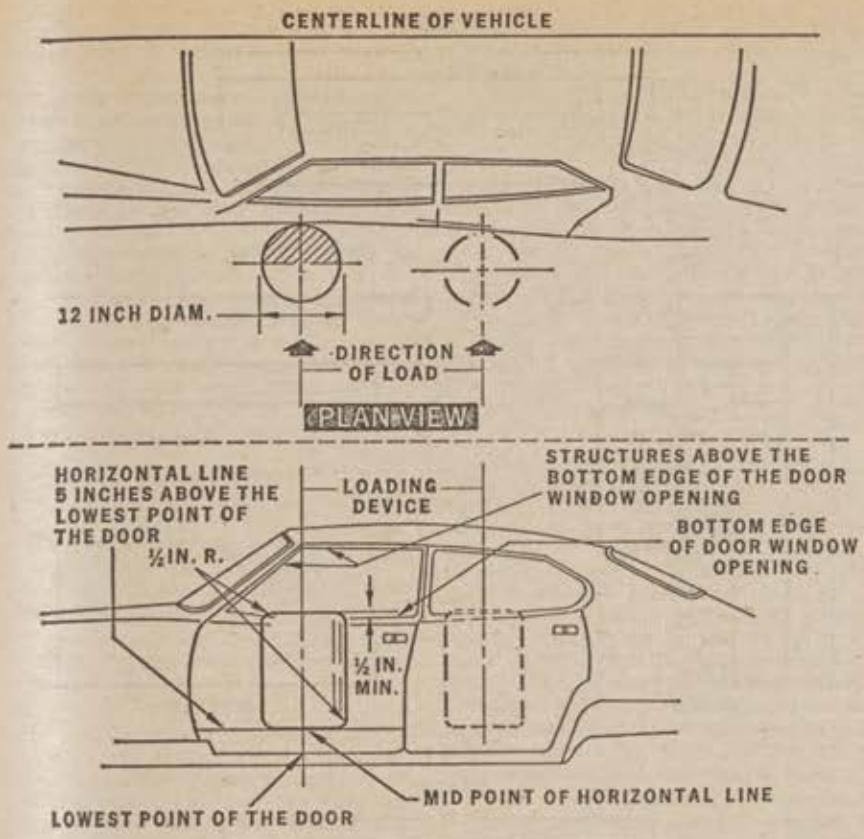
(f) Determine the initial crush resistance, intermediate crush resistance, and peak crush resistance as follows:

(1) From the results recorded in subparagraph (e) of this paragraph, plot a curve of load versus displacement and obtain the integral of the applied load with respect to the crush distances specified in subdivisions (2) and (3) of this paragraph. These quantities, expressed in inch-pounds and divided by the specified crush distances, represent the average forces in pounds required to deflect the door those distances.

(2) The initial crush resistance is the average force required to deform the door over the initial 6 inches of crush.

(3) The intermediate crush resistance is the average force required to deform the door over the initial 12 inches of crush.

(4) The peak crush resistance is the largest force recorded over the entire 18-inch crush distance.




LOADING DEVICE LOCATION AND APPLICATION TO THE DOOR

FIGURE 1

**§ 571.215 Standard No. 215; Exterior protection.**

NOTE: *Effective date.* September 1, 1972, with further requirements effective September 1, 1973, as noted in the text of the rule.

S1. *Scope.* This standard establishes requirements for the impact resistance and the configuration of front and rear vehicle surfaces.

S2. *Purpose.* The purpose of this standard is to prevent low-speed collisions from impairing the safe operation of vehicle systems, and to reduce the frequency of override or underride in higher speed collisions.

S3. *Application.* This standard applies to passenger cars.

S4. *Definition.* All terms defined in the Act and the rules and standards issued under its authority are used as defined therein.

S5. *Requirements.*

S5.1 *Vehicle manufactured on or after September 1, 1972.*

Each vehicle manufactured on or after September 1, 1972, shall meet the protective criteria of S5.3.1 through S5.3.4 when it impacts a fixed collision barrier that is perpendicular to the line of travel of the vehicle, while traveling longitudinally forward at 5 m.p.h. and while traveling longitudinally rearward at 2½ m.p.h., under the conditions of S6.1.

S5.2 *Vehicles Manufactured on or after September 1, 1973.* Except as provided in S5.2.1 and S5.2.2, each vehicle manufactured on or after September 1, 1973, shall meet the protective criteria of S5.3.1 through S5.3.6 during and after impacts by a pendulum-type test device in accordance with the procedures of S7.1 and S7.2 followed by impacts into a fixed-collision barrier that is perpendicular to the line of travel of the vehicle, while traveling longitudinally forward at 5 m.p.h. and while traveling longitudinally rearward at 5 m.p.h., under the conditions of S6.

S5.2.1 The corner-impact procedure of S7.2.2 shall not apply to any vehicle manufactured from September 1, 1973, to August 31, 1975.

S5.2.2 The fixed-collision-barrier impact requirements of S5.2 shall apply, but the pendulum-impact requirements of S5.2 shall not apply to each vehicle manufactured from September 1, 1973 to August 31, 1974, that has a wheelbase of 115 inches or less and that either—

(a) Has a convertible top;

(b) Has no roof support structure between the A-pillar and the rear roof support structure; or

(c) Has no designated seating position behind the front designated seating positions.

S5.3.1 Each lamp or reflective device, except license plate lamps, shall be free of cracks and shall comply with the applicable requirements of § 571.108.

S5.3.2 The vehicle's hood, trunk, and doors shall operate in the normal manner.

S5.3.3 The vehicle's fuel and cooling systems shall have no leaks or constricted fluid passages and all sealing devices and caps shall operate in the normal manner.

S5.3.4 The vehicle's exhaust system shall have no leaks or constrictions.

S5.3.5 The vehicle's propulsion, suspension, steering, and braking systems shall suffer no damage, shall remain in adjustment and shall operate in the normal manner.

S5.3.6 The vehicle shall not touch the test device except on the impact ridge shown in Figures 1 and 2.

S6. *Conditions.* The vehicle shall meet the requirements of S5 under the following conditions.

S6.1 *General.*

S6.1.1 The vehicle is at unloaded vehicle weight.

S6.1.2 The front wheels are parallel to the vehicle's longitudinal centerline.

S6.1.3 Tires are inflated to the vehicle manufacturer's recommended pressure for the specified loading condition.

S6.1.4 Brakes are disengaged and the transmission is in neutral.

S6.2 *Pendulum test conditions.* The following conditions apply to the pendulum test procedures of S7.1 and S7.2.

S6.2.1 The test device consists of a block with one side contoured as specified in figure 1 and figure 2 with the impact ridge made of hardened steel.

S6.2.2 With plan A vertical, the impact line shown in figures 1 and 2 is horizontal at the same height as the test device's center of percussion.

S6.2.3 The effective impacting mass of the test device is equal to the mass of the tested vehicle.

S6.2.4 When impacted by the test device, the vehicle is at rest on a level, rigid concrete surface.

S6.3 *Barrier test condition.* At the onset of a barrier impact, the vehicle's engine is operating at idling speed.

S7. *Test procedures.*

S7.1 *Longitudinal impact test procedures.* Impact the vehicle's front surface and its rear surface three times each with the impact line at the height of 20 inches, and three times each with the impact line at any height between 20 inches and 16 inches, in accordance with the following procedure.

S7.1.1 For impacts at a height of 20 inches, place the test device shown in figure 1 so that plane A is vertical and the impact line is horizontal at the specified height.

S7.1.2 For impacts at a height between 20 inches and 16 inches, place the test device shown in figure 2 so that plane A is vertical and the impact line is horizontal at a height within the range.

S7.1.3 For each impact, position the test device so that the impact line is at least 2 inches apart in vertical direction

from its position in any prior impact, unless the midpoint of the impact line with respect to the vehicle is to be more than 12 inches apart laterally from its position in any prior impact.

S7.1.4 For each impact, aline the vehicle so that it touches, but does not move, the test device, with the vehicle's longitudinal centerline perpendicular to the plane that includes plane A of the test device and with the test device inboard of the vehicle corner test positions specified in S7.2.

S7.1.5 Move the test device away from the vehicle, then release it so that plane A remains vertical from release until the onset of rebound, and the arc described by any point on the impact line is constant, with a radius of not less than 11 feet, and lies in a plane parallel to the vertical plane through the vehicle's longitudinal centerline.

S7.1.6 Impact the vehicle at 5 m.p.h.

S7.1.7 Perform the impacts at intervals of not less than 30 minutes.

S7.2 *Corner impact test procedure.* Impact a front corner and a rear corner of the vehicle once each with the impact line at a height of 20 inches and impact the other front corner and the other rear corner once each with the impact line at any height between 20 inches and 16 inches in accordance with the following procedure.

S7.2.1 For an impact at a height of 20 inches, place the test device shown in figure 1 so that plane A is vertical and the impact line is horizontal at the specified height.

S7.2.2 For an impact at a height between 20 inches and 16 inches, place the test device shown in figure 2 so that plane A is vertical and the impact line is horizontal at a height within the range.

S7.2.3 Align the vehicle so that a vehicle corner touches, but does not move, the lateral center of the test device, with plane A of the test device forming an angle of 60 degrees with a vertical longitudinal plane.

S7.2.4 Move the test device away from the vehicle, then release it so that plane A remains vertical from release until the onset of rebound, and the arc described by any point on the impact line is constant, with a radius of not less than 11 feet, and lies in a vertical plane at an angle of 30° to the vertical plane through the vehicle's longitudinal centerline.

S7.2.5 Impact each corner at 3 m.p.h.

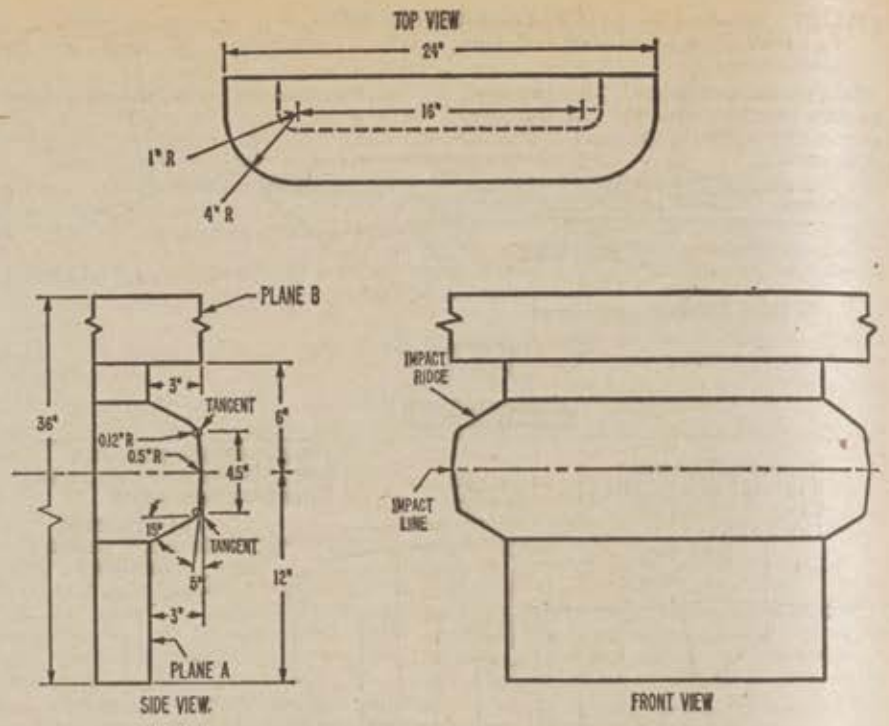



FIGURE 1

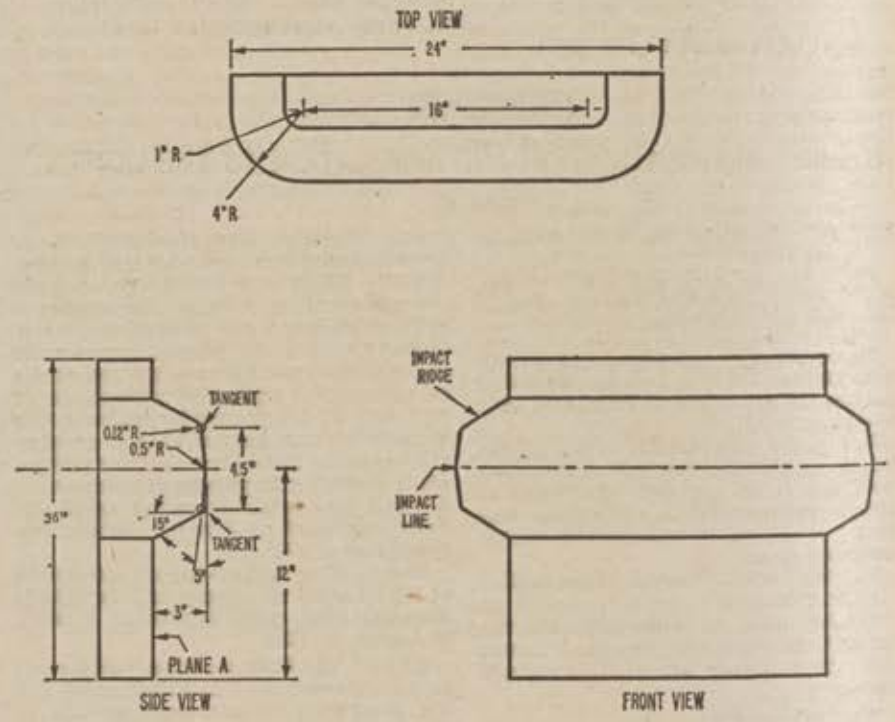



FIGURE 2

NOTE: *Effective date.* The amendments to the protective criteria are effective September 1, 1972. The amendments to S5.2, S7.2.5 and Figures 1 and 2 are effective September 1, 1973.

**§ 571.301 Standard No. 301; Fuel tanks, fuel tank filler pipes, and fuel tank connections.**

S1. *Purpose and scope.* This standard specifies requirements for the integrity and security of fuel tanks, fuel tank filler pipes, and fuel tank connections to minimize fire hazard as a result of collision.

S2. *Application.* This standard applies to passenger cars.

S3. *Requirements.* When tested in accordance with S4:

(a) Fuel tank filler pipes, fuel tank connections to fuel lines, and fuel tanks filled to at least 90 percent of capacity with a liquid having substantially the same viscosity as, and specific gravity no less than, the fuel used in the vehicle, shall not discharge fluid at a rate greater than 1 ounce (by weight) per minute after termination of impact.

(b) Fluid losses during impact shall not exceed 1 ounce (by weight).

S4. *Demonstration procedures.* Impact the vehicle perpendicularly into a fixed collision barrier at a forward longitudinal velocity of 30 miles per hour.

**§ 571.302 Standard No. 302; Flammability of interior materials. (Effective Sept. 1, 1972)**

S1. *Scope.* This standard specifies burn resistance requirements for materials used in the occupant compartments of motor vehicles.

S2. *Purpose.* The purpose of this standard is to reduce the deaths and injuries to motor vehicle occupants caused by vehicle fires, especially those originating in the interior of the vehicle from sources such as matches or cigarettes.

S3. *Application.* This standard applies to passenger cars, multipurpose passenger vehicles, trucks, and buses.

S4. *Requirements.*

S4.1 The portions described in S4.2 of the following components of vehicle occupant compartments shall meet the requirements of S4.3: Seat cushions, seat backs, seat belts, headlining, convertible tops, arm rests, all trim panels including door, front, rear, and side panels, compartment shelves, head restraints, floor coverings, sun visors, curtains, shades, wheel housing covers, engine compartment covers, mattress covers, and any other interior materials, including padding and crash-deployed elements, that are designed to absorb energy on contact by occupants in the event of a crash.

S4.2 The portions of the components that shall meet the requirements of S4.3 are all of the following:

(a) The surface material taken separately if it is not bonded, sewed or mechanically attached to underlying material.

(b) A composite consisting of the surface material bonded, sewed or mechanically attached to underlying material, if such a composite is used in the component.

(c) Padding and cushioning materials taken separately, if those materials are not bonded, sewed or mechanically attached to surface materials.

S4.3 Material described in S4.1 and S4.2 shall not burn, or transmit a flame front across its surface, at a rate of more than 4 inches per minute. However, if a material stops burning before it has burned for 60 seconds from the start of timing, and has not burned more than 2 inches from the point where timing was started, it shall be considered to meet this requirement.

S5. *Test procedure.*

S5.1 *Conditions.*

S5.1.1 The test is conducted in a metal cabinet for protecting the test specimens from drafts. The interior of the cabinet is 15 inches long, 8 inches deep, and 14 inches high. It has a glass observation window in the front, a closable opening to permit insertion of the specimen holder, and a hole to accommodate tubing for a gas burner. For ventilation, it has a ½-inch clearance space around the top of the cabinet, ten ¾-inch-diameter holes in the base of the cabinet, and legs to elevate the bottom of the cabinet by three-eighths of an inch, all located as shown in Figure 1.

S5.1.2 Prior to testing, each specimen is conditioned for 24 hours at a temperature of 70° F. and a relative humidity of 50 percent, and the test is conducted under those ambient conditions.

S5.1.3 The test specimen is inserted between two matching U-shaped frames of metal stock 1-inch wide and ⅜ of an inch high. The interior dimensions of the U-shaped frames are 2 inches wide by 13 inches long. A specimen that softens and bends at the flaming end so as to cause erratic burning is kept horizontal by supports consisting of thin, heat-resistant wires, spanning the width of the U-shaped frame under the specimen at 1-inch intervals. A device that may be used for supporting this type of material is an additional U-shaped frame, wider than the U-shaped frame containing the specimen, spanned by 10-mil wires of heat-resistant composition at 1-inch intervals, inserted over the bottom U-shaped frame.

S5.1.4 A bunsen burner with a tube of ⅜-inch inside diameter is used. The gas adjusting valve is set to provide a flame, with the tube vertical, of 1½ inches in height. The air inlet to the burner is closed.

S5.1.5 The gas supplied to the burner has a flame temperature equivalent to that of natural gas.

S5.2 *Preparation of specimens.*

S5.2.1 Each specimen of material to be tested is a rectangle 4 inches wide by 14 inches long, wherever possible. The thickness of the specimen is that of the material as used in the vehicle, except that where the material's thickness exceeds ½ inch the specimen is cut down to that thickness. Where it is not possible to obtain a flat specimen, because of component configuration, the specimen is cut to not more than ½ inch in thickness at any point, from the area with the least curvature, and in such a manner as to include the face side. The maximum available length or width of a specimen is used where either dimension is less than 14 inches or 4 inches respectively.

S5.2.2 Material with directional effects is oriented so as to provide the most adverse results.

S5.2.3 Material with a napped or tufted surface is placed on a flat surface and combed twice against the nap with a comb having seven to eight smooth, rounded teeth per inch.

S5.3 *Procedure.*

(a) Mount the specimen so that both sides and one end are held by the U-shaped frame, and one end is even with the open end of the frame. Where the maximum available width of a specimen is not more than 2 inches, so that the sides of the specimen cannot be held in the U-shaped frame, place the specimen in position on wire supports as described in S5.1.3, with one end held by the closed end of the U-shaped frame.

(b) Place the mounted specimen in a horizontal position, in the center of the cabinet.

(c) With the flame adjusted according to S5.1.4, position the bunsen burner and specimen so that the center of the burner tip is three-fourths of an inch below the center of the bottom edge of the open end of the specimen.

(d) Expose the specimen to the flame for 15 seconds.

(e) Begin timing (without reference to the period of application of the burner flame) when the flame from the burning specimen reaches a point 1½ inches from the open end of the specimen.

(f) Measure the time that it takes the flame to progress to a point 1½ inches from the clamped end of the specimen. If the flame does not reach the specified end point, time its progress to the point where flaming stops.

(g) Calculate the burn rate from the formula

$$B = 60 \times \frac{D}{T}$$

Where:

$B$ = Burn rate in inches per minute,
$D$ = Length the flame travels in inches, and
$T$ = Time in seconds for the flame to travel $D$ inches.

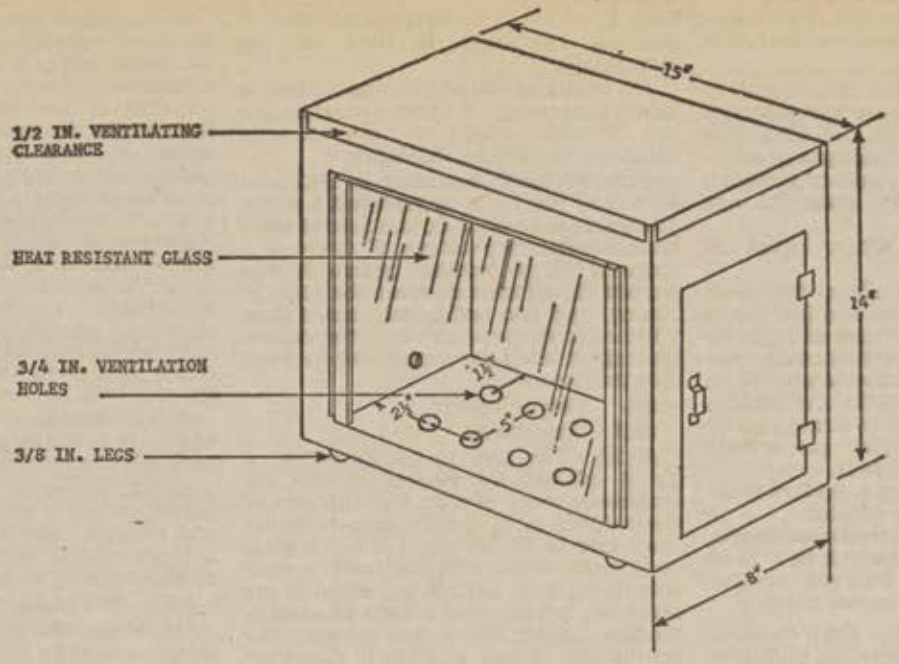



FIGURE 1

[FR Doc.71-17612 Filed 12-1-71;8:51 am]

# Title 7—AGRICULTURE

## Chapter VII—Agricultural Stabilization and Conservation Service (Agricultural Adjustment), Department of Agriculture

SUBCHAPTER B—FARM MARKETING QUOTAS AND ACREAGE ALLOTMENTS

## PART 722—COTTON

### Subpart—1972 Crop of Upland Cotton; Base Acreage Allotments

STATE RESERVES AND COUNTY BASE ACREAGE ALLOTMENTS

Section 722.467 is issued pursuant to the Agricultural Adjustment Act of 1938, as amended (7 U.S.C. 1281 et seq.) (referred to as the "act"), with respect to the 1972 crop of upland cotton (referred to as "cotton"). The purpose of this section is to establish State reserves, allocate the State reserves to counties and establish county base acreage allotments (referred to as "county allotments"). Determinations with respect to the State reserves and county allotments were made initially by the respective State committees and are hereby approved and made effective by the Administrator, ASCS, pursuant to delegated authority (29 F.R. 16210, 35 F.R. 19798, 36 F.R. 6907, 21529).

In order that farmers may be informed as soon as possible of 1972 farm base acreage allotments so that they may make plans for their 1972 farming operations, it is essential that this section be made effective immediately. Accordingly, § 722.467 shall be effective upon filing this document with the Director, Office of the Federal Register.

**§ 722.467 State reserve and county allotments for the 1972 crop of cotton.**

(a) *State reserves.* The total State reserve for all uses established by the State committee shall not exceed 2 percent of the State allotment available for distribution to counties in the State. The allotment available for distribution shall be the State's share of the national allotment less the allotment in the State productivity pool attributable to history acreage pooled as a result of productivity adjustments under section 344a(f) of the act. The State committee may determine that no reserve for any one or more uses, or all uses, specified under section 350(c) of the act, shall be established. It is hereby determined that no State reserve for abnormal conditions is required, and the reserve for each State shall be established and allocated among uses as shown in the following table. The table also sets forth the allotment in the State productivity pool which shall not be allocated to counties and farms.

| State | State productivity pool | Total State reserve | Allocations from State reserve for: Trends | Small farms | Inequity and hardship cases | New farms and correction of errors |
|---|---|---|---|---|---|---|
| | *Acres* | *Acres* | *Acres* | *Acres* | *Acres* | *Acres* |
| Alabama | 12,043 | 78 | | | | 78 |
| Arizona | 1,945 | 8 | | | | 8 |
| Arkansas | 18,609 | 370 | 310 | | | 60 |
| California | 2,913 | 50 | | | | 50 |
| Florida | 908 | 199 | | | | 199 |
| Georgia | 15,488 | 106 | | | | 106 |
| Illinois | 62 | | | | | |
| Kansas | | | | | | |
| Kentucky | 36 | 98 | | | | 98 |
| Louisiana | 14,295 | 7,721 | 7,034 | | 687 | |
| Mississippi | 15,243 | 21,694 | 21,669 | | | 25 |
| Missouri | 328 | 30 | | | | 30 |
| Nevada | 7 | | | | | |
| New Mexico | 271 | 26 | | | 1 | 25 |
| North Carolina | 1,203 | 203 | | | | 203 |
| Oklahoma | 6,264 | 10,533 | 10,383 | | | 150 |
| South Carolina | 4,906 | 9,447 | 9,347 | | | 100 |
| Tennessee | 2,608 | 7,484 | 7,433 | | | 51 |
| Texas | 95,603 | 6,026 | 5,254 | | | 772 |
| Virginia | 22 | 211 | | 100 | 100 | 11 |
| U.S. total | 192,804 | 64,374 | 61,430 | 100 | 788 | 2,056 |

(b) *Apportionment of State allotment to counties*—(1) *Computed county allotment.* The State allotment less the allotment in the State productivity pool and the State reserve is apportioned among counties in the State on the basis of the acreage planted (including acreage regarded as having been planted) to cotton within the farm acreage allotment during the 5 calendar years 1966 through 1970

adjusted for abnormal weather conditions or other natural disaster. It is hereby determined that no adjustments for abnormal weather conditions or other natural disaster are required. The acreage apportioned under this paragraph is referred to as the computed county allotment.

(2) *County allotments.* The county allotment is the sum of the computed county allotment and allocation to the county from the State reserve for trends. The following table sets forth the county allotment and allocations from the State reserve.

ALABAMA

| County | Computed county allotment | Allocation from State reserves for trends | County allotment (sum of columns (1) and (2)) | Allocation from State reserve for: | |
|---|---|---|---|---|---|
| | | | | Small farms | Inequity and hardship cases |
| | (1) | (2) | (3) | (4) | (5) |
| | *Acres* | *Acres* | *Acres* | *Acres* | *Acres* |
| Autauga | 6,742 | 0 | 6,742 | 0 | 0 |
| Baldwin | 1,931 | 0 | 1,931 | 0 | 0 |
| Barbour | 9,195 | 0 | 9,195 | 0 | 0 |
| Bibb | 2,661 | 0 | 2,661 | 0 | 0 |
| Blount | 11,555 | 0 | 11,555 | 0 | 0 |
| Bullock | 5,811 | 0 | 5,811 | 0 | 0 |
| Butler | 6,382 | 0 | 6,382 | 0 | 0 |
| Calhoun | 4,644 | 0 | 4,644 | 0 | 0 |
| Chambers | 5,264 | 0 | 5,264 | 0 | 0 |
| Cherokee | 15,626 | 0 | 15,626 | 0 | 0 |
| Chilton | 6,460 | 0 | 6,460 | 0 | 0 |
| Choctaw | 4,413 | 0 | 4,413 | 0 | 0 |
| Clarke | 3,948 | 0 | 3,948 | 0 | 0 |
| Clay | 1,336 | 0 | 1,336 | 0 | 0 |
| Cleburne | 1,254 | 0 | 1,254 | 0 | 0 |
| Coffee | 11,895 | 0 | 11,895 | 0 | 0 |
| Colbert | 15,260 | 0 | 15,260 | 0 | 0 |
| Conecuh | 8,349 | 0 | 8,349 | 0 | 0 |
| Coosa | 715 | 0 | 715 | 0 | 0 |
| Covington | 10,654 | 0 | 10,654 | 0 | 0 |
| Crenshaw | 6,621 | 0 | 6,621 | 0 | 0 |
| Cullman | 22,873 | 0 | 22,873 | 0 | 0 |
| Dale | 5,344 | 0 | 5,344 | 0 | 0 |
| Dallas | 18,356 | 0 | 18,356 | 0 | 0 |
| DeKalb | 21,763 | 0 | 21,763 | 0 | 0 |
| Elmore | 10,671 | 0 | 10,671 | 0 | 0 |
| Escambia | 7,182 | 0 | 7,182 | 0 | 0 |
| Etowah | 8,184 | 0 | 8,184 | 0 | 0 |
| Fayette | 6,087 | 0 | 6,087 | 0 | 0 |
| Franklin | 9,180 | 0 | 9,180 | 0 | 0 |
| Geneva | 13,193 | 0 | 13,193 | 0 | 0 |
| Greene | 8,986 | 0 | 8,986 | 0 | 0 |
| Hale | 10,338 | 0 | 10,338 | 0 | 0 |
| Henry | 10,707 | 0 | 10,707 | 0 | 0 |
| Houston | 17,899 | 0 | 17,899 | 0 | 0 |
| Jackson | 16,647 | 0 | 16,647 | 0 | 0 |
| Jefferson | 2,478 | 0 | 2,478 | 0 | 0 |
| Lamar | 7,323 | 0 | 7,323 | 0 | 0 |
| Lauderdale | 18,992 | 0 | 18,992 | 0 | 0 |
| Lawrence | 27,332 | 0 | 27,332 | 0 | 0 |
| Lee | 6,301 | 0 | 6,301 | 0 | 0 |
| Limestone | 37,564 | 0 | 37,564 | 0 | 0 |
| Lowndes | 7,146 | 0 | 7,146 | 0 | 0 |
| Macon | 10,797 | 0 | 10,797 | 0 | 0 |
| Madison | 41,817 | 0 | 41,817 | 0 | 0 |
| Marengo | 11,185 | 0 | 11,185 | 0 | 0 |
| Marion | 8,742 | 0 | 8,742 | 0 | 0 |
| Marshall | 20,263 | 0 | 20,263 | 0 | 0 |
| Mobile | 1,936 | 0 | 1,936 | 0 | 0 |
| Monroe | 12,136 | 0 | 12,136 | 0 | 0 |
| Montgomery | 6,846 | 0 | 6,846 | 0 | 0 |
| Morgan | 19,141 | 0 | 19,141 | 0 | 0 |
| Perry | 7,493 | 0 | 7,493 | 0 | 0 |
| Pickens | 10,193 | 0 | 10,193 | 0 | 0 |
| Pike | 10,035 | 0 | 10,035 | 0 | 0 |
| Randolph | 4,034 | 0 | 4,034 | 0 | 0 |
| Russell | 6,591 | 0 | 6,591 | 0 | 0 |

ALABAMA—Continued

| County | Computed county allotment | Allocation from State reserves for trends | County allotment (sum of columns (1) and (2)) | Allocation from State reserve for: | |
|---|---|---|---|---|---|
| | | | | Small farms | Inequity and hardship cases |
| | (1) | (2) | (3) | (4) | (5) |
| | *Acres* | *Acres* | *Acres* | *Acres* | *Acres* |
| St. Clair | 2,598 | 0 | 2,598 | 0 | 0 |
| Shelby | 4,262 | 0 | 4,262 | 0 | 0 |
| Sumter | 9,428 | 0 | 9,428 | 0 | 0 |
| Talladega | 8,387 | 0 | 8,387 | 0 | 0 |
| Tallapoosa | 4,806 | 0 | 4,806 | 0 | 0 |
| Tuscaloosa | 11,125 | 0 | 11,125 | 0 | 0 |
| Walker | 4,014 | 0 | 4,014 | 0 | 0 |
| Washington | 1,747 | 0 | 1,747 | 0 | 0 |
| Wilcox | 7,697 | 0 | 7,697 | 0 | 0 |
| Winston | 4,778 | 0 | 4,778 | 0 | 0 |
| ARIZONA | | | | | |
| Cochise | 10,676 | 0 | 10,676 | 0 | 0 |
| Gila | 27 | 0 | 27 | 0 | 0 |
| Graham | 6,339 | 0 | 6,339 | 0 | 0 |
| Greenlee | 1,292 | 0 | 1,292 | 0 | 0 |
| Maricopa | 87,490 | 0 | 87,490 | 0 | 0 |
| Mohave | 203 | 0 | 203 | 0 | 0 |
| Pima | 13,278 | 0 | 13,278 | 0 | 0 |
| Pinal | 94,168 | 0 | 94,168 | 0 | 0 |
| Santa Cruz | 229 | 0 | 229 | 0 | 0 |
| Yavapai | 9 | 0 | 9 | 0 | 0 |
| Yuma | 23,038 | 0 | 23,038 | 0 | 0 |
| ARKANSAS | | | | | |
| Arkansas | 6,843 | 0 | 6,843 | 0 | 0 |
| Ashley | 19,228 | 2 | 19,230 | 0 | 0 |
| Baxter | 5 | 2 | 7 | 0 | 0 |
| Bradley | 1,779 | 3 | 1,782 | 0 | 0 |
| Calhoun | 1,347 | 4 | 1,351 | 0 | 0 |
| Chicot | 24,403 | 5 | 24,408 | 0 | 0 |
| Clark | 2,043 | 0 | 2,043 | 0 | 0 |
| Clay | 25,172 | 25 | 25,197 | 0 | 0 |
| Cleburne | 467 | 6 | 473 | 0 | 0 |
| Cleveland | 1,097 | 0 | 1,097 | 0 | 0 |
| Columbia | 2,375 | 0 | 2,375 | 0 | 0 |
| Conway | 3,902 | 5 | 3,907 | 0 | 0 |
| Craighead | 58,594 | 10 | 58,604 | 0 | 0 |
| Crawford | 18 | 1 | 19 | 0 | 0 |
| Crittenden | 69,315 | 0 | 69,315 | 0 | 0 |
| Cross | 26,738 | 0 | 26,738 | 0 | 0 |
| Dallas | 1,136 | 1 | 1,137 | 0 | 0 |
| Desha | 31,106 | 13 | 31,119 | 0 | 0 |
| Drew | 9,770 | 0 | 9,770 | 0 | 0 |
| Faulkner | 6,008 | 3 | 6,011 | 0 | 0 |
| Franklin | 281 | 0 | 281 | 0 | 0 |
| Fulton | 124 | 0 | 124 | 0 | 0 |
| Grant | 50 | 2 | 52 | 0 | 0 |
| Greene | 27,174 | 0 | 27,174 | 0 | 0 |
| Hempstead | 2,219 | 0 | 2,219 | 0 | 0 |
| Hot Spring | 40 | 9 | 49 | 0 | 0 |
| Howard | 828 | 4 | 832 | 0 | 0 |
| Independence | 2,995 | 9 | 3,004 | 0 | 0 |
| Izard | 289 | 0 | 289 | 0 | 0 |
| Jackson | 30,693 | 0 | 30,693 | 0 | 0 |
| Jefferson | 51,546 | 4 | 51,550 | 0 | 0 |
| Johnson | 557 | 0 | 557 | 0 | 0 |
| Lafayette | 9,936 | 9 | 9,945 | 0 | 0 |
| Lawrence | 14,120 | 13 | 14,133 | 0 | 0 |
| Lee | 41,454 | 0 | 41,454 | 0 | 0 |
| Lincoln | 22,780 | 23 | 22,803 | 0 | 0 |
| Little River | 3,283 | 0 | 3,283 | 0 | 0 |

ARKANSAS—Continued

| County | Computed county allotment | Allocation from State reserves for trends | County allotment (sum of columns (1) and (2)) | Allocation from State reserve for: | |
|---|---|---|---|---|---|
| | | | | Small farms | Inequity and hardship cases |
| | (1) | (2) | (3) | (4) | (5) |
| | Acres | Acres | Acres | Acres | Acres |
| Logan | 829 | 4 | 833 | 0 | 0 |
| Lonoke | 33,883 | 25 | 33,908 | 0 | 0 |
| Marion | 2 | 0 | 2 | 0 | 0 |
| Miller | 6,325 | 0 | 6,325 | 0 | 0 |
| Mississippi | 129,326 | 18 | 129,344 | 0 | 0 |
| Monroe | 27,606 | 0 | 27,606 | 0 | 0 |
| Nevada | 564 | 16 | 580 | 0 | 0 |
| Newton | 24 | 0 | 24 | 0 | 0 |
| Ouachita | 1,574 | 0 | 1,574 | 0 | 0 |
| Perry | 597 | 2 | 599 | 0 | 0 |
| Phillips | 58,483 | 3 | 58,486 | 0 | 0 |
| Pike | 160 | 2 | 162 | 0 | 0 |
| Poinsett | 60,295 | 0 | 60,295 | 0 | 0 |
| Pope | 1,646 | 9 | 1,655 | 0 | 0 |
| Prairie | 6,069 | 7 | 6,076 | 0 | 0 |
| Pulaski | 11,987 | 7 | 11,994 | 0 | 0 |
| Randolph | 6,555 | 7 | 6,562 | 0 | 0 |
| St. Francis | 46,684 | 0 | 46,684 | 0 | 0 |
| Scott | 11 | 0 | 11 | 0 | 0 |
| Searcy | 100 | 0 | 100 | 0 | 0 |
| Sebastian | 98 | 4 | 102 | 0 | 0 |
| Sevier | 115 | 0 | 115 | 0 | 0 |
| Sharp | 261 | 0 | 261 | 0 | 0 |
| Union | 26 | 14 | 40 | 0 | 0 |
| Van Buren | 119 | 16 | 135 | 0 | 0 |
| Washington | 1 | 2 | 3 | 0 | 0 |
| White | 9,821 | 21 | 9,842 | 0 | 0 |
| Woodruff | 26,116 | 0 | 26,116 | 0 | 0 |
| Yell | 3,976 | 0 | 3,976 | 0 | 0 |
| CALIFORNIA | | | | | |
| Fresno | 133,086 | 0 | 133,086 | 0 | 0 |
| Imperial | 34,048 | 0 | 34,048 | 0 | 0 |
| Kern | 127,324 | 0 | 127,324 | 0 | 0 |
| Kings | 68,886 | 0 | 68,886 | 0 | 0 |
| Madera | 32,510 | 0 | 32,510 | 0 | 0 |
| Merced | 18,753 | 0 | 18,753 | 0 | 0 |
| Riverside | 13,808 | 0 | 13,808 | 0 | 0 |
| San Benito | 102 | 0 | 102 | 0 | 0 |
| San Bernardino | 260 | 0 | 260 | 0 | 0 |
| San Diego | 46 | 0 | 46 | 0 | 0 |
| Stanislaus | 37 | 0 | 37 | 0 | 0 |
| Tulare | 99,441 | 0 | 99,441 | 0 | 0 |
| FLORIDA | | | | | |
| Alachua | 45 | 0 | 45 | 0 | 0 |
| Baker | 2 | 0 | 2 | 0 | 0 |
| Bay | 3 | 0 | 3 | 0 | 0 |
| Calhoun | 237 | 0 | 237 | 0 | 0 |
| Columbia | 158 | 0 | 158 | 0 | 0 |
| Dixie | 8 | 0 | 8 | 0 | 0 |
| Escambia | 860 | 0 | 860 | 0 | 0 |
| Gadsden | 45 | 0 | 45 | 0 | 0 |
| Hamilton | 785 | 0 | 785 | 0 | 0 |
| Holmes | 2,794 | 0 | 2,794 | 0 | 0 |
| Jackson | 5,134 | 0 | 5,134 | 0 | 0 |
| Jefferson | 928 | 0 | 928 | 0 | 0 |
| Lafayette | 146 | 0 | 146 | 0 | 0 |
| Leon | 159 | 0 | 159 | 0 | 0 |
| Levy | 4 | 0 | 4 | 0 | 0 |
| Liberty | 11 | 0 | 11 | 0 | 0 |
| Madison | 1,811 | 0 | 1,811 | 0 | 0 |

FLORIDA—Continued

| County | Computed county allotment | Allocation from State reserves for trends | County allotment (sum of columns (1) and (2)) | Allocation from State reserve for: | |
|---|---|---|---|---|---|
| | | | | Small farms | Inequity and hardship cases |
| | (1) | (2) | (3) | (4) | (5) |
| | Acres | Acres | Acres | Acres | Acres |
| Okaloosa | 655 | 0 | 655 | 0 | 0 |
| Santa Rosa | 4,847 | 0 | 4,847 | 0 | 0 |
| Suwannee | 460 | 0 | 460 | 0 | 0 |
| Taylor | 14 | 0 | 14 | 0 | 0 |
| Union | 13 | 0 | 13 | 0 | 0 |
| Walton | 1,442 | 0 | 1,442 | 0 | 0 |
| Washington | 486 | 0 | 486 | 0 | 0 |
| GEORGIA | | | | | |
| Appling | 2,993 | 0 | 2,993 | 0 | 0 |
| Atkinson | 675 | 0 | 675 | 0 | 0 |
| Bacon | 1,554 | 0 | 1,554 | 0 | 0 |
| Baker | 2,202 | 0 | 2,202 | 0 | 0 |
| Baldwin | 1,552 | 0 | 1,552 | 0 | 0 |
| Banks | 1,624 | 0 | 1,624 | 0 | 0 |
| Barrow | 3,719 | 0 | 3,719 | 0 | 0 |
| Bartow | 12,079 | 0 | 12,079 | 0 | 0 |
| Ben Hill | 3,558 | 0 | 3,558 | 0 | 0 |
| Berrien | 2,451 | 0 | 2,451 | 0 | 0 |
| Bibb | 525 | 0 | 525 | 0 | 0 |
| Bleckley | 5,111 | 0 | 5,111 | 0 | 0 |
| Brantley | 30 | 0 | 30 | 0 | 0 |
| Brooks | 6,083 | 0 | 6,083 | 0 | 0 |
| Bryan | 140 | 0 | 140 | 0 | 0 |
| Bulloch | 9,986 | 0 | 9,986 | 0 | 0 |
| Burke | 24,457 | 0 | 24,457 | 0 | 0 |
| Butts | 2,726 | 0 | 2,726 | 0 | 0 |
| Calhoun | 3,896 | 0 | 3,896 | 0 | 0 |
| Candler | 4,612 | 0 | 4,612 | 0 | 0 |
| Carroll | 4,377 | 0 | 4,377 | 0 | 0 |
| Catoosa | 259 | 0 | 259 | 0 | 0 |
| Charlton | 9 | 0 | 9 | 0 | 0 |
| Chatham | 23 | 0 | 23 | 0 | 0 |
| Chattahoochee | 34 | 0 | 34 | 0 | 0 |
| Chattooga | 2,977 | 0 | 2,977 | 0 | 0 |
| Cherokee | 114 | 0 | 114 | 0 | 0 |
| Clarke | 1,067 | 0 | 1,067 | 0 | 0 |
| Clay | 2,347 | 0 | 2,347 | 0 | 0 |
| Clayton | 198 | 0 | 198 | 0 | 0 |
| Clinch | 94 | 0 | 94 | 0 | 0 |
| Cobb | 115 | 0 | 115 | 0 | 0 |
| Coffee | 4,903 | 0 | 4,903 | 0 | 0 |
| Colquitt | 15,311 | 0 | 15,311 | 0 | 0 |
| Columbia | 1,086 | 0 | 1,086 | 0 | 0 |
| Cook | 2,708 | 0 | 2,708 | 0 | 0 |
| Coweta | 3,957 | 0 | 3,957 | 0 | 0 |
| Crawford | 1,151 | 0 | 1,151 | 0 | 0 |
| Crisp | 7,451 | 0 | 7,451 | 0 | 0 |
| Dade | 111 | 0 | 111 | 0 | 0 |
| Dawson | 101 | 0 | 101 | 0 | 0 |
| Decatur | 2,768 | 0 | 2,768 | 0 | 0 |
| De Kalb | 32 | 0 | 32 | 0 | 0 |
| Dodge | 9,388 | 0 | 9,388 | 0 | 0 |
| Dooly | 19,187 | 0 | 19,187 | 0 | 0 |
| Dougherty | 1,325 | 0 | 1,325 | 0 | 0 |
| Douglas | 22 | 0 | 22 | 0 | 0 |
| Early | 9,416 | 0 | 9,416 | 0 | 0 |
| Echols | 36 | 0 | 36 | 0 | 0 |
| Effingham | 1,062 | 0 | 1,062 | 0 | 0 |
| Elbert | 5,949 | 0 | 5,949 | 0 | 0 |
| Emanuel | 11,488 | 0 | 11,488 | 0 | 0 |
| Evans | 1,782 | 0 | 1,782 | 0 | 0 |
| Fayette | 565 | 0 | 565 | 0 | 0 |
| Floyd | 5,298 | 0 | 5,298 | 0 | 0 |
| Forsyth | 508 | 0 | 508 | 0 | 0 |

GEORGIA—Continued

| County | Computed county allotment | Allocation from State reserves for trends | County allotment (sum of columns (1) and (2)) | Allocation from State reserve for: Small farms | Allocation from State reserve for: Inequity and hardship cases |
|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) |
| | Acres | Acres | Acres | Acres | Acres |
| Franklin | 5,081 | 0 | 5,081 | 0 | 0 |
| Fulton | 350 | 0 | 350 | 0 | 0 |
| Glascock | 3,328 | 0 | 3,328 | 0 | 0 |
| Gordon | 6,653 | 0 | 6,653 | 0 | 0 |
| Grady | 2,499 | 0 | 2,499 | 0 | 0 |
| Greene | 1,603 | 0 | 1,603 | 0 | 0 |
| Gwinnett | 1,466 | 0 | 1,466 | 0 | 0 |
| Habersham | 30 | 0 | 30 | 0 | 0 |
| Hall | 934 | 0 | 934 | 0 | 0 |
| Hancock | 5,379 | 0 | 5,379 | 0 | 0 |
| Haralson | 488 | 0 | 488 | 0 | 0 |
| Harris | 951 | 0 | 951 | 0 | 0 |
| Hart | 7,814 | 0 | 7,814 | 0 | 0 |
| Heard | 609 | 0 | 609 | 0 | 0 |
| Henry | 5,089 | 0 | 5,089 | 0 | 0 |
| Houston | 3,969 | 0 | 3,969 | 0 | 0 |
| Irwin | 6,868 | 0 | 6,868 | 0 | 0 |
| Jackson | 3,960 | 0 | 3,960 | 0 | 0 |
| Jasper | 1,864 | 0 | 1,864 | 0 | 0 |
| Jeff Davis | 1,588 | 0 | 1,588 | 0 | 0 |
| Jefferson | 13,513 | 0 | 13,513 | 0 | 0 |
| Jenkins | 8,127 | 0 | 8,127 | 0 | 0 |
| Johnson | 10,734 | 0 | 10,734 | 0 | 0 |
| Jones | 38 | 0 | 38 | 0 | 0 |
| Lamar | 1,504 | 0 | 1,504 | 0 | 0 |
| Lanier | 473 | 0 | 473 | 0 | 0 |
| Laurens | 20,004 | 0 | 20,004 | 0 | 0 |
| Lee | 2,578 | 0 | 2,578 | 0 | 0 |
| Liberty | 87 | 0 | 87 | 0 | 0 |
| Lincoln | 1,202 | 0 | 1,202 | 0 | 0 |
| Long | 348 | 0 | 348 | 0 | 0 |
| Lowndes | 2,247 | 0 | 2,247 | 0 | 0 |
| Lumpkin | 29 | 0 | 29 | 0 | 0 |
| McDuffie | 4,124 | 0 | 4,124 | 0 | 0 |
| Macon | 8,435 | 0 | 8,435 | 0 | 0 |
| Madison | 6,738 | 0 | 6,738 | 0 | 0 |
| Marion | 2,506 | 0 | 2,506 | 0 | 0 |
| Meriwether | 7,057 | 0 | 7,057 | 0 | 0 |
| Miller | 4,046 | 0 | 4,046 | 0 | 0 |
| Mitchell | 8,649 | 0 | 8,649 | 0 | 0 |
| Monroe | 448 | 0 | 448 | 0 | 0 |
| Montgomery | 2,650 | 0 | 2,650 | 0 | 0 |
| Morgan | 9,664 | 0 | 9,664 | 0 | 0 |
| Murray | 1,737 | 0 | 1,737 | 0 | 0 |
| Newton | 3,982 | 0 | 3,982 | 0 | 0 |
| Oconee | 5,442 | 0 | 5,442 | 0 | 0 |
| Oglethorpe | 4,503 | 0 | 4,503 | 0 | 0 |
| Paulding | 327 | 0 | 327 | 0 | 0 |
| Peach | 1,586 | 0 | 1,586 | 0 | 0 |
| Pickens | 9 | 0 | 9 | 0 | 0 |
| Pierce | 1,498 | 0 | 1,498 | 0 | 0 |
| Pike | 4,036 | 0 | 4,036 | 0 | 0 |
| Polk | 4,114 | 0 | 4,114 | 0 | 0 |
| Pulaski | 7,309 | 0 | 7,309 | 0 | 0 |
| Putnam | 571 | 0 | 571 | 0 | 0 |
| Quitman | 808 | 0 | 808 | 0 | 0 |
| Randolph | 4,263 | 0 | 4,263 | 0 | 0 |
| Richmond | 1,613 | 0 | 1,613 | 0 | 0 |
| Rockdale | 1,284 | 0 | 1,284 | 0 | 0 |
| Schley | 2,499 | 0 | 2,499 | 0 | 0 |
| Screven | 11,280 | 0 | 11,280 | 0 | 0 |
| Seminole | 3,290 | 0 | 3,290 | 0 | 0 |
| Spalding | 1,527 | 0 | 1,527 | 0 | 0 |
| Stephens | 353 | 0 | 353 | 0 | 0 |
| Stewart | 2,051 | 0 | 2,051 | 0 | 0 |
| Sumter | 8,087 | 0 | 8,087 | 0 | 0 |
| Talbot | 715 | 0 | 715 | 0 | 0 |

GEORGIA—Continued

| County | Computed county allotment | Allocation from State reserves for trends | County allotment (sum of columns (1) and (2)) | Allocation from State reserve for: Small farms | Allocation from State reserve for: Inequity and hardship cases |
|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) |
| | Acres | Acres | Acres | Acres | Acres |
| Taliaferro | 476 | 0 | 476 | 0 | 0 |
| Tattnall | 3,531 | 0 | 3,531 | 0 | 0 |
| Taylor | 5,159 | 0 | 5,159 | 0 | 0 |
| Telfair | 3,282 | 0 | 3,282 | 0 | 0 |
| Terrell | 9,349 | 0 | 9,349 | 0 | 0 |
| Thomas | 4,160 | 0 | 4,160 | 0 | 0 |
| Tift | 4,643 | 0 | 4,643 | 0 | 0 |
| Toombs | 5,193 | 0 | 5,193 | 0 | 0 |
| Treutlen | 2,310 | 0 | 2,310 | 0 | 0 |
| Troup | 825 | 0 | 825 | 0 | 0 |
| Turner | 5,592 | 0 | 5,592 | 0 | 0 |
| Twiggs | 2,197 | 0 | 2,197 | 0 | 0 |
| Upson | 484 | 0 | 484 | 0 | 0 |
| Walker | 557 | 0 | 557 | 0 | 0 |
| Walton | 13,101 | 0 | 13,101 | 0 | 0 |
| Ware | 564 | 0 | 564 | 0 | 0 |
| Warren | 7,360 | 0 | 7,360 | 0 | 0 |
| Washington | 11,843 | 0 | 11,843 | 0 | 0 |
| Wayne | 1,465 | 0 | 1,465 | 0 | 0 |
| Webster | 1,175 | 0 | 1,175 | 0 | 0 |
| Wheeler | 2,304 | 0 | 2,304 | 0 | 0 |
| White | 231 | 0 | 231 | 0 | 0 |
| Whitfield | 447 | 0 | 447 | 0 | 0 |
| Wilcox | 7,676 | 0 | 7,676 | 0 | 0 |
| Wilkes | 2,098 | 0 | 2,098 | 0 | 0 |
| Wilkinson | 1,608 | 0 | 1,608 | 0 | 0 |
| Worth | 13,531 | 0 | 13,531 | 0 | 0 |
| **ILLINOIS** | | | | | |
| Alexander | 1,204 | 0 | 1,204 | 0 | 0 |
| Massac | 2 | 0 | 2 | 0 | 0 |
| Pulaski | 800 | 0 | 800 | 0 | 0 |
| **KANSAS** | | | | | |
| Montgomery | 8 | 0 | 8 | 0 | 0 |
| **KENTUCKY** | | | | | |
| Ballard | 3 | 0 | 3 | 0 | 0 |
| Calloway | 32 | 0 | 32 | 0 | 0 |
| Carlisle | 32 | 0 | 32 | 0 | 0 |
| Fulton | 4,043 | 0 | 4,043 | 0 | 0 |
| Graves | 96 | 0 | 96 | 0 | 0 |
| Hickman | 572 | 0 | 572 | 0 | 0 |
| McCracken | 3 | 0 | 3 | 0 | 0 |
| Marshall | 7 | 0 | 7 | 0 | 0 |
| **LOUISIANA** | | | | | |
| Acadia | 6,773 | 0 | 6,773 | 0 | 137 |
| Allen | 329 | 0 | 329 | 0 | 0 |
| Avoyelles | 15,110 | 453 | 15,563 | 0 | 0 |
| Beauregard | 118 | 0 | 118 | 0 | 1 |
| Bienville | 617 | 0 | 617 | 0 | 0 |
| Bossier | 12,840 | 204 | 13,044 | 0 | 0 |
| Caddo | 23,280 | 359 | 23,599 | 0 | 0 |
| Caldwell | 5,892 | 129 | 6,021 | 0 | 0 |

LOUISIANA—Continued

| County | Computed county allotment | Allocation from State reserves for trends | County allotment (sum of columns (1) and (2)) | Allocation from State reserve for: Small farms | Allocation from State reserve for: Inequity and hardship cases |
|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) |
| | Acres | Acres | Acres | Acres | Acres |
| Catahoula | 8,888 | 236 | 9,124 | 0 | 0 |
| Claiborne | 1,118 | 0 | 1,118 | 0 | 0 |
| Concordia | 7,141 | 197 | 7,338 | 0 | 0 |
| De Soto | 3,818 | 0 | 3,818 | 0 | 83 |
| East Baton Rouge | 125 | 0 | 125 | 0 | 0 |
| East Carroll | 24,574 | 542 | 25,116 | 0 | 0 |
| East Feliciana | 189 | 0 | 189 | 0 | 0 |
| Evangeline | 10,149 | 122 | 10,273 | 0 | 0 |
| Franklin | 42,392 | 849 | 43,201 | 0 | 0 |
| Grant | 3,251 | 66 | 3,317 | 0 | 0 |
| Iberia | 49 | 0 | 49 | 0 | 0 |
| Iberville | 161 | 0 | 161 | 0 | 3 |
| Jackson | 289 | 0 | 289 | 0 | 0 |
| Jefferson Davis | 38 | 0 | 38 | 0 | 0 |
| Lafayette | 7,400 | 0 | 7,400 | 0 | 175 |
| La Salle | 352 | 11 | 363 | 0 | 0 |
| Lincoln | 168 | 0 | 168 | 0 | 0 |
| Livingston | 8 | 0 | 8 | 0 | 0 |
| Madison | 16,355 | 292 | 16,647 | 0 | 0 |
| Morehouse | 27,108 | 513 | 27,621 | 0 | 0 |
| Natchitoches | 15,739 | 323 | 16,062 | 0 | 0 |
| Ouachita | 10,786 | 202 | 10,988 | 0 | 0 |
| Pointe Coupee | 4,763 | 0 | 4,763 | 0 | 31 |
| Rapides | 14,283 | 268 | 14,551 | 0 | 0 |
| Red River | 7,272 | 241 | 7,513 | 0 | 0 |
| Richland | 37,326 | 780 | 38,106 | 0 | 0 |
| Sabine | 185 | 0 | 185 | 0 | 54 |
| St. Helena | 1,078 | 0 | 1,078 | 0 | 17 |
| St. Landry | 22,641 | 304 | 22,945 | 0 | 0 |
| St. Martin | 3,663 | 0 | 3,663 | 0 | 69 |
| Tangipahoa | 53 | 0 | 53 | 0 | 6 |
| Tensas | 15,731 | 356 | 16,087 | 0 | 0 |
| Union | 1,119 | 0 | 1,119 | 0 | 20 |
| Vermilion | 2,087 | 0 | 2,087 | 0 | 0 |
| Vernon | 115 | 0 | 115 | 0 | 27 |
| Washington | 1,079 | 0 | 1,079 | 0 | 0 |
| Webster | 553 | 0 | 553 | 0 | 51 |
| West Baton Rouge | 223 | 0 | 223 | 0 | 0 |
| West Carroll | 20,307 | 587 | 20,894 | 0 | 0 |
| West Feliciana | 544 | 0 | 544 | 0 | 0 |
| Winn | 300 | 0 | 300 | 0 | 4 |

MISSISSIPPI

| | | | | | |
|---|---|---|---|---|---|
| Adams | 1,450 | 10 | 1,460 | 0 | 0 |
| Alcorn | 9,213 | 471 | 9,684 | 0 | 0 |
| Amite | 2,010 | 20 | 2,030 | 0 | 0 |
| Attala | 8,727 | 326 | 9,053 | 0 | 0 |
| Benton | 8,388 | 261 | 8,649 | 0 | 0 |
| Bolivar | 84,995 | 1,159 | 86,154 | 0 | 0 |
| Calhoun | 11,393 | 468 | 11,861 | 0 | 0 |
| Carroll | 10,303 | 333 | 10,636 | 0 | 0 |
| Chickasaw | 9,890 | 350 | 10,240 | 0 | 0 |
| Choctaw | 2,361 | 31 | 2,392 | 0 | 0 |
| Claiborne | 2,853 | 37 | 2,890 | 0 | 0 |
| Clarke | 2,558 | 38 | 2,596 | 0 | 0 |
| Clay | 5,013 | 377 | 5,390 | 0 | 0 |
| Coahoma | 63,349 | 822 | 64,171 | 0 | 0 |
| Copiah | 4,787 | 21 | 4,808 | 0 | 0 |
| Covington | 5,226 | 128 | 5,354 | 0 | 0 |

MISSISSIPPI—Continued

| County | Computed county allotment | Allocation from State reserves for trends | County allotment (sum of columns (1) and (2)) | Allocation from State reserve for: Small farms | Allocation from State reserve for: Inequity and hardship cases |
|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) |
| | Acres | Acres | Acres | Acres | Acres |
| De Soto | 22,587 | 466 | 23,053 | 0 | 0 |
| Forrest | 247 | 0 | 247 | 0 | 0 |
| Franklin | 406 | 39 | 445 | 0 | 0 |
| George | 146 | 31 | 177 | 0 | 0 |
| Greene | 684 | 0 | 684 | 0 | 0 |
| Grenada | 8,032 | 193 | 8,225 | 0 | 0 |
| Hinds | 15,054 | 177 | 15,231 | 0 | 0 |
| Holmes | 24,592 | 580 | 25,172 | 0 | 0 |
| Humphreys | 33,823 | 389 | 34,212 | 0 | 0 |
| Issaquena | 8,647 | 138 | 8,785 | 0 | 0 |
| Itawamba | 7,000 | 346 | 7,346 | 0 | 0 |
| Jasper | 3,886 | 10 | 3,896 | 0 | 0 |
| Jefferson | 2,345 | 15 | 2,360 | 0 | 0 |
| Jefferson Davis | 7,990 | 313 | 8,303 | 0 | 0 |
| Jones | 4,703 | 14 | 4,717 | 0 | 0 |
| Kemper | 5,787 | 241 | 6,008 | 0 | 0 |
| Lafayette | 10,472 | 264 | 10,736 | 0 | 0 |
| Lamar | 686 | 17 | 703 | 0 | 0 |
| Lauderdale | 1,901 | 2 | 1,903 | 0 | 0 |
| Lawrence | 3,371 | 39 | 3,410 | 0 | 0 |
| Leake | 9,801 | 423 | 10,224 | 0 | 0 |
| Lee | 17,776 | 442 | 18,218 | 0 | 0 |
| Leflore | 52,567 | 719 | 53,286 | 0 | 0 |
| Lincoln | 2,355 | 14 | 2,369 | 0 | 0 |
| Lowndes | 10,709 | 352 | 11,061 | 0 | 0 |
| Madison | 22,806 | 428 | 23,234 | 0 | 0 |
| Marion | 4,619 | 32 | 4,651 | 0 | 0 |
| Marshall | 24,262 | 543 | 24,805 | 0 | 0 |
| Monroe | 19,471 | 631 | 20,102 | 0 | 0 |
| Montgomery | 5,133 | 208 | 5,341 | 0 | 0 |
| Neshoba | 7,758 | 15 | 7,773 | 0 | 0 |
| Newton | 2,218 | 11 | 2,229 | 0 | 0 |
| Noxubee | 10,647 | 288 | 10,935 | 0 | 0 |
| Oktibbeha | 2,101 | 18 | 2,119 | 0 | 0 |
| Panola | 27,711 | 558 | 28,269 | 0 | 0 |
| Pearl River | 4 | 0 | 4 | 0 | 0 |
| Perry | 1,083 | 14 | 1,097 | 0 | 0 |
| Pike | 1,471 | 4 | 1,475 | 0 | 0 |
| Pontotoc | 13,363 | 725 | 14,088 | 0 | 0 |
| Prentiss | 11,681 | 514 | 12,195 | 0 | 0 |
| Quitman | 41,709 | 693 | 42,402 | 0 | 0 |
| Rankin | 5,165 | 66 | 5,231 | 0 | 0 |
| Scott | 6,100 | 44 | 6,144 | 0 | 0 |
| Sharkey | 20,113 | 276 | 20,389 | 0 | 0 |
| Simpson | 6,893 | 27 | 6,920 | 0 | 0 |
| Smith | 5,829 | 59 | 5,888 | 0 | 0 |
| Sunflower | 87,133 | 1,133 | 88,266 | 0 | 0 |
| Tallahatchie | 41,603 | 632 | 42,235 | 0 | 0 |
| Tate | 16,782 | 402 | 17,184 | 0 | 0 |
| Tippah | 10,739 | 558 | 11,297 | 0 | 0 |
| Tishomingo | 6,282 | 369 | 6,651 | 0 | 0 |
| Tunica | 33,976 | 381 | 34,357 | 0 | 0 |
| Union | 12,021 | 513 | 12,534 | 0 | 0 |
| Walthall | 6,679 | 86 | 6,765 | 0 | 0 |
| Warren | 4,213 | 71 | 4,284 | 0 | 0 |
| Washington | 58,807 | 735 | 59,542 | 0 | 0 |
| Wayne | 3,583 | 80 | 3,663 | 0 | 0 |
| Webster | 5,894 | 335 | 6,229 | 0 | 0 |
| Wilkinson | 653 | 75 | 728 | 0 | 0 |
| Winston | 7,415 | 294 | 7,709 | 0 | 0 |
| Yalobusha | 8,992 | 347 | 9,339 | 0 | 0 |
| Yazoo | 30,067 | 458 | 30,525 | 0 | 0 |

| County | Computed county allotment | Allocation from State reserves for trends | County allotment (sum of columns (1) and (2)) | Allocation from State reserve for: | |
|---|---|---|---|---|---|
| | | | | Small farms | Inequity and hardship cases |
| | (1) | (2) | (3) | (4) | (5) |
| | *Acres* | *Acres* | *Acres* | *Acres* | *Acres* |
| **MISSOURI** | | | | | |
| Bollinger | 80 | 0 | 80 | 0 | 0 |
| Butler | 12,977 | 0 | 12,977 | 0 | 0 |
| Cape Girardeau | 85 | 0 | 85 | 0 | 0 |
| Dunklin | 57,053 | 0 | 57,053 | 0 | 0 |
| Howell | 1 | 0 | 1 | 0 | 0 |
| Mississippi | 18,901 | 0 | 18,901 | 0 | 0 |
| New Madrid | 61,648 | 0 | 61,648 | 0 | 0 |
| Pemiscot | 65,126 | 0 | 65,126 | 0 | 0 |
| Ripley | 1,540 | 0 | 1,540 | 0 | 0 |
| Scott | 11,445 | 0 | 11,445 | 0 | 0 |
| Stoddard | 27,708 | 0 | 27,708 | 0 | 0 |
| Vernon | 3 | 0 | 3 | 0 | 0 |
| **NEVADA** | | | | | |
| Clark | 10 | 0 | 10 | 0 | 0 |
| Nye | 2,513 | 0 | 2,513 | 0 | 0 |
| **NEW MEXICO** | | | | | |
| Chaves | 21,897 | 0 | 21,897 | 0 | 0 |
| Curry | 1,066 | 0 | 1,066 | 0 | 0 |
| De Baca | 358 | 0 | 358 | 0 | 0 |
| Dona Ana | 27,465 | 0 | 27,465 | 0 | 0 |
| Eddy | 19,050 | 0 | 19,050 | 0 | 0 |
| Grant | 138 | 0 | 138 | 0 | 0 |
| Harding | 6 | 0 | 6 | 0 | 1 |
| Hidalgo | 4,444 | 0 | 4,444 | 0 | 0 |
| Lea | 18,947 | 0 | 18,947 | 0 | 0 |
| Luna | 9,707 | 0 | 9,707 | 0 | 0 |
| Otero | 1,622 | 0 | 1,622 | 0 | 0 |
| Quay | 1,985 | 0 | 1,985 | 0 | 0 |
| Roosevelt | 13,503 | 0 | 13,503 | 0 | 0 |
| Sierra | 1,815 | 0 | 1,815 | 0 | 0 |
| Socorro | 1,411 | 0 | 1,411 | 0 | 0 |
| **NORTH CAROLINA** | | | | | |
| Alamance | 15 | 0 | 15 | 0 | 0 |
| Alexander | 314 | 0 | 314 | 0 | 0 |
| Anson | 8,479 | 0 | 8,479 | 0 | 0 |
| Beaufort | 699 | 0 | 699 | 0 | 0 |
| Bertie | 5,213 | 0 | 5,213 | 0 | 0 |
| Bladen | 2,326 | 0 | 2,326 | 0 | 0 |
| Brunswick | 163 | 0 | 163 | 0 | 0 |
| Burke | 40 | 0 | 40 | 0 | 0 |
| Cabarrus | 2,252 | 0 | 2,252 | 0 | 0 |
| Caldwell | 10 | 0 | 10 | 0 | 0 |
| Camden | 194 | 0 | 194 | 0 | 0 |
| Carteret | 26 | 0 | 26 | 0 | 0 |
| Catawba | 792 | 0 | 792 | 0 | 0 |
| Chatham | 229 | 0 | 229 | 0 | 0 |
| Chowan | 1,909 | 0 | 1,909 | 0 | 0 |
| Cleveland | 21,120 | 0 | 21,120 | 0 | 0 |
| Columbus | 1,807 | 0 | 1,807 | 0 | 0 |
| Craven | 263 | 0 | 263 | 0 | 0 |
| Cumberland | 8,670 | 0 | 8,670 | 0 | 0 |
| Currituck | 188 | 0 | 188 | 1 | 0 |
| Davidson | 504 | 0 | 504 | 1 | 0 |
| Davie | 965 | 0 | 965 | 1 | 0 |
| Duplin | 2,209 | 0 | 2,209 | 3 | 0 |

| County | Computed county allotment | Allocation from State reserves for trends | County allotment (sum of columns (1) and (2)) | Allocation from State reserve for: | |
|---|---|---|---|---|---|
| | | | | Small farms | Inequity and hardship cases |
| | (1) | (2) | (3) | (4) | (5) |
| | *Acres* | *Acres* | *Acres* | *Acres* | *Acres* |
| **NORTH CAROLINA—Continued** | | | | | |
| Durham | 78 | 0 | 78 | 0 | 0 |
| Edgecombe | 9,884 | 0 | 9,884 | 0 | 0 |
| Forsyth | 48 | 0 | 48 | 0 | 0 |
| Franklin | 6,743 | 0 | 6,743 | 0 | 0 |
| Gaston | 1,723 | 0 | 1,723 | 0 | 0 |
| Gates | 1,538 | 0 | 1,538 | 0 | 0 |
| Granville | 270 | 0 | 270 | 0 | 0 |
| Greene | 2,823 | 0 | 2,823 | 0 | 0 |
| Guilford | 38 | 0 | 38 | 0 | 0 |
| Halifax | 18,500 | 0 | 18,500 | 0 | 0 |
| Harnett | 9,626 | 0 | 9,626 | 0 | 0 |
| Hertford | 3,858 | 0 | 3,858 | 0 | 0 |
| Hoke | 10,912 | 0 | 10,912 | 0 | 0 |
| Hyde | 124 | 0 | 124 | 0 | 0 |
| Iredell | 4,850 | 0 | 4,850 | 0 | 0 |
| Johnston | 14,221 | 0 | 14,221 | 0 | 0 |
| Jones | 171 | 0 | 171 | 0 | 0 |
| Lee | 703 | 0 | 703 | 0 | 0 |
| Lenoir | 1,413 | 0 | 1,413 | 0 | 0 |
| Lincoln | 4,444 | 0 | 4,444 | 0 | 0 |
| Martin | 2,363 | 0 | 2,363 | 0 | 0 |
| Mecklenburg | 3,250 | 0 | 3,250 | 0 | 0 |
| Montgomery | 2,227 | 0 | 2,227 | 0 | 0 |
| Moore | 1,970 | 0 | 1,970 | 0 | 0 |
| Nash | 10,690 | 0 | 10,690 | 0 | 0 |
| Northampton | 17,025 | 0 | 17,025 | 0 | 0 |
| Onslow | 161 | 0 | 161 | 0 | 0 |
| Orange | 45 | 0 | 45 | 0 | 0 |
| Pamlico | 115 | 0 | 115 | 0 | 0 |
| Pasquotank | 138 | 0 | 138 | 0 | 0 |
| Pender | 196 | 0 | 196 | 0 | 0 |
| Perquimans | 758 | 0 | 758 | 0 | 0 |
| Person | 2 | 0 | 2 | 0 | 0 |
| Pitt | 5,035 | 0 | 5,035 | 0 | 0 |
| Polk | 826 | 0 | 826 | 0 | 0 |
| Randolph | 16 | 0 | 16 | 0 | 0 |
| Richmond | 4,295 | 0 | 4,295 | 0 | 0 |
| Robeson | 36,034 | 0 | 36,034 | 0 | 0 |
| Rowan | 3,372 | 0 | 3,372 | 0 | 0 |
| Rutherford | 5,181 | 0 | 5,181 | 0 | 0 |
| Sampson | 18,232 | 0 | 18,232 | 0 | 0 |
| Scotland | 13,000 | 0 | 13,000 | 0 | 0 |
| Stanly | 405 | 0 | 405 | 0 | 0 |
| Tyrrell | 156 | 0 | 156 | 0 | 0 |
| Union | 9,223 | 0 | 9,223 | 0 | 0 |
| Vance | 2,820 | 0 | 2,820 | 0 | 0 |
| Wake | 3,268 | 0 | 3,268 | 0 | 0 |
| Warren | 5,653 | 0 | 5,653 | 0 | 0 |
| Washington | 384 | 0 | 384 | 0 | 0 |
| Wayne | 7,865 | 0 | 7,865 | 0 | 0 |
| Wilkes | 40 | 0 | 40 | 0 | 0 |
| Wilson | 6,119 | 0 | 6,119 | 0 | 0 |
| Yadkin | 21 | 0 | 21 | 0 | 0 |
| **OKLAHOMA** | | | | | |
| Adair | 24 | 1 | 25 | 0 | 0 |
| Asoka | 1,174 | 18 | 1,192 | 0 | 0 |
| Beckham | 43,042 | 607 | 43,649 | 0 | 0 |
| Blaine | 8,471 | 282 | 8,753 | 0 | 0 |
| Bryan | 11,425 | 413 | 11,838 | 0 | 0 |
| Caddo | 32,812 | 1,327 | 34,139 | 0 | 0 |
| Canadian | 8,800 | 179 | 8,979 | 0 | 0 |
| Carter | 1,058 | 8 | 1,066 | 0 | 0 |

OKLAHOMA—Continued

| County | Computed county allotment | Allocation from State reserves for trends | County allotment (sum of columns (1) and (2)) | Allocation from State reserve for: | |
|---|---|---|---|---|---|
| | | | | Small farms | Inequity and hardship cases |
| | (1) | (2) | (3) | (4) | (5) |
| | *Acres* | *Acres* | *Acres* | *Acres* | *Acres* |
| Choctaw | 945 | 22 | 967 | 0 | 0 |
| Cimmaron | 46 | 0 | 46 | 0 | 0 |
| Cleveland | 1,037 | 29 | 1,066 | 0 | 0 |
| Coal | 2,267 | 25 | 2,292 | 0 | 0 |
| Comanche | 5,135 | 119 | 8,254 | 0 | 0 |
| Cotton | 12,808 | 318 | 13,126 | 0 | 0 |
| Craig | 40 | 4 | 44 | 0 | 0 |
| Creek | 636 | 0 | 636 | 0 | 0 |
| Custer | 17,388 | 572 | 17,960 | 0 | 0 |
| Dewey | 5,504 | 105 | 5,609 | 0 | 0 |
| Ellis | 458 | 26 | 484 | 0 | 0 |
| Garfield | 5 | 0 | 5 | 0 | 0 |
| Garvin | 3,713 | 124 | 3,837 | 0 | 0 |
| Grady | 12,228 | 530 | 12,758 | 0 | 0 |
| Grant | 32 | 1 | 33 | 0 | 0 |
| Greer | 28,374 | 355 | 28,729 | 0 | 0 |
| Harmon | 33,031 | 434 | 33,465 | 0 | 0 |
| Harper | 10 | 1 | 11 | 0 | 0 |
| Haskell | 1,216 | 64 | 1,280 | 0 | 0 |
| Hughes | 2,105 | 0 | 2,105 | 0 | 0 |
| Jackson | 40,023 | 545 | 40,568 | 0 | 0 |
| Jefferson | 11,814 | 135 | 11,949 | 0 | 0 |
| Johnston | 2,849 | 57 | 2,906 | 0 | 0 |
| Kay | 57 | 2 | 59 | 0 | 0 |
| Kingfisher | 728 | 2 | 730 | 0 | 0 |
| Kiowa | 38,639 | 772 | 39,411 | 0 | 0 |
| Le Flore | 1,460 | 17 | 1,477 | 0 | 0 |
| Lincoln | 533 | 0 | 533 | 0 | 0 |
| Logan | 1,849 | 86 | 1,935 | 0 | 0 |
| Love | 5,832 | 0 | 5,832 | 0 | 0 |
| McClain | 6,710 | 166 | 6,876 | 0 | 0 |
| McCurtain | 4,632 | 76 | 4,708 | 0 | 0 |
| McIntosh | 5,712 | 105 | 5,817 | 0 | 0 |
| Major | 906 | 0 | 906 | 0 | 0 |
| Marshall | 3,110 | 83 | 3,193 | 0 | 0 |
| Mayes | 206 | 8 | 214 | 0 | 0 |
| Murray | *213 | 6 | 219 | 0 | 0 |
| Muskogee | 11,735 | 247 | 11,972 | 0 | 0 |
| Noble | 327 | 3 | 330 | 0 | 0 |
| Nowata | 325 | 1 | 326 | 0 | 0 |
| Okfuskee | 1,183 | 0 | 1,183 | 0 | 0 |
| Oklahoma | 366 | 5 | 371 | 0 | 0 |
| Okmulgee | 6,296 | 224 | 6,520 | 0 | 0 |
| Osage | 1,758 | 0 | 1,758 | 0 | 0 |
| Pawnee | 2,222 | 44 | 2,266 | 0 | 0 |
| Payne | 1,483 | 34 | 1,517 | 0 | 0 |
| Pittsburg | 1,883 | 21 | 1,904 | 0 | 0 |
| Pontotoc | 709 | 0 | 709 | 0 | 0 |
| Pottawatomie | 321 | 8 | 329 | 0 | 0 |
| Pushmataha | 173 | 0 | 173 | 0 | 0 |
| Roger Mills | 14,727 | 371 | 15,098 | 0 | 0 |
| Rogers | 206 | 9 | 215 | 0 | 0 |
| Seminole | 724 | 0 | 724 | 0 | 0 |
| Sequoyah | 701 | 24 | 725 | 0 | 0 |
| Stephens | 4,108 | 86 | 4,194 | 0 | 0 |
| Texas | 6 | 0 | 6 | 0 | 0 |
| Tillman | 49,107 | 720 | 49,827 | 0 | 0 |
| Tulsa | 641 | 0 | 641 | 0 | 0 |
| Wagoner | 5,494 | 0 | 5,494 | 0 | 0 |
| Washita | 50,942 | 944 | 51,886 | 0 | 0 |
| Woodward | 469 | 18 | 487 | 0 | 0 |

SOUTH CAROLINA

| County | Computed county allotment | Allocation from State reserves for trends | County allotment (sum of columns (1) and (2)) | Allocation from State reserve for: | |
|---|---|---|---|---|---|
| | | | | Small farms | Inequity and hardship cases |
| | (1) | (2) | (3) | (4) | (5) |
| | *Acres* | *Acres* | *Acres* | *Acres* | *Acres* |
| Abbeville | 4,210 | 434 | 4,644 | 0 | 0 |
| Aiken | 13,017 | 60 | 13,077 | 0 | 0 |
| Allendale | 7,090 | 192 | 7,282 | 0 | 0 |
| Anderson | 15,085 | 60 | 15,145 | 0 | 0 |
| Bamberg | 9,083 | 304 | 9,387 | 0 | 0 |
| Barnwell | 9,697 | 320 | 10,017 | 0 | 0 |
| Beaufort | 38 | 0 | 38 | 0 | 0 |
| Berkeley | 4,727 | 0 | 4,727 | 0 | 0 |
| Calhoun | 11,381 | 273 | 11,654 | 0 | 0 |
| Charleston | 287 | 0 | 287 | 0 | 0 |
| Cherokee | 6,792 | 74 | 6,866 | 0 | 0 |
| Chester | 5,970 | 28 | 5,998 | 0 | 0 |
| Chesterfield | 19,051 | 532 | 19,583 | 0 | 0 |
| Clarendon | 25,074 | 643 | 25,717 | 0 | 0 |
| Colleton | 5,069 | 104 | 5,173 | 0 | 0 |
| Darlington | 21,910 | 598 | 22,508 | 0 | 0 |
| Dillon | 16,459 | 594 | 17,053 | 0 | 0 |
| Dorchester | 5,493 | 13 | 5,506 | 0 | 0 |
| Edgefield | 6,432 | 88 | 6,520 | 0 | 0 |
| Fairfield | 2,204 | 48 | 2,252 | 0 | 0 |
| Florence | 22,599 | 0 | 22,599 | 0 | 0 |
| Georgetown | 1,442 | 9 | 1,451 | 0 | 0 |
| Greenville | 6,665 | 1 | 6,666 | 0 | 0 |
| Greenwood | 2,102 | 33 | 2,135 | 0 | 0 |
| Hampton | 5,139 | 172 | 5,311 | 0 | 0 |
| Horry | 4,478 | 77 | 4,555 | 0 | 0 |
| Jasper | 1,032 | 21 | 1,053 | 0 | 0 |
| Kershaw | 10,339 | 0 | 10,339 | 0 | 0 |
| Lancaster | 4,222 | 14 | 4,236 | 0 | 0 |
| Laurens | 9,776 | 39 | 9,815 | 0 | 0 |
| Lee | 26,663 | 888 | 27,571 | 0 | 0 |
| Lexington | 6,636 | 178 | 6,814 | 0 | 0 |
| McCormick | 1,805 | 69 | 1,874 | 0 | 0 |
| Marion | 8,114 | 178 | 8,292 | 0 | 0 |
| Marlboro | 28,349 | 725 | 29,074 | 0 | 0 |
| Newberry | 4,141 | 29 | 4,170 | 0 | 0 |
| Oconee | 3,593 | 0 | 3,593 | 0 | 0 |
| Orangeburg | 40,809 | 853 | 41,662 | 0 | 0 |
| Pickens | 2,014 | 0 | 2,014 | 0 | 0 |
| Richland | 3,482 | 281 | 3,763 | 0 | 0 |
| Saluda | 4,963 | 104 | 5,063 | 0 | 0 |
| Spartanburg | 11,323 | 0 | 11,323 | 0 | 0 |
| Sumter | 27,824 | 457 | 28,281 | 0 | 0 |
| Union | 2,864 | 40 | 2,904 | 0 | 0 |
| Williamsburg | 24,303 | 796 | 25,099 | 0 | 0 |
| York | 9,122 | 18 | 9,140 | 0 | 0 |

TENNESSEE

| | | | | | |
|---|---|---|---|---|---|
| Bedford | 339 | 0 | 399 | 0 | 0 |
| Benton | 1,278 | 0 | 1,278 | 0 | 0 |
| Bradley | 71 | 1 | 72 | 0 | 0 |
| Cannon | 6 | 0 | 6 | 0 | 0 |
| Carroll | 13,285 | 241 | 13,526 | 0 | 0 |
| Chester | 7,575 | 162 | 7,737 | 0 | 0 |
| Coffee | 231 | 0 | 231 | 0 | 0 |
| Crockett | 23,243 | 755 | 23,998 | 0 | 0 |
| Decatur | 1,993 | 17 | 2,010 | 0 | 0 |
| Dickson | 6 | 0 | 6 | 0 | 0 |
| Dyer | 22,152 | 609 | 22,761 | 0 | 0 |
| Fayette | 29,298 | 806 | 30,104 | 0 | 0 |

TENNESSEE—Continued

| County | Computed county allotment | Allocation from State reserves for trends | County allotment (sum of columns (1) and (2)) | Allocation from State reserve for: | |
|---|---|---|---|---|---|
| | | | | Small farms | Inequity and hardship cases |
| | (1) | (2) | (3) | (4) | (5) |
| | Acres | Acres | Acres | Acres | Acres |
| Franklin | 2,980 | 0 | 2,980 | 0 | 0 |
| Gibson | 31,429 | 819 | 32,248 | 0 | 0 |
| Giles | 4,810 | 0 | 4,810 | 0 | 0 |
| Grundy | 54 | 3 | 57 | 0 | 0 |
| Hamilton | 38 | 1 | 39 | 0 | 0 |
| Hardeman | 14,089 | 269 | 14,358 | 0 | 0 |
| Hardin | 5,418 | 0 | 5,418 | 0 | 0 |
| Haywood | 29,661 | 787 | 30,448 | 0 | 0 |
| Henderson | 11,263 | 155 | 11,418 | 0 | 0 |
| Henry | 2,969 | 0 | 2,969 | 0 | 0 |
| Humphreys | 1 | 0 | 1 | 0 | 0 |
| Lake | 14,835 | 421 | 15,256 | 0 | 0 |
| Lauderdale | 24,418 | 659 | 25,077 | 0 | 0 |
| Lawrence | 12,661 | 0 | 12,661 | 0 | 0 |
| Lewis | 31 | 0 | 31 | 0 | 0 |
| Lincoln | 7,712 | 0 | 7,712 | 0 | 0 |
| Loudon | 3 | 1 | 4 | 0 | 0 |
| McMinn | 10 | 5 | 15 | 0 | 0 |
| McNairy | 12,540 | 154 | 12,694 | 0 | 0 |
| Madison | 22,328 | 554 | 22,882 | 0 | 0 |
| Marion | 47 | 4 | 51 | 0 | 0 |
| Marshall | 42 | 0 | 42 | 0 | 0 |
| Maury | 16 | 0 | 16 | 0 | 0 |
| Meigs | 106 | 0 | 106 | 0 | 0 |
| Moore | 1 | 0 | 1 | 0 | 0 |
| Obion | 6,172 | 114 | 6,286 | 0 | 0 |
| Perry | 2 | 0 | 2 | 0 | 0 |
| Polk | 183 | 0 | 183 | 0 | 0 |
| Rhea | 2 | 0 | 2 | 0 | 0 |
| Robertson | 0 | 0 | 0 | 0 | 0 |
| Rutherford | 2,479 | 0 | 2,479 | 0 | 0 |
| Shelby | 26,212 | 0 | 26,212 | 0 | 0 |
| Sumner | 2 | 0 | 2 | 0 | 0 |
| Tipton | 32,178 | 839 | 33,017 | 0 | 0 |
| Warren | 5 | 0 | 5 | 0 | 0 |
| Wayne | 1,401 | 0 | 1,401 | 0 | 0 |
| Weakley | 6,695 | 56 | 6,751 | 0 | 0 |
| Wilson | 34 | 1 | 35 | 0 | 0 |

TEXAS

| | | | | | |
|---|---|---|---|---|---|
| Anderson | 1,916 | 56 | 1,972 | 0 | 0 |
| Andrews | 5,224 | 0 | 5,224 | 0 | 0 |
| Angelina | 948 | 0 | 948 | 0 | 0 |
| Aransas | 916 | 0 | 916 | 0 | 0 |
| Archer | 1,290 | 0 | 1,290 | 0 | 0 |
| Armstrong | 1,392 | 15 | 1,407 | 0 | 0 |
| Atascosa | 5,241 | 0 | 5,241 | 0 | 0 |
| Austin | 13,044 | 0 | 13,044 | 0 | 0 |
| Bailey | 69,434 | 19 | 69,453 | 0 | 0 |
| Bastrop | 7,834 | 0 | 7,834 | 0 | 0 |
| Baylor | 12,581 | 0 | 12,581 | 0 | 0 |
| Bee | 9,932 | 0 | 9,932 | 0 | 0 |
| Bell | 47,822 | 0 | 47,822 | 0 | 0 |
| Bexar | 2,450 | 0 | 2,450 | 0 | 0 |
| Blanco | 45 | 0 | 45 | 0 | 0 |
| Borden | 13,858 | 0 | 13,858 | 0 | 0 |
| Bosque | 7,812 | 0 | 7,812 | 0 | 0 |
| Bowie | 7,486 | 80 | 7,566 | 0 | 0 |
| Brazoria | 5,499 | 55 | 5,554 | 0 | 0 |
| Brazos | 13,423 | 0 | 13,423 | 0 | 0 |
| Brewster | 45 | 1 | 46 | 0 | 0 |
| Briscoe | 18,530 | 0 | 18,530 | 0 | 0 |
| Brooks | 2,302 | 0 | 2,302 | 0 | 0 |

TEXAS—Continued

| County | Computed county allotment | Allocation from State reserves for trends | County allotment (sum of columns (1) and (2)) | Allocation from State reserve for: | |
|---|---|---|---|---|---|
| | | | | Small farms | Inequity and hardship cases |
| | (1) | (2) | (3) | (4) | (5) |
| | Acres | Acres | Acres | Acres | Acres |
| Brown | 3,349 | 4 | 3,353 | 0 | 0 |
| Burleson | 19,015 | 0 | 19,015 | 0 | 0 |
| Burnet | 1,933 | 0 | 1,933 | 0 | 0 |
| Caldwell | 13,419 | 0 | 13,419 | 0 | 0 |
| Calhoun | 12,108 | 0 | 12,108 | 0 | 0 |
| Callahan | 5,369 | 23 | 5,392 | 0 | 0 |
| Cameron | 110,940 | 1,485 | 112,425 | 0 | 0 |
| Camp | 68 | 18 | 86 | 0 | 0 |
| Carson | 0 | 461 | 461 | 0 | 0 |
| Cass | 1,806 | 0 | 1,806 | 0 | 0 |
| Castro | 37,755 | 0 | 37,755 | 0 | 0 |
| Cherokee | 2,158 | 0 | 2,158 | 0 | 0 |
| Childress | 37,779 | 1 | 37,780 | 0 | 0 |
| Clay | 6,845 | 0 | 6,845 | 0 | 0 |
| Cochran | 54,226 | 63 | 54,289 | 0 | 0 |
| Coke | 4,375 | 0 | 4,375 | 0 | 0 |
| Coleman | 22,068 | 0 | 22,068 | 0 | 0 |
| Collin | 57,030 | 0 | 57,030 | 0 | 0 |
| Collingsworth | 45,733 | 20 | 45,753 | 0 | 0 |
| Colorado | 6,135 | 0 | 6,135 | 0 | 0 |
| Comal | 126 | 14 | 140 | 0 | 0 |
| Commanche | 4,923 | 0 | 4,923 | 0 | 0 |
| Concho | 17,744 | 0 | 17,744 | 0 | 0 |
| Cooke | 4,851 | 0 | 4,851 | 0 | 0 |
| Coryell | 12,969 | 0 | 12,969 | 0 | 0 |
| Cottle | 37,401 | 0 | 37,401 | 0 | 0 |
| Crockett | 43 | 0 | 43 | 0 | 0 |
| Crosby | 86,025 | 0 | 86,025 | 0 | 0 |
| Culberson | 3,562 | 0 | 3,562 | 0 | 0 |
| Dallas | 22,860 | 0 | 22,860 | 0 | 0 |
| Dawson | 149,425 | 0 | 149,425 | 0 | 0 |
| Deaf Smith | 6,244 | 0 | 6,244 | 0 | 0 |
| Delta | 25,884 | 0 | 25,884 | 0 | 0 |
| Denton | 14,810 | 0 | 14,810 | 0 | 0 |
| De Witt | 8,746 | 0 | 8,746 | 0 | 0 |
| Dickens | 36,081 | 0 | 36,081 | 0 | 0 |
| Dimmit | 1,083 | 6 | 1,089 | 0 | 0 |
| Donley | 20,342 | 0 | 20,342 | 0 | 0 |
| Duval | 7,333 | 3 | 7,336 | 0 | 0 |
| Eastland | 1,714 | 84 | 1,798 | 0 | 0 |
| Ector | 143 | 0 | 143 | 0 | 0 |
| Ellis | 89,133 | 0 | 89,133 | 0 | 0 |
| El Paso | 16,839 | 82 | 16,921 | 0 | 0 |
| Erath | 4,081 | 0 | 4,081 | 0 | 0 |
| Falls | 52,711 | 0 | 52,711 | 0 | 0 |
| Fannin | 47,546 | 0 | 47,546 | 0 | 0 |
| Fayette | 17,944 | 0 | 17,944 | 0 | 0 |
| Fisher | 58,007 | 1 | 58,008 | 0 | 0 |
| Floyd | 68,661 | 20 | 68,681 | 0 | 0 |
| Foard | 8,800 | 0 | 8,800 | 0 | 0 |
| Fort Bend | 45,258 | 13 | 45,271 | 0 | 0 |
| Franklin | 997 | 0 | 997 | 0 | 0 |
| Freestone | 4,102 | 174 | 4,276 | 0 | 0 |
| Frio | 3,315 | 0 | 3,315 | 0 | 0 |
| Gaines | 88,196 | 0 | 88,196 | 0 | 0 |
| Garza | 27,530 | 0 | 27,530 | 0 | 0 |
| Gillespie | 751 | 0 | 751 | 0 | 0 |
| Glasscock | 10,975 | 0 | 10,975 | 0 | 0 |
| Goliad | 2,726 | 0 | 2,726 | 0 | 0 |
| Gonzales | 7,709 | 0 | 7,709 | 0 | 0 |
| Gray | 2,637 | 2 | 2,639 | 0 | 0 |
| Grayson | 23,468 | 0 | 23,468 | 0 | 0 |
| Gregg | 299 | 0 | 299 | 0 | 0 |
| Grimes | 6,693 | 0 | 6,693 | 0 | 0 |
| Guadalupe | 13,221 | 0 | 13,221 | 0 | 0 |
| Hale | 113,683 | 0 | 113,683 | 0 | 0 |

TEXAS—Continued

| County | Computed county allotment | Allocation from State reserves for trends | County allotment (sum of columns (1) and (2)) | Allocation from State reserve for: | |
|---|---|---|---|---|---|
| | | | | Small farms | Inequity and hardship cases |
| | (1) | (2) | (3) | (4) | (5) |
| | Acres | Acres | Acres | Acres | Acres |
| Hall | 65,929 | 0 | 65,929 | 0 | 0 |
| Hamilton | 7,271 | 0 | 7,271 | 0 | 0 |
| Hansford | 312 | 174 | 486 | 0 | 0 |
| Hardeman | 22,946 | 0 | 22,946 | 0 | 0 |
| Harris | 1,646 | 0 | 1,646 | 0 | 0 |
| Harrison | 1,342 | 35 | 1,377 | 0 | 0 |
| Hartley | 30 | 29 | 59 | 0 | 0 |
| Haskell | 82,601 | 0 | 82,601 | 0 | 0 |
| Hays | 4,894 | 0 | 4,894 | 0 | 0 |
| Hemphill | 1,139 | 0 | 1,139 | 0 | 0 |
| Henderson | 2,198 | 29 | 2,227 | 0 | 0 |
| Hidalgo | 130,569 | 0 | 130,569 | 0 | 0 |
| Hill | 81,039 | 0 | 81,039 | 0 | 0 |
| Hockley | 130,279 | 0 | 130,279 | 0 | 0 |
| Hood | 1,867 | 0 | 1,867 | 0 | 0 |
| Hopkins | 5,165 | 48 | 5,213 | 0 | 0 |
| Houston | 15,970 | 0 | 15,970 | 0 | 0 |
| Howard | 51,341 | 2 | 51,343 | 0 | 0 |
| Hudspeth | 11,575 | 0 | 11,575 | 0 | 0 |
| Hunt | 62,273 | 0 | 62,273 | 0 | 0 |
| Hutchinson | 26 | 0 | 26 | 0 | 0 |
| Irion | 433 | 4 | 437 | 0 | 0 |
| Jack | 1,399 | 7 | 1,406 | 0 | 0 |
| Jackson | 12,478 | 0 | 12,478 | 0 | 0 |
| Jasper | 73 | 21 | 94 | 0 | 0 |
| Jeff Davis | 286 | 0 | 286 | 0 | 0 |
| Jim Hogg | 60 | 56 | 116 | 0 | 0 |
| Jim Wells | 15,428 | 0 | 15,428 | 0 | 0 |
| Johnson | 24,599 | 0 | 24,599 | 0 | 0 |
| Jones | 74,256 | 0 | 74,256 | 0 | 0 |
| Karnes | 19,756 | 107 | 19,863 | 0 | 0 |
| Kaufman | 37,584 | 0 | 37,584 | 0 | 0 |
| Kendall | 7 | 0 | 7 | 0 | 0 |
| Kent | 13,782 | 0 | 13,782 | 0 | 0 |
| Kimble | 27 | 0 | 27 | 0 | 0 |
| King | 7,225 | 0 | 7,225 | 0 | 0 |
| Kinney | 144 | 6 | 150 | 0 | 0 |
| Kleberg | 6,038 | 0 | 6,038 | 0 | 0 |
| Knox | 40,257 | 0 | 40,257 | 0 | 0 |
| Lamar | 38,890 | 0 | 38,890 | 0 | 0 |
| Lamb | 133,999 | 0 | 133,999 | 0 | 0 |
| Lampasas | 885 | 0 | 885 | 0 | 0 |
| La Salle | 1,387 | 42 | 1,429 | 0 | 0 |
| Lavaca | 14,109 | 0 | 14,109 | 0 | 0 |
| Lee | 2,711 | 0 | 2,711 | 0 | 0 |
| Leon | 7,141 | 0 | 7,141 | 0 | 0 |
| Liberty | 1,549 | 0 | 1,549 | 0 | 0 |
| Limestone | 33,873 | 94 | 33,967 | 0 | 0 |
| Live Oak | 12,320 | 0 | 12,320 | 0 | 0 |
| Llano | 148 | 44 | 192 | 0 | 0 |
| Loving | 294 | 0 | 294 | 0 | 0 |
| Lubbock | 157,106 | 0 | 157,106 | 0 | 0 |
| Lynn | 131,274 | 0 | 131,274 | 0 | 0 |
| McCulloch | 11,478 | 7 | 11,485 | 0 | 0 |
| McLennan | 58,498 | 0 | 58,498 | 0 | 0 |
| McMullen | 867 | 0 | 867 | 0 | 0 |
| Madison | 1,330 | 0 | 1,330 | 0 | 0 |
| Marion | 488 | 38 | 526 | 0 | 0 |
| Martin | 67,181 | 0 | 67,181 | 0 | 0 |
| Mason | 1,257 | 0 | 1,257 | 0 | 0 |
| Matagorda | 12,332 | 0 | 12,332 | 0 | 0 |
| Maverick | 2,405 | 0 | 2,405 | 0 | 0 |
| Medina | 1,174 | 0 | 1,174 | 0 | 0 |
| Menard | 483 | 0 | 483 | 0 | 0 |
| Midland | 19,266 | 0 | 19,266 | 0 | 0 |
| Milam | 35,702 | 0 | 35,702 | 0 | 0 |
| Mills | 1,848 | 7 | 1,855 | 0 | 0 |
| Mitchell | 65,453 | 0 | 65,453 | 0 | 0 |
| Montague | 2,819 | 0 | 2,819 | 0 | 0 |

TEXAS—Continued

| County | Computed county allotment | Allocation from State reserves for trends | County allotment (sum of columns (1) and (2)) | Allocation from State reserve for: | |
|---|---|---|---|---|---|
| | | | | Small farms | Inequity and hardship cases |
| | (1) | (2) | (3) | (4) | (5) |
| | Acres | Acres | Acres | Acres | Acres |
| Montgomery | 124 | 0 | 124 | 0 | 0 |
| Moore | 66 | 89 | 155 | 0 | 0 |
| Morris | 10 | 0 | 10 | 0 | 0 |
| Motley | 23,929 | 6 | 23,935 | 0 | 0 |
| Nacogdoches | 747 | 177 | 924 | 0 | 0 |
| Navarro | 74,887 | 0 | 74,887 | 0 | 0 |
| Newton | 13 | 0 | 13 | 0 | 0 |
| Nolan | 30,153 | 0 | 30,153 | 0 | 0 |
| Nueces | 68,719 | 0 | 68,719 | 0 | 0 |
| Ochiltree | 264 | 0 | 264 | 0 | 0 |
| Oldham | 33 | 4 | 37 | 0 | 0 |
| Palo Pinto | 2,206 | 0 | 2,206 | 0 | 0 |
| Panola | 1,192 | 0 | 1,192 | 0 | 0 |
| Parker | 1,811 | 0 | 1,811 | 0 | 0 |
| Parmer | 31,924 | 0 | 31,924 | 0 | 0 |
| Pecos | 16,215 | 0 | 16,215 | 0 | 0 |
| Polk | 530 | 41 | 571 | 0 | 0 |
| Potter | 75 | 32 | 107 | 0 | 0 |
| Presidio | 2,210 | 0 | 2,210 | 0 | 0 |
| Rains | 5,561 | 0 | 5,561 | 0 | 0 |
| Randall | 1,168 | 726 | 1,894 | 0 | 0 |
| Reagan | 2,748 | 0 | 2,748 | 0 | 0 |
| Red River | 18,732 | 0 | 18,732 | 0 | 0 |
| Reeves | 38,329 | 0 | 38,329 | 0 | 0 |
| Refugio | 9,012 | 6 | 9,018 | 0 | 0 |
| Roberts | 120 | 76 | 196 | 0 | 0 |
| Robertson | 17,679 | 0 | 17,679 | 0 | 0 |
| Rockwall | 12,431 | 0 | 12,431 | 0 | 0 |
| Runnels | 58,414 | 0 | 58,414 | 0 | 0 |
| Rusk | 6,413 | 0 | 6,413 | 0 | 0 |
| Sabine | 273 | 39 | 312 | 0 | 0 |
| San Augustine | 1,205 | 11 | 1,216 | 0 | 0 |
| San Jacinto | 391 | 5 | 396 | 0 | 0 |
| San Patricio | 55,223 | 0 | 55,223 | 0 | 0 |
| San Saba | 3,482 | 16 | 3,498 | 0 | 0 |
| Schleicher | 6,225 | 0 | 6,225 | 0 | 0 |
| Scurry | 47,462 | 0 | 47,462 | 0 | 0 |
| Shackelford | 2,885 | 0 | 2,885 | 0 | 0 |
| Shelby | 2,819 | 44 | 2,863 | 0 | 0 |
| Smith | 496 | 139 | 635 | 0 | 0 |
| Somervell | 661 | 123 | 784 | 0 | 0 |
| Starr | 15,984 | 81 | 16,065 | 0 | 0 |
| Stephens | 741 | 0 | 741 | 0 | 0 |
| Sterling | 271 | 0 | 271 | 0 | 0 |
| Stonewall | 18,877 | 0 | 18,877 | 0 | 0 |
| Swisher | 37,196 | 0 | 37,196 | 0 | 0 |
| Tarrant | 6,911 | 0 | 6,911 | 0 | 0 |
| Taylor | 23,880 | 0 | 23,880 | 0 | 0 |
| Terry | 103,071 | 0 | 103,071 | 0 | 0 |
| Throckmorton | 8,065 | 0 | 8,065 | 0 | 0 |
| Titus | 148 | 26 | 174 | 0 | 0 |
| Tom Green | 38,657 | 0 | 38,657 | 0 | 0 |
| Travis | 24,387 | 0 | 24,387 | 0 | 0 |
| Trinity | 835 | 70 | 905 | 0 | 0 |
| Tyler | 32 | 6 | 38 | 0 | 0 |
| Upshur | 158 | 23 | 181 | 0 | 0 |
| Upton | 650 | 1 | 651 | 0 | 0 |
| Uvalde | 776 | 0 | 776 | 0 | 0 |
| Val Verde | 92 | 1 | 93 | 0 | 0 |
| Van Zandt | 15,475 | 0 | 15,475 | 0 | 0 |
| Victoria | 16,991 | 0 | 16,991 | 0 | 0 |
| Walker | 1,900 | 27 | 1,927 | 0 | 0 |
| Waller | 3,356 | 0 | 3,356 | 0 | 0 |
| Ward | 3,500 | 0 | 3,500 | 0 | 0 |
| Washington | 14,982 | 0 | 14,982 | 0 | 0 |
| Webb | 1,197 | 7 | 1,204 | 0 | 0 |
| Wharton | 50,573 | 0 | 50,573 | 0 | 0 |
| Wheeler | 19,318 | 0 | 19,318 | 0 | 0 |
| Wichita | 4,302 | 0 | 4,302 | 0 | 0 |

TEXAS—Continued

| County | Computed county allotment | Allocation from State reserves for trends | County allotment (sum of columns (1) and (2)) | Allocation from State reserve for: Small farms | Allocation from State reserve for: Inequity and hardship cases |
|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) |
| | Acres | Acres | Acres | Acres | Acres |
| Wilbarger | 35,050 | 0 | 35,050 | 0 | 0 |
| Willacy | 62,766 | 0 | 62,766 | 0 | 0 |
| Williamson | 74,990 | 0 | 74,990 | 0 | 0 |
| Wilson | 2,667 | 0 | 2,667 | 0 | 0 |
| Wise | 1,418 | 0 | 1,418 | 0 | 0 |
| Wood | 53 | 8 | 61 | 0 | 0 |
| Yoakum | 29,209 | 0 | 29,209 | 0 | 0 |
| Young | 8,206 | 0 | 8,206 | 0 | 0 |
| Zapata | 723 | 0 | 723 | 0 | 0 |
| Zavala | 6,026 | 0 | 6,026 | 0 | 0 |
| VIRGINIA | | | | | |
| Brunswick | 1,278 | 0 | 1,278 | 12 | 12 |
| Charlotte | 3 | 0 | 3 | 0 | 0 |
| Dinwiddie | 124 | 0 | 124 | 2 | 2 |
| Greensville | 2,902 | 0 | 2,902 | 27 | 27 |
| Isle of Wight | 166 | 0 | 166 | 2 | 2 |
| Lunenburg | 116 | 0 | 116 | 2 | 2 |
| Mecklenburg | 1,217 | 0 | 1,217 | 10 | 10 |
| Nansemond | 957 | 0 | 957 | 8 | 8 |
| Prince Edward | 2 | 0 | 2 | 0 | 0 |
| Prince George | 23 | 0 | 23 | 0 | 0 |
| Southampton | 2,983 | 0 | 2,983 | 27 | 27 |
| Surry | 3 | 0 | 3 | 0 | 0 |
| Sussex | 1,044 | 0 | 1,044 | 10 | 10 |

(Secs. 301, 350, 375, 52 Stat. 38, as amended, 84 Stat. 1358, 52 Stat. 66, as amended; 7 U.S.C. 1301, 1350, 1375)

*Effective date.* Date of filing this document with the Director, Office of the Federal Register.

Signed at Washington, D.C., on November 22, 1971.

CARROLL G. BRUNTHAVER,
*Acting Administrator, Agricultural Stabilization and Conservation Service.*

[FR Doc.71-17324 Filed 11-23-71;12:35 pm]

## Chapter IX—Consumer and Marketing Service (Marketing Agreements and Orders; Fruits, Vegetables, Nuts), Department of Agriculture

[Navel Orange Regulation 242]

## PART 907—NAVEL ORANGES GROWN IN ARIZONA AND DESIGNATED PART OF CALIFORNIA

### Limitation of Handling

§ 907.542 Navel Orange Regulation 242.

(a) *Findings.* (1) Pursuant to the marketing agreement, as amended, and Order No. 907, as amended (7 CFR Part 907, 35 F.R. 16359), regulating the handling of Navel oranges grown in Arizona and designated part of California, effective under the applicable provisions of the Agricultural Marketing Agreement Act of 1937, as amended (7 U.S.C. 601–674), and upon the basis of the recommendations and information submitted by the Navel Orange Administrative Committee, established under the said amended marketing agreement and order, and upon other available information, it is hereby found that the limitation of handling of such Navel oranges, as hereinafter provided, will tend to effectuate the declared policy of the act.

(2) It is hereby further found that it is impracticable and contrary to the public interest to give preliminary notice, engage in public rule making procedure, and postpone the effective date of this section until 30 days after publication hereof in the FEDERAL REGISTER (5 U.S.C. 553) because the time intervening between the date when information upon which this section is based became available and the time when this section must become effective in order to effectuate the declared policy of the act is insufficient, and a reasonable time is permitted, under the circumstances, for preparation for such effective time; and good cause exists for making the provisions hereof effective as hereinafter set forth. The committee held an open meeting during the current week, after giving due notice thereof, to consider supply and market conditions for Navel oranges and the need for regulation; interested persons were afforded an opportunity to submit information and views at this meeting; the recommendation and supporting information for regulation during the period specified herein were promptly submitted to the Department after such meeting was held; the provisions of this section, including its effective time, are identical with the aforesaid recommendation of the committee, and information concerning such provisions and effective time has been disseminated among handlers of such Navel oranges; it is necessary, in order to effectuate the declared policy of the act, to make this section effective during the period herein specified; and compliance with this section will not require any special preparation on the part of persons subject hereto which cannot be completed on or before the effective date hereof. Such committee meeting was held on November 30, 1971.

(b) *Order.* (1) The respective quantities of Navel oranges grown in Arizona and designated part of California which may be handled during the period December 3, 1971, through December 9, 1971, are hereby fixed as follows:

(i) District 1: 846,000 Cartons;

(ii) District 2: 40,285 Cartons;

(iii) District 3: 54,000 Cartons.

(2) As used in this section, "handled," "District 1," "District 2," "District 3," and "carton" have the same meaning as when used in said amended marketing agreement and order.

(Secs. 1–19, 48 Stat. 31, as amended; 7 U.S.C. 601–674)

Dated: December 1, 1971.

PAUL A. NICHOLSON,
*Deputy Director, Fruit and Vegetable Division, Consumer and Marketing Service.*

[FR Doc.71-17332 Filed 12-1-71;11:20 am]

# Title 20—EMPLOYEES' BENEFITS

## Chapter V—Manpower Administration, Department of Labor

## PART 614—UNEMPLOYMENT COMPENSATION FOR EX-SERVICEMEN

### Schedule of Remuneration

The enactment of Public Law 92–129, providing increased pay and allowances for members of the uniformed services, makes it necessary to amend § 614.19 of Title 20 of the Code of Federal Regulations, which contains the schedule of remuneration for each pay grade of ex-servicemen used in the administration of the program of unemployment compensation for ex-servicemen established by Subchapter II of Chapter 85 of Title 5 of the United States Code (5 U.S.C. 8521–8525).

The provisions of 5 U.S.C. 553 which require notice of proposed rulemaking, public participation in their adoption, and delay in effective date are not applicable because such notice, public participation, and delay are found not to be in the public interest which in this instance requires the prompt implementation of the amended schedule of remuneration by the several State agencies administering such program.

Section 614.19 of Title 20, Code of Federal Regulations, is revised to read:

§ 614.19 Schedule of Remuneration.

(a) The schedule provided in this paragraph applies to first claims under the UCX program filed on or after January 2, 1972.