CS88-41
Flares; liquid-burning

U. S. DEPARTMENT OF COMMERCE
JESSE H. JONES, Secretary

NATIONAL BUREAU OF STANDARDS
LYMAN J. BRIGGS, Director

LIQUID-BURNING FLARES

COMMERCIAL STANDARD CS88-41

Effective Date for New Production from January 1, 1941

A RECORDED VOLUNTARY STANDARD
OF THE TRADE

UNITED STATES
GOVERNMENT PRINTING OFFICE
WASHINGTON : 1940

For sale by the Superintendent of Documents, Washington, D. C. - - - - Price 5 cents

PROMULGATION

of

COMMERCIAL STANDARD CS88-41

for

LIQUID-BURNING FLARES

On January 11 and 12, 1940, at the instance of the Safety Equipment Manufacturers Association, a general conference of representative manufacturers, distributors, regulatory officials, testing laboratories, and users of liquid-burning flares adopted a recommended commercial standard for this commodity. Those concerned have since accepted and approved for promulgation by the United States Department of Commerce, through the National Bureau of Standards, the standard as shown herein.

The standard is effective for new production from January 1, 1941.

Promulgation recommended.

I. J. Fairchild,
Chief, Division of Trade Standards.

Promulgated.

Lyman J. Briggs,
Director, National Bureau of Standards.

Promulgation approved.

Jesse H. Jones,
Secretary of Commerce.

LIQUID-BURNING FLARES

COMMERCIAL STANDARD CS88-41

EXPLANATORY

These specifications are intended to apply primarily to sample equipments submitted by the manufacturer to the testing laboratory for original approval but may be applied to equipments purchased on the open market or to equipments taken at random from regular production. Should the first sample fail to pass one or more of the test requirements, two or more samples may be tested, and, if two out of the three samples comply with each of the requirements, the equipment shall be considered to be satisfactory.

PURPOSE

1. The purpose is to establish standard specifications and methods of test for liquid-burning flares for the guidance of manufacturers, distributors, and users.

SCOPE

2. This standard covers the requirements and methods for construction, vibration and shock, weatherproof, reliability and life, and photometric tests of liquid-burning flares.

DEFINITION

3. A "liquid-burning flare" is a device capable of providing and displaying a warning light, indicating to the driver of an approaching motor vehicle that beyond the burning flare there is a hazard and that he should proceed with caution.

GENERAL REQUIREMENTS

4. Flares shall be provided in sets of three (3) contained in a metal rack or metal box which can be securely mounted on the motor vehicle.

5. Flares shall be designed for use with liquid fuel having a fire-hazard classification not greater than that of kerosene.

6. The body or fuel container of all flares shall be made of molded or pressed steel of not less than 22-gage U. S. Standard.

7. All joints of seams, if any, shall be constructed as to prevent leakage in the body or fuel container.

8. The burner element shall be securely fastened in its proper position.

9. The flare shall be provided with a sealing cap so secured as to prevent leakage of fuel while the flare is not in use.

INSTRUCTIONS FOR USE

10. The manufacturer shall furnish with each set of flares submitted for laboratory test printed instructions as to wick adjustment, maximum filling level, the method of installation, and such other details as the manufacturer may deem necessary in order that the user of these flares may be able to operate them at their maximum efficiency.

SAMPLES FOR TEST

11. Sample flares submitted for laboratory test shall be representative of the devices as regularly manufactured and marketed. The various tests may be made on separate samples, if desired, to expedite completion of tests.

LABORATORY FACILITIES

12. All laboratory tests shall be made by a recognized, impartial engineering laboratory having all facilities and equipment necessary to make accurate physical and optical tests herein specified in accordance with established laboratory practices.

VIBRATION AND SHOCK TEST

13a. Three sample flares, in the metal rack or metal box in which they were submitted to the laboratory and mounted as would obtain in service, shall be bolted to the anvil end of the table of the vibration rack and vibrated approximately 750 times per minute through a distance of ¼ inch. The table is spring-mounted at one end and fitted with steel calks on the under side of the other end. These calks are to make contact with the steel anvil once during each cycle at the completion of the fall. The rack shall be operated under a spring tension of 60 to 70 pounds. This test shall be continued for 1 hour.

13b. The flares shall then be examined. Any flare showing evidence of structural failure or leakage in the body or joints at any time during this test shall be considered to have failed.

13c. It is recommended that for the purpose of standardizing the vibration and shock test, the testing machine shall be made substantially in accordance with the drawing, figure 1.

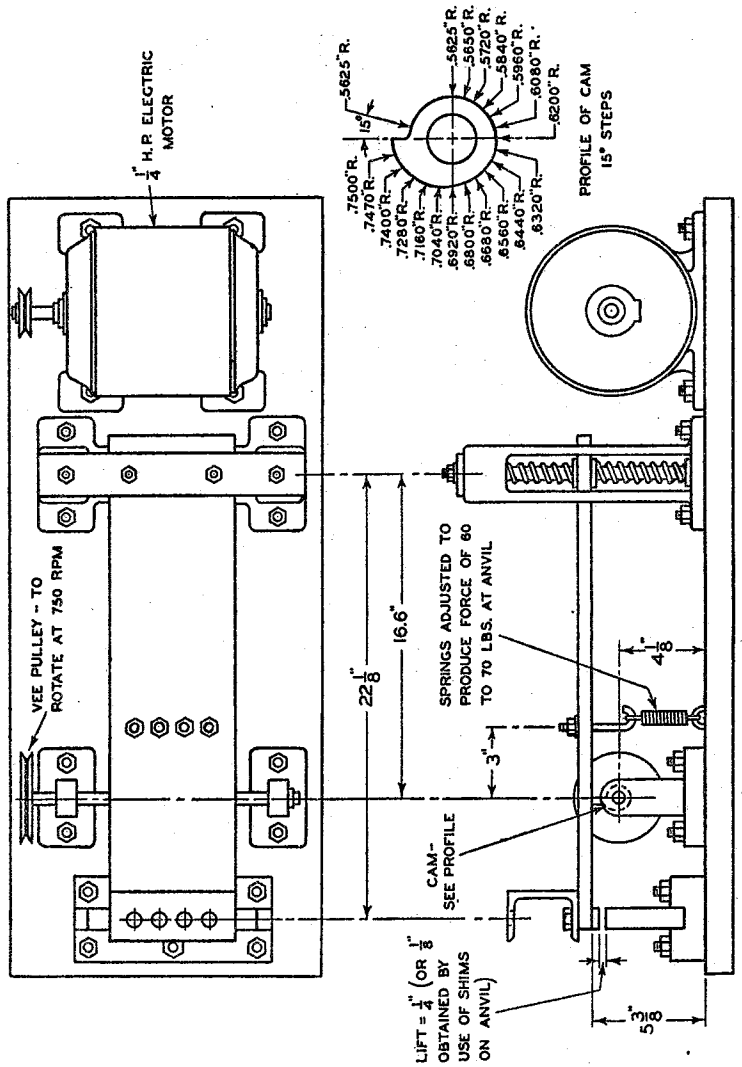

FIGURE 1.—*Vibration and shock-testing machine.*

WEATHERPROOF TEST

14a. The flares used for these tests shall be filled with kerosene to the level recommended in the manufacturer's instructions and shall have the wicks adjusted as recommended by the manufacturer.

14b. After a preheating period of 5 minutes, in still air, a sample flare, lighted and mounted in its normal operating position on a table rotating at 4 rpm and in a wind of approximately 2 mph, shall be subjected to a water spray from an adjustable, solid-cone nozzle (such as the ordinary garden-hose spray nozzle) set so that the nozzle outlet is 8 to 12 feet horizontally from the sample and 1 to 3 feet vertically above the sample, with the nozzle axis pointing upward at an angle of approximately 45 degrees with the horizontal, and with the water striking the sample at an angle of approximately 45 degrees with the horizontal in a downward direction.

14c. Under the above-specified conditions and with a water pressure of 5 to 7½ lb/in.^{2} at the nozzle, the rate of precipitation at the location of the sample shall be adjusted to 0.10 inch per minute. The sample shall be introduced gradually into the spray and after being placed in the test location shall continue to operate under these conditions for 15 minutes. This test shall be made on each of the three flares constituting a set, and two out of three shall pass the test.

14d. With the rate of rotation and the wind condition the same as specified in paragraphs 14a and 14b, the water pressure shall then be increased to a value of 10 to 12 lb/in.^{2} and the sample moved farther from the nozzle, if necessary, to a location giving a precipitation of 0.03 inch per minute striking the sample at approximately 45 degrees with the horizontal. Under these conditions, the sample shall continue to operate for 30 minutes. This test shall be made on each of the three flares constituting a set and two out of the three shall pass the test.

14e. With the rate of rotation and the wind condition the same as described in paragraphs 14a and 14b, the water pressure shall be further increased to a value of 18 to 20 lb/in.^{2} and the sample moved farther from the nozzle, if necessary, to a location giving a precipitation of 0.01 inch per minute striking the sample at approximately 45 degrees with the horizontal. Under these conditions, the sample shall continue to operate for 45 minutes. This test shall be made on each of the three flares constituting a set and two out of the three shall pass the test.

NOTE.—Solid-cone spray nozzles, operating at 5 to 7½ lb/in.^{2}, give a spray consisting of relatively large drops when set so that the center of the stream at the flare shows 0.10 inch per minute precipitation. At higher pressures, the drops are smaller. These conditions are comparable to actual rain.

RELIABILITY AND LIFE TEST

15a. The flares used for these tests shall be filled with kerosene to the level recommended by the manufacturer and shall have the wicks adjusted in accordance with the manufacturer's instructions.

15b. A flare shall be lighted and allowed to burn in still air for a preheating period of 5 minutes. It shall then be placed suddenly in an air stream of 40 mph and withdrawn. After rotating through approximately 45 degrees, it shall again be placed in the air stream and withdrawn. It shall be rotated again through an additional 45 de-

grees approximately and placed in the air stream and withdrawn a third time. If the flame is extinguished on any one of these three operations, the sample shall have failed to pass the test. The test shall then be repeated on each of the other two samples constituting a set and two out of the three shall pass the test.

15c. A flare, lighted and mounted in its normal operating position, rotating about its vertical axis at 4 rpm, shall be subjected to a horizontal current of air having a velocity the equivalent of wind at 40 mph. This test shall continue for 15 minutes and the flare shall remain lighted throughout the entire 15-minute period.

15d. Upon completion of the above test, the flare shall, while lighted, and rotated as above specified, be subjected to a horizontal current of air having a velocity of 5 mph. The total uninterrupted burning time, including the first 15 minutes at 40 mph, shall be at least 12 hours.

15e. The flare shall be capable of burning in "still" air.

PHOTOMETRIC TEST

16. A sample flare, when subjected to a wind velocity of 5 mph and 40 mph, respectively, shall produce a minimum of 0.10 cp in a horizontal direction.

MARKING AND LABELING

17. Each liquid-burning flare manufactured and sold as conforming to this standard shall bear a distinctive designation prominently and permanently indicating the trade-mark of the manufacturer, duly applied for or registered under the laws of the United States, or the trade name or other distinctive model, designation, or other means of identification.

18. In order to provide the purchaser with a ready means for distinguishing between liquid-burning flares which meet the requirements of this standard and those which do not, the Safety Equipment Manufacturers Association has adopted the wording quoted below for labels or statements on cartons. The mark "SEMA-APPROVED" on the flares is based upon tests on samples and reexaminations by a recognized impartial engineering laboratory. It illustrates a method of certifying that these items comply with the commercial standard.

> This Liquid-burning Flare, marked SEMA-APPROVED, is certified by the Safety Equipment Manufacturers Association and by the manufacturer as conforming to Commercial Standard CS88–41.

EFFECTIVE DATE

The standard is effective for new production from January 1, 1941.

STANDING COMMITTEE

The following individuals comprise the membership of the standing committee, which is to review, prior to circulation for acceptance, revisions proposed to keep the standard abreast of progress. Each association nominated its own representatives. Comment concerning the standard and suggestions for revision may be addressed to any member of the committee or to the Division of Trade Standards

National Bureau of Standards, which acts as secretary for the committee.

Manufacturers:

H. B. DONLEY (chairman), Columbus Metal Products, Inc., 767 North 4th St., Columbus, Ohio. Representing Safety Equipment Manufacturers Association.

A. B. DETTMER, K–D Lamp Co., 610 West Court St., Cincinnati, Ohio. Representing Safety Equipment Manufacturers Association.

R. R. WHIPPLE, The Trippe Manufacturing Co., 564 W. Adams St., Chicago, Ill. Representing Safety Equipment Manufacturers Association.

CHARLES W. ANKLAM, C. M. Hall Lamp Co., 1035 E. Hancock Ave., Detroit, Mich. Representing Society of Automotive Engineers.

R. N. FALGE, Guide Lamp Division, General Motors Corp., Anderson, Ind. Representing Society of Automotive Engineers.

WILLIAM F. LITTLE, Electrical Testing Laboratories, East End Ave. at 79th St., New York, N. Y. Representing Society of Automotive Engineers.

Distributors:

W. E. BLANCHARD, National Automobile Dealers Association, 154 Bagley Avenue, Detroit, Mich.

G. B. CORNWELL, Sears, Roebuck & Co., Homan Ave. and Arthington St., Chicago, Ill. Representing Mail Order Association of America.

L. S. JULLIEN, L. S. Jullien, Inc., 1439 P St., NW., Washington, D. C. Representing Motor & Equipment Wholesalers Association.

Users:

CHARLES G. MORGAN, JR., American Trucking Associations, Inc., 1013 16th St. N.W., Washington, D. C.

LEON F. BANIGAN, National Council of Private Motor Truck Owners, Inc., National Press Bldg., Washington, D. C

BURTON W. MARSH, American Automobile Association, Mills Bldg., 17th and Pennsylvania Ave., Washington, D. C.

Alternate: EARL ALLGAIER.

MARTIN SCHREIBER, Public Service Coordinated Transport, 80 Park Place, Newark, N. J. Representing National Association of Motor Bus Operators.

General interest:

H. H. ALLEN, Interstate Commerce Commission, Washington, D. C.

H. H. KELLY, Interstate Commerce Commission, Washington, D. C. Representing Federal Interdepartmental Safety Council.

Alternate: H. H. ALLEN.

FRANK W. MATSON, Minnesota Railroad and Warehouse Commission, St. Paul, Minn. Representing National Association of Railroad and Utilities Commissioners.

J. J. SHANLEY, Department of Motor Vehicles, Trenton, N. J. Representing American Association of Motor Vehicle Administrators.

Laboratories:

SYDNEY V. JAMES, Underwriters' Laboratories, Inc., 207 E. Ohio St., Chicago, Ill.

MONROE L. PATZIG, American Council of Commercial Laboratories, 2215 Ingersoll Ave., Des Moines, Iowa.

WM. F. LITTLE, Electrical Testing Laboratories, East End Ave. at 79th St., New York, N. Y.

Alternate: HERMAN KOENIG.

HISTORY OF PROJECT

Pursuant to a request on July 18, 1938, from the Safety Equipment Manufacturers Association (then known as the MEMA Light and Signal Group) for the cooperation of the National Bureau of Standards in the establishment of commercial standards for nine items of lamps and signal equipment for vehicles (after market), preliminary conferences of all interested manufacturers were held in Detroit on September 22 and 23, 1938, and again on March 1, and 2, 1939, in order to adjust the drafts to suit the consensus of producers.

The proposed standards, as adjusted by the preliminary manufacturers' conferences, were then submitted to the American Association of Motor Vehicle Administrators and other key organizations for advance consideration and recommendations. Following receipt of these recommendations, a general conference was held in Washington, D. C., on January 11 and 12, 1940, to which all interested producers, distributors, users, regulatory bodies, and testing laboratories were invited. The report of the general conference was circulated on February 20, 1940.

On April 8, 1940, copies of the Recommended Commercial Standards as adopted by the general conference, including recommendations of two subcommittees appointed by the conference, were circulated to all concerned for written acceptance. Upon receipt of written acceptances from a preponderant majority, announcement was issued on July 10, 1940, that the standards would become effective for new production from January 1, 1941.

ACCEPTANCE OF COMMERCIAL STANDARD

If acceptance has not previously been filed, this sheet properly filled in, signed, and returned will provide for the recording of your organization as an acceptor of this commercial standard.

Date _____

Division of Trade Standards,
National Bureau of Standards,
Washington, D. C.

Gentlemen:

Having considered the statements on the reverse side of this sheet, we accept the Commercial Standard CS88–41 as our standard of practice in the

Production [1] Distribution [1] Use [1]

of liquid-burning flares.

We will assist in securing its general recognition and use and will cooperate with the standing committee to effect revisions of the standard when necessary.

(Cut on this line)

Signature of individual officer _____
(In ink)

(Kindly typewrite or print the following lines)

Name and title of above officer _____

Organization _____
(Fill in exactly as it should be listed)

Street address _____

City and State _____

[1] Please designate which group you represent by drawing lines through the other two. Please file separate acceptances for all subsidiary companies and affiliates which should be listed separately as acceptors. In the case of related interests, trade papers, colleges, etc., desiring to record their general approval, the words "in principle" should be added after the signature.

TO THE ACCEPTOR

The following statements answer the usual questions arising in connection with the acceptance and its significance:

1. *Enforcement.*—Commercial standards are commodity specifications voluntarily established by mutual consent of those concerned. They present a common basis of understanding between the producer, distributor, and consumer and should not be confused with any plan of governmental regulation or control. The United States Department of Commerce has no regulatory power in the enforcement of their provisions, but since they represent the will of the interested groups as a whole, their provisions through usage soon become established as trade customs, and are made effective through incorporation into sales contracts by means of labels, invoices, and the like.

2. *The acceptor's responsibility.*—The purpose of commercial standards is to establish for specific commodities, nationally recognized grades or consumer criteria and the benefits therefrom will be measurable in direct proportion to their general recognition and actual use. Instances will occur when it may be necessary to deviate from the standard and the signing of an acceptance does not preclude such departures; however, such signature indicates an intention to follow the commercial standard where practicable, in the production, distribution, or consumption of the article in question.

3. *The Department's responsibility.*—The major function performed by the Department of Commerce in the voluntary establishment of commercial standards on a Nation-wide basis is fourfold: first, to act as an unbiased coordinator to bring all interested parties together for the mutually satisfactory adjustment of trade standards; second, to supply such assistance and advice as past experience with similar programs may suggest; third, to canvass and record the extent of acceptance and adherence to the standard on the part of producers, distributors, and users; and fourth, after acceptance, to publish and promulgate the standard for the information and guidance of buyers and sellers of the commodity.

4. *Announcement and promulgation.*—When the standard has been endorsed by a satisfactory majority of production or consumption in the absence of active, valid opposition, the success of the project is announced. If, however, in the opinion of the standing committee or the Department of Commerce, the support of any standard is inadequate, the right is reserved to withhold promulgation and publication.

ACCEPTORS

The organizations and individuals listed below have accepted this standard as their standard of practice in the production, distribution, and use of liquid-burning flares. Such endorsement does not signify that they may not find it necessary to deviate from the standard, nor that producers so listed guarantee all of their products in this field to conform with the requirements of this standard. Therefore, specific evidence of conformity should be obtained where required.

ASSOCIATIONS

American Transit Association, New York, N. Y.
Arkansas, Associated Motor Carriers of, Little Rock, Ark.
Michigan Trucking Association, Detroit, Mich.
National Council of Women of the U. S., Inc., New York, N. Y.
National Standard Parts Association, Detroit, Mich. (In principle.)
Safety Equipment Manufacturer's Association, Inc., New York, N. Y.

FIRMS

A. G. Sales Co., Inc., New York, N. Y. (In principle.)
Aetna Motor Products Co., Boston (Dorchester), Mass.
Anthes Force Oiler Co., Fort Madison, Iowa.
Appleton Electric Co., Chicago, Ill.
Approved Patents Corporation, New York, N. Y.
Arrow Safety Device Co., Medford, N. J.
Atlantic Greyhound Corporation, Charleston, W. Va.
Atlantic Refining Co., The, Philadelphia, Pa.
Autocar Co., The, Ardmore, Pa.
Automotive Lighting Equipment, Inc., Franklinton, La.
Bendix Aviation Corporation, Bendix Products Division, New York, N. Y.
Bolser Corporation, The, Cedar Falls, Iowa.
Carlton Lamp Corporation, Union City, N. J. (In principle.)
Casco Products Corporation, Bridgeport, Conn.
Central Co-operative Wholesale, Superior, Wis.
Coleman Motors Corporation, Littleton, Colo.
Columbus Metal Products, Inc., Columbus, Ohio.
Connecticut, State Motor Vehicle Department of, Hartford, Conn.
Connecticut Telephone & Electric Corporation, Meriden, Conn.
Culver-Stearns Manufacturing Co., Worcester, Mass.
Dallas, Better Business Bureau of, Dallas, Tex. (In principle.)
Detroit Testing Laboratory, The, Detroit, Mich. (In principle.)
Dietz Co., R. E., New York, N. Y. (In principle.)
Divco-Twin Truck Co., Detroit, Mich.
Dixie Motor Coach Corporation, Dallas, Tex.
Economy Electric Lantern Co., Inc., Milwaukee, Wis.
Electric Service Supplies Co., Philadelphia, Pa.
Electrical Testing Laboratories, New York, N. Y. (In principle.)
Embury Manufacturing Co., Warsaw, N. Y.
Firestone Tire & Rubber Co., The, Akron, Ohio.
Hunt & Co., J. R., Baltimore, Md.
Idaho, State of, Boise, Idaho.
K-D Lamp Co., The, Cincinnati, Ohio.
Kilborn-Sauer Co., The, Fairfield, Conn.
Lancaster Lens Co., The, Lancaster, Ohio.
Long Beach, Calif., Ltd., Better Business Bureau of, Long Beach, Calif.
Maryland Casualty Co., Baltimore, Md. (In principle.)
Mercury Motors, Inc., Fort Smith, Ark.
Minnesota Department of Highways, St. Paul, Minn.
Moreland Motor Truck Co., Los Angeles, Calif.
National Transportation Co., Inc., Bridgeport, Conn.
Nebraska State Railway Commission, Lincoln, Nebr.

New Orleans, Inc., Better Business Bureau of, New Orleans, La. (In principle.)
Oklahoma Department of Public Safety, Oklahoma City, Okla.
Packard Properties, Inc., General Accessories Division of, New York, N. Y.
Patzig Testing Laboratories, Des Moines, Iowa.
Perfection Motor Products Co., The, Bridgeport, Conn.
Pittsburgh & Weirton Bus Co., Weirton, W. Va.
Pollak Corporation, Joseph, Boston (Dorchester), Mass.
Premier Signal Co., Bellevue, Ohio.
Protectall Motor Signal, Inc., Syracuse, N. Y.
Purdue University, Engineering Experiment Station, Lafayette, Ind. (In principle.)
Reo Motors, Inc., Lansing, Mich.
Rich Foglite, Inc., Bellaire, Ohio.
Sears, Roebuck & Co., Chicago, Ill.
Sunshine Bus Lines, Inc., Dallas, Tex.
Tennessee Department of Safety, Nashville, Tenn.
Trippe Manufacturing Co., Chicago, Ill.
Underwriters Laboratories, Inc., Chicago, Ill. (In principle.)
Unity Manufacturing Co., Chicago, Ill.
Virginia, Division of Motor Vehicles of, Richmond, Va. (In principle.)
Walter Motor Truck Co., Ridgewood, L. I., N. Y.
Ward Motor Vehicle Co., Mt. Vernon, N. Y.
Washington, State of, Olympia, Wash.
Western Auto Supply Co., Kansas City, Mo.
Wisconsin, Motor Vehicle Department of, Madison, Wis.

U. S. GOVERNMENT

Agriculture, U. S. Department of, Office of Plant & Operations, Washington, D. C.
Foreign & Domestic Commerce, Bureau of, Electrical Division, Washington, D. C. (In principle.)
Panama Canal, The, Transportation Division, Supply Department, Balboa Heights, Canal Zone.
Veterans' Administration, Washington, D. C.
War Department, Washington, D. C.

COMMERCIAL STANDARDS

CS No.	Item
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2-30.	Mopsticks.
3-40.	Stoddard solvent (third edition).
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5-40.	Pipe nipples; brass, copper, steel, and wrought iron.
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39-37.	Wool and part wool blankets (second edition).
40-32.	Surgeons' rubber gloves.
41-32.	Surgeons' latex gloves.
42-35.	Fiber insulating board (second edition).
43-32.	Grading of sulphonated oils.
44-32.	Apple wraps.
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46-40.	Hosiery lengths and sizes (third edition).
47-34.	Marking of gold-filled and rolled-gold-plate articles other than watch cases.
48-34.	Domestic burners for Pennsylvania anthracite (underfeed type).
49-34.	Chip board, laminated chip board, and miscellaneous boards for bookbinding purposes.
50-34.	Binders board for bookbinding and other purposes.
51-35.	Marking articles made of silver in combination with gold.
52-35.	Mohair pile fabrics (100-percent mohair plain velvet, 100-percent mohair plain frieze, and 50-percent mohair plain frieze).
53-35.	Colors and finishes for cast stone.
54-35.	Mattresses for hospitals.
55-35.	Mattresses for institutions.
56-36.	Oak flooring.
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58-36.	Woven elastic fabrics for use in overalls (overall elastic webbing).
59-39.	Woven dress fabrics—testing and reporting (second edition).
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61-37.	Wood-slat venetian blinds.
62-38.	Colors for kitchen accessories.
63-38.	Colors for bathroom accessories.
64-37.	Walnut veneers.
65-38.	Wool and part-wool fabrics.
66-38.	Marking of articles made wholly or in part of platinum.
67-38.	Marking articles made of karat gold.
68-38.	Liquid hypochlorite disinfectant, deodorant, and germicide.
69-38.	Pine oil disinfectant.
70-38.	Coal tar disinfectant (emulsifying type).
71-38.	Cresylic disinfectants.
72-38.	Household insecticide (liquid spray type).
73-38.	Old growth Douglas fir standard stock doors.
74-39.	Solid hardwood wall paneling.
75-39.	Automatic mechanical draft oil burners.
76-39.	Hardwood interior trim and molding.
77-40.	Sanitary cast-iron enameled ware.
78-39.	Ground-and-polished lenses for sun glasses.
79-39.	Blown, drawn, and dropped lenses for sun glasses.
80-41.	Electric direction signal systems other than semaphore type for commercial and other vehicles subject to special motor vehicle laws (after market).
81-41.	Adverse-weather lamps for vehicles (after market).
82-41.	Inner-controlled spotlamps for vehicles (after market).
83-41.	Clearance, marker, and identification lamps for vehicles (after market).
84-41.	Electric tail lamps for vehicles (after market).
85-41.	Electric license-plate lamps for vehicles (after market).
86-41.	Electric stop lamps for vehicles (after market).
87-41.	Red electric warning lanterns.
88-41.	Liquid-burning flares.
89-40.	Hardwood stair treads and risers.

NOTICE.—Those interested in commercial standards with a view toward accepting them as a basis of everyday practice may secure copies of the above standards, while the supply lasts, by addressing the Division of Trade Standards, National Bureau of Standards, Washington, D. C.