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Bureau of Standards
Washington
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Information Section
Bureau of Standards, Washington

The Safety Code for Brakes and Brake Testing has been approved by the American Engineering Standards Committee effective May 16, 1927, and will be designated as Tentative American Standard on this subject. The American Engineering Standards Committee designation is D4 - 1927.

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PROPOSED FINAL DRAFT FOR
SAFETY CODE FOR BRAKES AND BRAKE TESTING

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A Code to regulate the Brakes and Brake Testing of all Motor Vehicles in the State of _____, for the purpose of Public Safety, and for other purposes.

Part I.

Section I. Definitions

1. "Shall" and "Should". The word "shall" is to be understood as mandatory and the word "should" as advisory.

2. "Approved". The word "approved" means approved by the authority having legal jurisdiction.

3. "Independently operated brakes". Brakes are independently operated when there are at least two means of operating the brakes, each of which means shall apply braking effort to at least two wheels, the braking mechanism being so constructed that no part which is likely to fail shall be common to the two.

4. "Hand Brake". A "Hand Brake" means a brake which is normally operated by the hand of the operator, Provided, that in such cases where there are two brakes, both designed to be operated by the foot, the one equipped with a ratchet or other device for holding the brake in the applied position shall be considered as taking the place of the "Hand Brake" as herein defined and the requirements for such a brake shall be the same as those required for hand brakes.

5. "Foot Brake". A "Foot Brake" means a brake which is normally operated by the operators foot.

6. "Motor Vehicle". "Motor Vehicle" means any vehicle which is self-propelled by mechanical power, in, upon, or by which, any person or property is, or may be, transported upon a public highway.

7. "Gross Weight of a Motor Vehicle". The "Gross Weight of a Motor Vehicle" means the combined weight of the vehicle and its maximum allowable load, or any fraction thereof.

8. "Motor Cycle" A "Motor Cycle" means any motor vehicle designed to travel on not more than three wheels in contact with the ground, Provided, that this definition shall include ordinary two wheeled motor cycles, motor cycles with side cars, or motor tri-cycles, but shall not include any three wheeled tractor or other motor vehicle used, or designed to be used, for the hauling of other vehicles.

Section II. General

Rule 20. Approval of Methods.

The Commissioner of Motor Vehicles of this State (or equivalent authority in States not having this officer) shall approve methods of test, type of test equipment, and calibration of such equipment, and such approval shall be based upon decisions made by an unprejudiced engineering authority of recognized standing. When necessary the U. S. Bureau of Standards may be called upon to act as referee concerning matters coming under this Rule, and its decisions shall be final.

Rule 21. New and Old Installations.

After the date at which this Code becomes effective, the equipment on all new motor vehicles shall conform to its

provisions, and equipment on motor vehicles in service prior to that date shall be modified to conform to its provisions, except as may be hereinafter provided.

Requirements for all motor vehicles shall be made the same as for Motor Vehicles in Part II two years after the adoption of this Code.

Rule 22. Time of Effect of Code Following Adoption.

Unless otherwise expressly stated, this Code shall become effective six months subsequent to its adoption.

Section X General Requirements.

Rule 100. All Motor Vehicles.

Every motor vehicle operating or designed to operate on the public highways of this State, unless herein excepted, shall be equipped with independently operated brakes, which shall, at all times, be capable of meeting the requirements of this Code.

Exceptions to Rule 100.

1. Motor-cycles, unless used in the transportation of passengers for hire, need be equipped with only one brake. In such cases as motor cycles are used in the transportation of passengers for hire, Rule 100 shall apply in full force and effect, and the requirements as to performance shall be in accordance with Rules 200 and 201 of this Code.

2. Electric vehicles of whatever gross weight purchased prior to the date at which this Code becomes effective are exempted throughout their remaining life from the provisions of this Rule, providing such vehicles comply with the requirements of Rule 200 of this Code, and shall be capable of meeting

all other requirements of this Code.

Rule 101. Means of Holding Hand Brake

Means shall be provided to retain at least one brake in such a position as to restrain the vehicle from moving.

Rule 102. Method of Test

The method of test to be used in determining if vehicles of the several classes mentioned meet the performance requirements of the Code shall be by the use of instruments suitable for the purpose, which shall be approved after examination by an unprejudiced engineering authority of recognized standing. When necessary, the U. S. Bureau of Standards may be called upon to act as referee concerning matters coming under this Rule and its decisions shall be final.

Rule 103. Loaded Vehicles

Enforcing authorities may, at their discretion, require that tests be conducted with the vehicles fully loaded.

Rule 104. Clutch Disengaged

All testing shall be conducted with the clutch disengaged, Provided, that, where the motor vehicle is not provided with a clutch, the testing shall be conducted with no motive power being supplied to the driving wheels, except in such instances as such testing is to be applied to electrical brakes.

Part II

Section XX. All Motor Vehicles Weighing 6000 pounds Gross or Less, Except as Specifically Provided Herein, and Motor Vehicles of Whatever Gross Weight Which are fitted for the Accommodation of Passengers or Commonly Used for Their Transportation.

Rule 200 Foot Brakes

On a dry, hard, level road free from loose material, the foot brake shall be capable of stopping the vehicle from a speed of 20 miles per hour within a distance of 50 feet, or at a rate which corresponds to such performance.

Rule 201. Hand Brakes

On a dry, hard, level road free from loose material, the hand brake shall be capable of stopping the vehicle from a speed of 20 miles per hour within a distance of 75 feet, or at a rate which corresponds to such performance.

Part III

Section XXX. Motor Vehicles Exceeding
6000 Pounds Gross Weight, Designed for the
Transportation of Goods or Materials, Tractors,
and all other Motor Vehicles not Covered in Part II.

Rule 300.

During the two year period following the adoption of this Code any Motor Vehicle coming in this Class, as defined under Section XXX, operating either singly or in combination, shall be capable of stopping on a dry, hard, level road, free from loose material, within the following distances, or at rates, corresponding, in each instance, to the several performances specified:

- (a) Within 50 feet from 20 miles per hour upon simultaneous application of two brakes.
- (b) Within 75 feet from 20 miles per hour upon application of the foot brake alone.
- (c) Within 75 feet from 20 miles per hour upon application of the hand brake alone.

Rule 301.

Subsequent to the two year period following the adoption of this Code Rule 300 shall not apply, and the requirements for

Motor Vehicles coming in this class shall be in accordance with Rules 200 and 201 of this Code.

Rule 302 Vehicles in Combination

When vehicles are operated in combination the "application of brakes" shall be construed to mean the application of all brakes on any vehicles of the train which are normally capable of being operated simultaneously by the driver.

DISCUSSION

General

Throughout the preparation of this Code it has been continuously kept in mind that its object was to promote safety in the operation of motor vehicles. While this has been the primary consideration, nevertheless, practicability of application had also to be considered. While it is realized that many of the provisions of this Code are not as stringent as they might have been made, it is believed that greater compliance, and hence greater safety, is likely to be obtained with its provisions than would be the case if they were made stricter. Should four wheel brakes become universally adopted revisions of this Code would doubtless be both necessary and expedient.

SECTION II General.

Rule 12. Approval of Methods.

This Rule is designed so that the enforcing authorities may have the advantage of engineering opinion concerning methods of test, type of test equipment, and the calibration of such equipment. Where such engineering facilities as would be necessary are contained within the Departments of the State, they, of course, could be utilized. The U. S. Bureau of Standards will calibrate instruments for State, Municipal, or other Authorities, when called upon to do so, and will act as Referee, when called upon to do so, concerning matters coming under this Rule.

Rule 21. New and Old Installations

Attention is called to the fact that the requirements in Part III for performance of commercial vehicles exceeding 6000 pounds gross weight differs from those contained in Part II of this Code and fixes the time after its adoption at which the requirements shall be the same for all vehicles.

The reason for this difference is that it appears from an analysis of the data at hand that about 75% of the vehicles tested which would come under Part III of this Code were incapable, as operating at the time of test, of meeting the requirements as outlined under Part II. About 25% of such vehicles were, however, capable of meeting such requirements. In both cases the vehicles tested covered the entire range from 6000 lb. to 34,000 lb. gross weight. No reason appears, therefore, why eventually the same requirements should not be made for all vehicles, regardless of gross weight. It is believed that the two year period allowed for meeting these requirements is sufficient.

SECTION X. General Requirements

Rule 100. All Motor Vehicles.

It seems quite reasonable that all vehicles should be equipped with independently operated brakes (see definition of "independently operated brakes", Sec. 1 "Definitions").

It seems, however, that a large number of electric commercial vehicles would be adversely affected by this Rule, if it were to be applied directly upon adoption of the Code. Consequently, an exception to this Rule is made to apply only to such vehicles purchased prior to the adoption of the Code.

Motor Cycles are also excepted, it being deemed necessary for them to be equipped with but one brake, excepting where they are used in the transportation of passengers for hire.

The question has arisen as to the application of this Rule to electrical brakes. Owing to the fact that some of these brakes vary in efficacy with, or depend in great measure upon, the speed of either the vehicle or the engine, the following interpretation is placed upon their use:

Any electrical brake shall be capable of the same performance as that required for foot brakes in the class in which the vehicle falls, and any mechanical or electrical feature which makes such a brake likely to become inoperative or less effective before bringing the vehicle to a complete stop shall be deemed sufficient cause for its rejection as one of two means of applying braking effort. In no case shall such a brake be substituted for a hand brake as defined in this Code.

Any subsidiary brake which depends for its action entirely upon the operation of the engine or whose efficacy is destroyed or adversely affected by the stopping of either engine or vehicle shall not be deemed one of two means of applying braking effort; (1) unless the brake be provided with mechanical means of applying braking effort in the event of its being thus adversely affected by engine or vehicle speed, or (2) unless the brake be so designed and constructed that the likelihood of its becoming ineffective or impaired in action is remote.

Rule 101. Means of Holding Hand Brake.

This rule means that at least one brake must be provided which at all times is capable of restraining the vehicle from

motion. The necessity for having the vehicle equipped with at least one such brake is obvious.

Rule 102. Method of Test

This rule provides for means of testing vehicles provided for in this Code. An adequate means of testing is desirable in which the personal equation both of the operator and of the testing official is as little concerned as possible. It is believed that this rule provides such a means.

Rule 103. Loaded Vehicles.

The purpose of this Rule is to provide authority to test a vehicle loaded to its full capacity, when its performance is such at part or no load as to lead the enforcing officials to believe that the performance at full load would fail to meet the performance requirements of this Code for the Class in which the vehicle falls.

Rule 104. Clutch Disengaged.

Inasmuch as this Code pertains to requirements for brakes only, it is believed that all testing should be done with the clutch disengaged, so that there will be no other retarding forces than those due to the brakes.

PART II

Section II. All Motor Vehicles Weighing 6000 pounds Gross or Less, except as specifically Provided herein, and Motor Vehicles of whatever Gross Weight Which are Fitted for the Accomodation of Passengers, or Commonly Used for Their Transportation.

This section includes motor vehicles which sonstitute about 95% of the total volume of traffic. All of such vehicles are capable of performing in accordance with the requirements

as outlined in this Section. A considerable percentage of such vehicles already perform in accordance with such requirements.

Large passenger carrying vehicles, regardless of their gross weight, are included in this section for the reason that they travel at as great speeds as the average vehicle of less weight, and often maintain average speeds in excess thereof. In addition to this fact, there is the additional mutual responsibility of operator and enforcing authority, to maintain good braking due to the fact that the "pay load" is always, literally, a "live load".

Rule 200. Foot Brakes.

The requirements for the performance of the foot brake is optionally expressed in terms of the number of feet to stop from 20 miles per hour, or the rate of stopping corresponding thereto. This is for the reason that instruments might be developed in the future which would be calibrated to read in other units than a given number of feet to stop from a given speed. It makes no difference in what units the requirements be expressed, so long as they are equivalent to those required in the Code.

The rates, expressed in various units, corresponding to a stopping distance of 50 feet from 20 miles per hour are 8.6 feet per second per second, 5.88 miles per hour per second, etc.

Rule 201. Hand Brakes.

The requirements for hand brakes are expressed in a similar manner as those for foot brakes and the same reasoning applies in this case.

The performance required is that which corresponds to an ability to hold a vehicle on a grade of more than 10%.

PART III

Section III. Motor Vehicles Exceeding 6000 Pounds Gross Weight, Designed for the Transportation of Goods or Materials, Tractors, and all other Motor Vehicles not Covered in Part II.

All the requirements for vehicles coming in this class are similarly expressed as in Part II.

The performance, upon the application of both brakes simultaneously, is the same as that required for foot brakes for vehicles coming in Part II. The requirements for hand brakes is the same as that required for vehicles in Part II for the reason that this requirement is regarded as the minimum allowable for safety.

Rule 301.

A two year period is allowed in which vehicles coming under Part III may be accommodated to meet the requirements as under Rule 200 and 201 of this Code.

Rule 302.

This rule is designed to allow the operation of brakes in a train of vehicles which corresponds to practice.



