



DEPARTMENT OF TRANSPORTATION
RESEARCH AND SPECIAL PROGRAMS ADMINISTRATION
WASHINGTON, D.C. 20590

25492

49 CFR Part 173

[Docket HM-178; Advance Notice]

Definition of Flammable Solid

AGENCY: Materials Transportation Bureau (MTB), Research and Special Programs Administration, DOT.

ACTION: Advance notice of proposed rulemaking.

SUMMARY: The MTB is publishing this advance notice of proposed rulemaking to request comments on efforts to make the definition of a flammable solid more specific and to provide tests which shippers may use to determine whether their products are flammable solids for purposes of transportation. The present definition of a flammable solid is so vague that many shippers are unable to determine if certain of their materials within the definition of this hazard.

DATE: Comments must be received by August 20, 1981.

ADDRESS: Comments must be addressed to the Dockets Branch, Materials Transportation Bureau, U.S. Department of Transportation, Washington, D.C. 20590. Comments should identify the docket and be submitted, if possible, in five copies. The docket branch is located in room 8426 of the NASSIF Building, 400 7th Street, S.W., Washington, D.C. 20590. Office hours are 8:30 a.m. to 5:00 p.m., Monday thru Friday. Telephone (202) 426-3148.

FOR FURTHER INFORMATION CONTACT: Dr. Charles Ke, Sciences Branch, Technical Division, Office of Hazardous Materials Regulation, Materials Transportation Bureau, Department of Transportation, Washington, DC 20590. (202-426-2311).

SUPPLEMENTARY INFORMATION: The flammable solid class has within it the most diversified types of hazardous materials of any of the hazard classes defined in the Department's Hazardous Materials Regulations. For this reason, the MTB is considering dividing the class into several groups and is proposing test methods and criteria which will enable a shipper to determine whether a material he wishes to ship falls within one of those groups. The principal reason for this advance

notice of proposed rulemaking is to request comments from interested persons as to the adequacy of the definition criteria under consideration in this ANPRM including the reproducibility of the results of the tests in Appendix B. Specific questions on which the MTB would like to receive comments and meaningful data are:

1. Are there any additional types of materials which should be included in the flammable solids class (e.g., should the temperature in (g) be lowered to include materials such as molten sulfur)? Should some of the proposed groups be eliminated?

2. If the definition in (g) is adopted, certain molten metals would become subject to the regulations. What type of packaging controls should the MTB consider for such materials. (The MTB has been contacted by officials of two States concerning the regulation of molten materials).

3. Current § 171.8, as pertinent here, defines "Water reactive material (solid)" as a material, that on contact with water, will evolve flammable or toxic gases in dangerous quantities. Is there any substance known which, on contact with water, will evolve a toxic nonflammable gas? If no such material is known to exist, water reactive materials would be included in paragraph (f) of the proposed definition.

4. Are there any consensus standard test methods which could be used in place of, or in addition to, the suggested methods?

For tests, such as the bacterial action or fermentation test, the MTB does not have specific information regarding sample sizes and temperature limitations. It is, therefore, requested that persons with experience with this type of spontaneous heating provide the MTB with pertinent information regarding development of such criteria.

The MTB anticipates that a number of highly competent and qualified experts will, upon review of Appendix B, consider the proposed methods for testing of flammable solids to be less than representative of currently available technology. This is intentional. The MTB has attempted to develop methods that would not require the acquisition of expensive and complicated test equipment. For example, metal drums could be used as test chambers and ovens with minor modifications.

This advanced notice of proposed rulemaking requests comments from interested persons regarding the

definition of a flammable solid. Such comments may be used for future rulemaking purposes.

In consideration of the foregoing, the MTB is considering the issuance of a proposal to revise the flammable solid definition as follows:

§ 173.150 Flammable solid: definition.

For the purpose of this subchapter, a "Flammable Solid," is any solid material, including gels and pastes, other than one classed as an explosive or a blasting agent, which is described in the following paragraphs:

(a) Pyrophoric solids which ignite when exposed to moist air at or below 55°C (130°F).

(b) Solids subject to spontaneous heating by reaction with oxygen and which contain unsaturated oils or other easily oxidizable substances.

(c) Solids subject to spontaneous heating by fermentation or bacterial action and which self-heat due to the action of bacteria or other organisms.

(d) Readily ignitable solids which are easily ignited and burn so vigorously and persistently as to create a hazard in transportation.

(e) Solids which can be ignited by friction.

(f) Solids which in contact with water evolve flammable gases.

(g) Solids or molten materials shipped at (elevated) temperatures exceeding 315°C (600°F), which can cause ignition of combustible materials.

Tests to be used to evaluate the above descriptions are found in Appendix B to this Part.

Appendix B: Methods for Testing for Flammable Solids

Pyrophoric Solids

At least one pound of material, in the particle size in which it will be shipped, shall be placed in an apparatus where the temperature, humidity and rate of air flow can be controlled. Air at 55°C (130°F) and having a relative humidity of 50 percent (± 5 percent) shall be passed at 8 kilometers per hour through the apparatus containing the material. A material that ignites in one hour in this test is classed as a flammable solid and considered a pyrophoric material.

Solids Subject to Heating by Reaction With Oxygen

The material, other than a gel or paste, in the particle size in which it will be shipped, shall be placed in a constant temperature oven having a test chamber with a volume of not less than 120 liters. The temperature control of the oven shall be set so as to maintain a temperature of 55°C (130°F) ± 3°C

In the oven when it is empty. Fifty kilograms of the material to be tested, or an amount occupying 50 percent of the volume of the test chamber, whichever is less, shall be placed in a holder within the oven. The holder shall be made of wire mesh with a mesh size no smaller than necessary to contain the materials and shall be supported in the geometrical center of the oven so as to clear its bottom and sides by no less than 5 centimeters. Air shall be introduced into the bottom of the test chamber at a rate, in liters per hour, no greater than 3 percent, nor less than 2 percent, of the volume of the test chamber. If the temperature at the center of the sample rises 20°C (36°F) or more within 7 days of initiation of the test, the material is classed as a flammable solid.

Solids subject to Heating by Fermentation or Bacterial Action

The temperature control of an oven is set to maintain a temperature of 37.8°C (100°F) when the oven is empty. One pound of material under test shall be in the oven for 7 days. If the temperature at the center of the sample rises 20°C (36°F) or higher during this period, the material is classed as a flammable solid.

Readily ignitable solids which burn vigorously and persistently:

Ease of ignition shall be determined by attempting to ignite 10 grams of the material under test, arranged in a conical (when practical) pile with:

1. Mechanical (metal) sparks
 2. Electrostatic sparks (0.006 joules delivered from a 0.002 to 0.004 microfarad capacitor)
 3. A small flame source such as a match.
- A material which can be ignited by one of these sources must be considered readily ignitable. Whether the material burns vigorously and persistently shall be determined as follows: when 50 ml of water are applied to 50 g of a material which is burning and the water produces no effect or increases the rate of burning, that material is considered to burn so vigorously and persistently as to create a hazard in transportation. A material which is readily ignitable and burns vigorously as defined in one of the above tests is classed as a flammable solid.

Solids Which Can Be Ignited by Friction

A solid which is as sensitive or more sensitive to friction than phosphorous pentasulfide is classed as a flammable solid.

Tests may be conducted on any commercial friction tester or using a laboratory constructed apparatus which gives comparable results.

Solids Which Emit Flammable Gases in Contact With Water

Twenty-five grams of the substance being tested are placed in a gas generator and treated with 50 ml of water. Any material which evolves a flammable gas at a rate exceeding one ml per gram per hour must be classed as a flammable solid.

[49 U.S.C. 1803, 1804, 1808; 49 CFR 1.53, App. A to Part 1 and paragraph (s)(4) of App. A to Part 108]

Note.—The Materials Transportation Bureau has determined that this document will not result in a "major rule" under the terms of Executive Order 12291 and DOT implementing procedures (44 FR 11034), nor require an environmental impact statement under the National Environmental Policy Act [49 U.S.C. 4321 et seq.]. Issued in Washington, DC on April 30, 1981.

Alan I. Roberts,

Associate Director for Hazardous Materials Regulation, Materials Transportation Bureau.

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