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Docket Room
National Highway Safety Bureau
U.S. Department of Transportation
Room 4223
400 Seventh St. S.W.
Washington, D.C. 20591

Gentlemen:

PETITION FOR RULE MAKING

The Notice of Proposed Rulemaking of December 19, 1969, on Federal Motor Vehicle Safety Standard #302 clearly established the compelling need for a standard regulating the flammability of motor vehicle interiors. The Center for Auto Safety strongly urges the adoption of such a regulation. We feel, however, that the currently proposed rule may not prove effective, for it fails to guarantee the motorist the level of safety he has a right to expect and that current technology can economically provide. For this reason, the Center for Auto Safety petitions the National Highway Safety Bureau to cease consideration of the currently proposed rule and to adopt the standard presented herein.

Comments to Docket #3-3 from auto manufacturers suggest that there is a lack of data to substantiate the usefulness of a regulatory standard in decreasing the hazard of vehicle interior fires. Consequently, they argue, the adoption of any rule is premature pending the availability of such data. We disagree. One does not have to perform experiments and draw up probability distributions to surmise that a hot stove will burn one's fingers; the danger is recognized after but one unpleasant experience. The same is true of vehicle interiors. Studies are not needed to point out the perils inherent in an interior made of flammable materials.

Some reports often cited by auto manufacturers claim that the incidence of fires in motor vehicles is low. Yet, a recent report by the University of Oklahoma Research Institute (OURI) entitled "Escape Worthiness of Vehicles and Occupant Survival" (Part I, Report No. 1729-FR-1-1, Contract No. FH-11-7303, July, 1970, First Draft) notes that there is a good reason to believe that the 400,000 auto fires per year figure cited by the National Fire Protection Association is conservative. Furthermore, the sincerity of some auto makers might be questioned in view of their advocacy of a fifteen inch per minute burn rate standard (horizontal test). OURI found that paper toweling, a substance commonly considered to be highly flammable, has a burn rate only slightly greater than fifteen inches per minute.

Since auto manufacturers have failed to incorporate modern, self-extinguishing materials in vehicle interiors, it is incumbent on the NHSB to assure that this is done through effective, dynamic regulatory action. There are, as we shall establish, numerous materials of outstanding flame retardant capability that are well suited for use in motor vehicles. Many of these products are currently available at only a small increase in price over presently used substances.

There are some significant differences between the standard we suggest and the one proposed in the Bureau's NPRM. Some of these differences are detailed here, along with supporting statements and relevant excerpts from the OURI report previously cited.

Our suggested standard uses a vertical test (patterned closely after Federal Specification CCC-T-191b, Method 5902) as opposed to the proposed rule's horizontal test (similar to SAE J369). This would not be the first time that a regulatory standard made use of a vertical test. In fact, the Federal Aviation Administration on aircraft interior flammability uses Federal Specification CCC-T-191b, Method 5903T. The vertical test is generally considered to be more severe than the horizontal test, and it is extensively used by the FAA, NASA and Department of Agriculture.

On the vertical test, OURI says:

> In contrast to the "mild" nature of the horizontal burn test, the vertical test is relatively severe for the usual fabrics used in current motor vehicle interiors. (page 4-53, emphasis added)

> It appears that the vertical burning test is too severe for testing current automobile interior materials. (page 4-54, emphasis added)

We agree with OURI that "current" automobile interiors probably can't stand up to a vertical test. This, however, is not an indication of unnecessary severity of the test, but rather proof of the flammability dangers inherent in substances currently used in motor vehicle interiors.

OURI does see the justification for going to the vertical test:

> Should the automotive industry move in the direction of less flammable materials for vehicle interiors, it is conceivable that the vertical burning test, with some modification of a pass-fail criterion, would have merit. (page 4-54)

Our standard does not require a specific burner gas for the test. The composition of the gas seems to be a non-critical factor, and specifying an exact mixture is needlessly restrictive. On this point OURI is in full agreement:

> The merit of this gas composition is not clear, particularly the presence of poisonous carbon monoxide. Substitution of this gas by methane or propane of specified purity (say 95 or 98 per cent) would not bias the usefulness of the test. (page 4-52)

> The gas mixture used as a fuel to support the flame which ignites the sample is probably relatively unimportant under the test conditions... It would appear that other fuels, such as methane or propane might be used as well, reducing some of the expense and potential hazard in the tests. (page 4-56)

It also appears that requiring a particular temperature and humidity in the test chamber is an unnecessary complication. OURI says the following:

> This additional requirement of running the tests in a chamber at the specified temperature and humidity is unnecessarily restrictive. (page 4-56)

> Drying the materials prior to burning would not only simplify the test procedure but it would also generate equally useful test results. Furthermore, for materials which absorb moisture under higher humidity, the evaluation of a dried material would be a more severe test, but at the same time it would be representative of conditions which could develop in a vehicle interior. (page 4-52-53)

> The test procedure should allow samples to be dried in an oven, cooled and tested immediately. If cooling requires more than a few minutes, a dessicator should be used for this purpose. (page 4-56)

The Center for Auto Safety realizes that its suggested standard is not the ultimate rule on motor vehicle interior flammability. Our rule is neither complete nor comprehensive. It does not consider, for example, the generation of smoke and toxic products. The reason for this is that there does not as yet appear to be a reliable and meaningful test which deals with these problems. This is, of course, a matter for further study. However, it would seem that the self extinguishing requirement that we suggest does much to reduce the problems of smoke and toxicity.

Some will argue that our test does not represent a "real-life situation." This is true. However, short of testing a complete vehicle interior, no test can predict actual fire behavior. Nonetheless, it is safe to say that an interior of materials passing our standard would undoubtedly do far better in an actual vehicle fire than one made of materials that just passes a four inch per minute burn rate horizontal test.

If NHSB fails to recognize the pressing need for a vertical flame test and chooses instead to adopt a horizontal test, it will again be making the mistake of supporting a current practice far below the

"state of the art." When the lives of thousands of people are at stake, such behavior is inexcusable. The data presented by Goldsmith in the May, 1969 Illinois Institute of Technology Research Institute report to the National Highway Safety Bureau and replotted by OURI make it clear that a four inch burn rate (horizontal) will do little toward making vehicle interiors less dangerous than they are at present. This standard would exclude only about twenty per cent of the currently used materials. In fact, there is evidence that General Motors could meet a one inch per minute burn rate horizontal test standard merely by using selected components already in use by their different divisions. (In other words, dashboard material now used in one product line, seat cushioning from another, carpeting from a third, etc.) In view of this, it is clear that the currently proposed standard will have little impact on the industry. It must be emphasized that the motor vehicle flammability problem is in need of strong regulatory action. A standard that can be met by usual practices is not enough.

An interior flammability standard, however strict, is not a complete solution to the motor vehicle fire problem. Contributing factors like fuel tank integrity, an important area recognized by NHSB in Dockets #3-1 and #3-2, as well as possible safety features such as mandatory installation of fire extinguishers, as proposed in the OURI report, must be examined. The Center for Auto Safety plans to present petitions on these matters in the near future.

The standard we include herein is suitable material for a Notice of Proposed Rulemaking. The Administrative Procedures Act which governs the establishment of Minimum Federal Motor Vehicle Safety Standards provides for the issuance of an Advanced Notice of Proposed Rulemaking is so desired and needed. It is an optional step in the rulemaking process. The Center for Auto Safety urges that an ANPRM for the standard which we propose would be an unnecessary step and one clearly conducive only to further delay.

The purposes served by an advanced notice, as cited in Federal Consumer Safety Legislation, by Howard A. Heffron (June, 1970), are as follows:

1) to state the safety problem

2) to describe the position of the agency concerning the issue

3) to allow for communication with large manufacturers

4) to allow foreign manufacturers and suppliers of component parts to prepare for imminent change in safety requirements

5) to find out whether facilities are available to test the new performance standards

6) to allow for suggestions for alternative means of solving the safety problem

7) to learn of economic and other collateral consequences of enforcing a new performance standard

8) to inform the public of agency activity

All of the above criteria have been satisfied. The ANPRM of October, 1967, the ensuing NPRM and docket submissions to Docket #3-3 have had the combined and total effect of stating the safety problem, allowing for the agency's position to become evident, and giving all interested parties an opportunity to state and support their positions. Finally no unique approach to solving this safety problem is required nor is lead time as important as for instance in the case of the air bag.

Since the needs of an ANPRM have already been served in this area of rulemaking, the Center for Auto Safety submits this petition in the form of an NPRM.

The text of the proposed standard follows.

NOTICE OF PROPOSED RULE-MAKING

Motor Vehicle Safety Standard No. 302

Flammability of Vehicle Interior Materials -- Passenger Cars, Multipurpose Passenger Vehicles, Trucks and Buses.

S1. Purpose and scope. This standard specifies burn resistance requirements for materials used in all components of the occupant and luggage compartments of motor vehicles.

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

S3. Requirements.

S3.1 The portions described in S3.3 (a) and (b) of all components of interior vehicle occupant and luggage compartments shall meet the requirement of S3.4 (a). The Components covered include but are not necessarily limited to the following: seat cushions, seat backs, seat belts, accessory seat cushions, headlining, armrests, door panels, instrument panel padding, front panels, compartment shelves, head restraints, floor coverings, accessory floor mats, sun visors, curtains, shades, wheel housing covers, engine comparment covers, luggage comparment lining, mattresses and mattress covers, seat coverings (original and accessory), and any other interior materials, including padding, inflatable cushions, or nets, that may be contacted by an occupant in the even of a crash.

S3.2 The portions described in S3.3 (c) of the following components of vehicle occupant and luggage compartments shall meet the requirements of S3.4 (b): electrical wire and cable insulation.

S3.3
(a) Composite materials must be tested either as a section cut from a fabricated part as installed in the vehicle or as a specimen simulating a cut section such as a model of the fabricated part. Thus, for example, a specimen of a vehicle cushion would comprise both the surface covering with the padding bonded to it, if so bonded, of a size determined by S4.2.1.
(b) Component materials must also be tested separately as subcomponents in addition to being tested in their fabricated formation as required by S3.3 (a). Thus, for example, each seat cushion sample must comply with the requirements in S3.4 (a) in at least two ways:
1) as a unit including covering and cushioning in the configuration actually employed in each type of vehicle manufactured and,
2) by its component types of material, i.e., both surface fabric or material and cushioning material composing seats. Components must each be tested separately and each component material must

comply with the requirements of S3.4 (a).
(c) The portions of the components that shall meet the requirements of S3.4(b) are the following:
(1) A single strand of electrical wire or cable insulation.
(2) A bundle of electrical wire of cable insulation.

S3.4
(a) When materials are tested in accordance with S4.3 they shall show no rapid transmission of a flame front across any surface ("flashing"), and shall be self-extinguishing. For the purposes of this standard self-extinguishing is defined as: in a vertical test as per S4.3, the burn length shall not exceed 6 inches and the flame time after removal of the flame source shall not exceed 15 seconds, and drippings from the test specimen shall not continue to flame for more than 3 seconds after falling.
(b) When materials are tested in accordance with S5.3 they shall meet the following requirements:
(1) Single stands shall have a maximum after flame time of two seconds and 0.25 inch flame travel.
(2) Bundles shall have a maximum after flame time of 5 seconds and 0.25 inch flame travel.

S4 Test conditions for components in S3.3(a) and (b).

S4.1 Conditions.

S4.1.1 Apparatus: The tests must be conducted in an initially draft-free cabinet in accordance with Federal Specifications CCC-T-191b Method 5902 (available from the General Services Administration, Business Service Center, Region 3, Seventh and D Streets, S.W., Washington, D.C. 20407).

S4.1.2 A Bunsen or Tirril burner with a nominal 3/8 inch I.D. (inner diameter) tube adjusted to give a flame of 1-½ inches in height is used. The minimum flame temperature measured by a calibrated thermocouple pyrometer in the center of the flame must be 1,550°F.

S4.2 Preparation of the specimens.

S4.2.1
(a) General:
When showing compliance with S3.3(a) and (b) the specimen to be tested must be no thicker than the minimum thickness to be used in the vehicle. When it is not possible to obtain a flat specimen, because of the component configuration, the specimen is cut to not more than ½ inch thickness at any point, from the area with the least curvature, and in such a manner as to include the face side. When performing the vertical test S4.3 for sections (a) and (b) of this section, the specimen must be mounted in a metal frame so that the two long edges are held securely. The exposed area of the specimen shall be at least two inches long and the edge to which the burner flame is applied must not consist of the finished or protected edge of the specimen, but must be representative of the actual cross-section of the material or part as installed in the vehicle.

(b) Foam:
Thick foam components and sub-components must be tested in 1/2 inch thickness.

S4.2.2 Material with a napped or tufted surface is placed on a flat surface and combed twice against the nap with a comb having 7 to 8 smooth, rounded teeth per inch.

S4.2.3 Material with directional effects, or with differences in burning properties between its face and inverted sides, is oriented so as to provide the most adverse results.

S4.2.4 Conditioning: Each specimen shall be conditioned for 2 hours at a temperature of 95-105 °C prior to testing. Immediately after conditioning the specimen shall be tested.

S4.3 Procedure.

(a) A minimum of three specimens of each component and sub-component must be tested and each result recorded. For fabrics, the direction of the weave corresponding to the most critical flammability condition must be parallel to the longitudinal axis of the sample so that such longitudinal axis runs vertically.

(b) The specimen must be exposed to the Bunsen or Tirril burner with the flame adjusted in accordance to S4.1.2 for 60 seconds. The lower edge of the specimen must be three-fourths of an inch above the top edge of the burner. The flame must be applied to the approximate center of any lower edge when the specimen is vertically suspended for the test.

(c) Flame time, burn length, and flame time of any drippings, must be recorded. Burn length determined in accordance with paragraph (d) of this section must be measured to the nearest one-tenth of an inch.

(d) Burn length is the distance from the original edge to the most distant evidence of damage to the test specimen due to flame or heat impingement, including areas of partial or complete consumption, charring, or embrittlement, but not including areas sooted, stained, warped, or discolored, or areas where material has shrunk away from the heat source.

S5 Test conditions for components in S3.3(c).

S5.1 Conditions.

S5.1.1 The test must be conducted in an initially draft-free cabinet which meets the requirements of Federal Specification CCC-T-191b, Method 5902.

S5.1.2 A Bunsen or Tirril Burner with a nominal 3/8 inch tube adjusted to give a flame of 3 inches in height with an inner cone approximately 1/3 of the flame height is used. The temperature of the hottest portion of the flame, as measured by a thermocouple pyrometer, shall not be less than 1751°F ± 54°F.

S5.2 Preparation of the specimens.

S5.2.1

(a) For items specified in S3.3(c)(1) the specimen shall be 18 inches in length.

(b) For items specified in S3.3(c)(2) the test specimens shall be prepared by assembling 7 single wire specimens, each 14 inches long, into a bundle tied in two places with glass cord or equivalent non-metallic, non-combustible material, three inches from each end.

S5.3 Test Procedure.

(a) A minimum of three specimens must be tested and each result recorded. Each specimen shall be fastened vertically in the specified chamber by means of a clamp and a weight must be attached to the specimen to hold the specimen taut during the flammability test.

(b):

(1) The specimens specified in S3.3(c)(1) shall be marked approximately 7 inches above the floor of the chamber to indicate where the flame is to be applied. A flame from a Bunsen or Tirril Burner adjusted in accordance to S5.1.2 shall be applied for 15 seconds to the specimen. The burner shall be positioned below the test mark on the specimen and at an angle of 20 degrees to the vertical plane of the specimen. The burner shall be positioned so that the hottest portion of the flame is applied to the approximate position of the test mark on the wire. The time of burning and the flame travel after removal of the flame shall be recorded. Breaking of the wire specimens in sizes 24 and smaller shall not be considered as a failure.

(2) The specimens specified in S3.3(c)(2) shall have a flame from a Bunsen or Tirril Burner adjusted in accordance to S5.1.2 applied vertically to the base of the bundle for 15 seconds. The time of burning and flame travel shall be recorded.

Effective date: It is proposed that this standard be effective for motor vehicles manufactured on or after September 1, 1971.

SURVEY OF SELF-EXTINGUISHING MATERIALS

Since the National Traffic and Motor Vehicle Safety Act of 1966 states that a motor vehicle safety standard is "a minimum standard for motor vehicle performance" (emphasis added, "The Federal motor vehicle safety standards are 'minimum' in the sense that they specify the lowest performance which is still acceptable."[1]), it is extremely important that each safety standard consider the current state of the art. Increased motor vehicle safety is not achieved by standards which overlook modern technological advances and merely incorporate present practices of the automotive industry. Based on its research, The Center for Auto Safety concludes that its proposed standard would establish a high level of safety which can easily be attained by using new technology.

In forming its conclusions, the Center has drawn not only on the material in National Highway Safety Bureau Docket 3-3, but also on extensive work on flammability done by the National Aeronautics and Space Administration, the Federal Aviation Administration, and the Department of Agriculture. Included in an appendix to this petition are copies of various reports from these agencies which support the technical feasibility of the Center's proposed standard. In particular, the research by the National Aviation Facilities Experimental Center, presented in "Flaming and Self-Extinguishing Characteristics of Aircraft Cabin Interior Materials," documents tests on some of the materials which can easily meet our suggested rule. The Center has also collected and examined information from various chemical, fabric, plastic and foam manufacturers concerning presently available self-extinguishing substances. This evidence further supports the Center's standard.

We include a summary of some commercially available materials and chemicals that will pass the Center's proposed regulation. This list is not meant to be definitive nor exhaustive, nor is it to be construed as an endorsement of any product or company. The following is a summary of a more comprehensive list of products included in an appendix to this petition. This summary shows that there already are chemical treatments and materials in production for all the various vehicle components covered by the standard.

Fabrics: The following is just one example of a fabric which exhibits self-extinguishing properties:

Nomex® nylon fibers. Here is what E.I. du Pont de Nemours and Company says about their product: "Nomex high temperature resistant nylon does

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[1] National Commission on Product Safety, Special Report on Federal Consumer Safety Legislation, June, 1970, Washington, D.C.

not melt and has extremely low flammability. At temperatures above 700° F. (371° C), the fiber degrades to a friable char at a rate proportional to the intensity of the heat source. Any flame produced during oxidation is self-extinguishing when the fiber is withdrawn from the source of heat."

While not specifying product trade names and manufacturers, the FAA in its report "Flaming and Self-Extinguishing Characteristics of Aircraft Cabin Interior Materials" lists 23 uncoated fabrics, used in upholstery, drapery, headliners, etc., that are self-extinguishing by a vertical flammability test quite similar to the Center's proposed test.

Foams or Padding Materials: Seat cushioning is a particularly critical area in a motor vehicle since many of the polyurethane and polyester foams used today are highly flammable. Among the several self-extinguishing products are:

-Cotton batting. The National Cotton Batting Institute claims that : "Tests of cottong batting (using AATCC Test Method 34-1969 [a vertical test with 12 second flame exposure]) treated by the U.S. Department of Agriculture laboratory in New Orleans show it can meet these limits:

1. Afterflame of not more than 5 seconds
2. Afterglow of not more than 5 seconds
3. A main char length of not more than 10 centimeters (4 inches)
4. An overall char length of 15 centimeters (6 inches)."

-Phosgard C-22-R, Monsanto Company. The application of Phosgard C-22-R to polyurethane foams causes them to become self-extinguishing when tested by ASTM D-1692 (horizontal test with 60 second flame exposure.)

-Updown, a lightweight neoprene foam. According to the Toyad Corporation, makers of Updown, their product is rated as non-burning using ASTM D-1692.

Plastics: There are numerous flame retardance additives available for plastics. Two of these are:

-Firebrake® ZB, U.S. Borax and Chemical Corporation. The makers claim that this chemical can make PVC plasisol sheets, chlorinated polyesters, and brominated polyesters self-extinguishing according to ASTM D757 (specimen placed into contact with a Globar element maintained at 950° C for 3 minutes).

-Phosgard C-22-R and Santicizer® 148, Monsanto Company. These products improve the flame retardancy of ABS/PVC materials, polysulfides and polystyrenes.

Rugs: In the FAA report cited previously, it is reported that rugs constructed of either modacrylic (100 percent) of aromatic polyamide fibers were self-extinguishing using a vertical test similar to the one proposed by the Center.

The appendix to this petition describes other available substances which could enable the manufacturers of motor vehicles to produce a vehicle with self-extinguishing interior materials. While the use of self-extinguishing materials is only the beginning in the effort to eliminate the hazards of fire in motor vehicles, it is an important step that can and should be taken now.

Respectfully submitted,

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THE CENTER FOR AUTO SAFETY

Attachments to the Petition of the Center for Auto Safety

1. High Temperature and Flame Resistant Materials Information, Supporting ' Development Branch, Crew Systems Division, NASA-MSC.

2. Proceedings of the NASA Conference on Materials for Improved Fire Safety, National Aeronautics and Space Administration, May 6 & 7, 1970.

3. Flaming and Self-Extinguishing Characteristics of Aircraft Cabin Interior Materials, Report No. NA-68-30 (DS-68-13), Federal Aviation Administration, July, 1968.

4. Proceedings of the Flame Retardant Cotton Batting Workshop, United States Department of Agriculture, November 15, 1968.

5. Nestor B. Knoepfler, Paul A. Koenig and W.T. Gentry, Jr., "Study Shows How Cotton Flote Retards Fire," Southern Regional Research Laboratory.

6. "Proposed Motor Vehicle Safety Standard No. 302," Monsanto Company.

7. "...a flame retardant organophorus compound," Monsanto Company.

8. Properties of Nomex, DuPont , Bulletin N-236, October, 1969.

9. Neoprene Foam, A materials report on one of the cellular forms of Neoprene synthetic rubber... its properties, applications, and design capabilites, Toyad Corporation.

10. E.L. Beidler and D.G. Walters, "New Seating Foams," Toyad Corporation, reprinted from Rubber Age, April, 1968.

11. [illegible] Chemicals, [illegible] Chemical Company.

12. William G. Woods and Joseph G. Bower, "Firebrake ZB, A New Fire Retardant Additive," 25th Annual Technical Conference, 1970. Reinforced Plastics/Composites Division. The Society of the Plastics Industry, Inc.

13. A Sample.