



March 3, 2011

David L. Strickland, Administrator  
National Highway Traffic Safety Administration  
West Building, Room W42-308  
U.S. Department of Transportation  
1200 New Jersey Avenue, S.E.  
Washington, D.C. 20590

**PETITION FOR RECONSIDERATION**

**Of the Final Rule and Agency Order Issued by the Administrator,  
National Highway Traffic Safety Administration,  
Regarding the Establishment of a Federal Motor Vehicle Safety Standard  
for Ejection Mitigation on January 5, 2011  
DOT Docket No. NHTSA-2011-0004-0001**

PETITIONER, Advocates for Highway and Auto Safety (Advocates or Petitioner), files this petition for reconsideration with the Administrator of the National Highway Transportation Safety Administration (NHTSA) in response to the final rule establishing Federal Motor Vehicle Safety Standard No. 226, Ejection Mitigation (FMVSS 226).<sup>1</sup> Advocates is an alliance of consumer, health, law enforcement and safety groups, and insurance companies and agents working together to make America's roads safer and filed comments in response to the notice of proposed rulemaking on this matter.<sup>2</sup>

NHTSA issued this final rule in response to section 10301(a) of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU)<sup>3</sup> which requires the Secretary of Transportation to issue an ejection mitigation final rule reducing complete and partial ejections of occupants from outboard seating positions. While Advocates commends NHTSA on its effort to reduce occupant ejections, a major source of death and injuries on our highways, we nevertheless request reconsideration of the Final Rule because it fails to meet the statutory obligation to mitigate complete and partial ejections. The final rule fails to provide a sound basis for the excessive limit on excursion selected by the agency, and the rule does not establish a robust test procedure and requirements to mitigate partial and complete ejections.

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<sup>1</sup> 49 CFR Parts 571 and 585; Federal Motor Vehicle Safety Standards, Ejection Mitigation; Phase-In Reporting Requirements; Incorporation by Reference; Final Rule, 76 FR 3212 (Jan. 19, 2011).

<sup>2</sup> 74 FR 63180 (DEC. 2, 2009). Advocates' comments dated Feb. 1, 2010 are available at FMCSA-2009-0183-0022.1.

<sup>3</sup> Pub. L. 109-59 (Aug. 10, 2005), § 10301(a) is codified at 49 U.S.C. § 30128(c)(1).

SAFETEA-LU specifically states that the performance standard must “reduce complete and partial ejections of vehicle occupants from outboard seating positions.”<sup>4</sup> The final rule, however, does not carry out this express direction from Congress to the extent that is both feasible and practicable in light of available ejection mitigation knowledge and technology.

In addition to the request for reconsideration of the rule based on the arguments below, and given the agency’s acknowledgement of the safety benefits of advanced glazing as it relates to ejection mitigation,<sup>5</sup> Advocates also requests that NHTSA provide consumers with information on which vehicles are equipped with advanced glazing, by vehicle make and model. This should be provided as part of the consumer information on the agency website, [www.safercar.gov](http://www.safercar.gov). This information disclosure would be in keeping with NHTSA’s recently published decision to include similar information regarding which makes and models are voluntarily equipped with Automatic Reversal Systems (ARS) for power windows on the safecar.gov website.<sup>6</sup> The combination of agency reconsideration of the rule along with the dissemination of additional consumer information on advanced glazing countermeasures will best serve to protect the public and enhance acceptance and implementation of the most advanced safety devices.

### **NHTSA’s Selection of the Excursion Limit was Not Based on Relevant Testing**

In the final rule, the agency indicates that the 100 mm excursion limit utilized in the testing procedure is based on the agency’s analysis of the size of the gap needed to prevent ejection. According to NHTSA:

ensur[ing] that the countermeasure does not allow gaps or openings to form through which occupants can be partially or fully ejected. In the research tests, targets that had displacements of less than 100 mm did not allow ejections in dynamic testing.<sup>7</sup>

The final rule goes on to state that:

the component and DRF [dynamic rollover fixture] testing indicated that there was an increased likelihood than an opening could be formed between the curtain and the window opening through which an occupant could be ejected if the displacement were over 100 mm in the headform test. In addition, a 100-mm limit would also help guard against the countermeasure being overly pliable or elastic so as to allow excessive excursion of an occupant’s head and shoulders outside of the confines of the vehicle even in the absence of a gap.<sup>8</sup>

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<sup>4</sup> *Id.*

<sup>5</sup> 76 FR 3219. (“The final rule recognizes the beneficial effect advanced glazing can have and permits the use of fixed glazing to achieve the performance criteria specified in the standard.”).

<sup>6</sup> 76 FR 11416.

<sup>7</sup> 76 FR 3241.

<sup>8</sup> *Id.* at 3242.

NHTSA also cited in the NPRM the fact that a 100-mm performance limit is used in several regulations relating to occupant retention.<sup>9</sup> And, finally, the agency also considered that a value of approximately 100 mm is used by the International Code Council (ICC) in developing building codes used to construct residential and commercial buildings.<sup>10</sup>

Advocates does not agree with NHTSA's decision to use the results of its testing analysis, intended to determine the size of gaps in protection around the window perimeter as the basis for establishing the excursion limit beyond the plane of the vehicle. While the agency's basis for establishing a 100 mm limit may apply to the limit on gaps or openings between the window opening and the safety countermeasure, applying this reasoning and the same metric to the limit of excursion is entirely inappropriate because excursion is a wholly separate and independent matter. A system which prevents the test headform from slipping through a gap that is 100 mm wide provides ample protection because it prevents partial ejection by prohibiting the headform from exiting the vehicle. An excursion limit of 100 mm, however, allows the headform to exit the vehicle by up to 100 mm, and this level of excursion ensures rather than prevents partial ejection.

The agency's basis for establishing the limit of 100 mm on excursion ignores the primary goal of the regulation which is to prevent ejection and the injuries related to its occurrence. The primary source of injury in cases of ejection is contact of the body with the outside of the vehicle or an object outside of the vehicle (e.g. ground or another vehicle). Under the current rule, the headform is allowed to travel a maximum of 100 mm (approximately 3.94 inches) outside the vehicle; this is over half the width of even the largest adult male's head.<sup>11</sup> While a countermeasure which meets the proposed excursion limit may prevent complete ejection when the occupant contacts the countermeasure, it will still allow more than 50% of any occupant's head to be exposed to contact with the exterior of the vehicle or objects outside of the vehicle. If NHTSA wants to apply the logic behind the 100 mm limit developed to prevent large gaps, that is, to prevent partial ejection, then the agency needs to adopt an excursion limit that has a similar result. The ideal protection system would prevent any excursion outside of the vehicle, thus guaranteeing that injuries associated with ejection would be prevented. The design of many racing vehicles is a testament to this principle.

Moreover, the rules and regulations relied on by the agency do not address excursion. In each of the standards quoted by the agency, the 100 mm limit is applied to openings created when a vehicle window glazing (FMVSS 217) or vehicle door (FMVSS 206) is tested or when an architectural guard (ICC) is designed. The purpose of the 100 mm limit in all three of these examples is to limit the width of any gaps to prevent a person from passing through the opening. In the case of the ejection mitigation final rule,

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<sup>9</sup> *Id.* The agency cites FMVSS 206 and FMVSS 217 as two standards which utilize the 100 mm limit for restricting gaps which could allow for ejection of occupants.

<sup>10</sup> *Id.*

<sup>11</sup> Woodson, W.E.; Tillman, B.; Tillman, P.; *Human Factors Design Handbook*, 2ed, 1992. p. 567; The average head breadth of a 95<sup>th</sup> percentile adult male is 6.4 inches.

however, the agency has applied the 100 mm limit to excursion which allows the occupant (headform) to pass beyond the plane of the window frame and technically be partially ejected. This difference in application of the 100 mm limit is critical. A system which allows 100 mm of excursion is not performing the same as a system intended to limit gaps to only 100 mm.

The agency mentions in a footnote that:

The agency further notes that an advantage to the displacement limit is that the linear displacement of the headform can be measured in a practicable and relatively straightforward manner, unlike a real-time dynamic measurement of a gap during an impact.

It is again, improper for the agency to assume, without supporting documentation, a direct correlation between limits in excursion and limits in the openings produced along the perimeter of a countermeasure. The limits on excursion and any gaps between the countermeasure and the vehicle body need to be addressed independently.

Attaining ideal protection levels and preventing all partial ejection is likely prohibited by cost and consumer acceptance of such highly protective designs. Advocates recommends, however, that the NHTSA consider the results of testing conducted in support of this rulemaking and establish the minimum feasible limit on excursion. In previous comments to the docket submitted by Advocates, an excursion limit of 50 mm was proposed.<sup>12</sup> Advocates still contends that this limit, 50 mm, is reasonable and would serve to focus future designs on minimizing excursion in the attempt to move towards a safer situation that effectively limits excursion and ejection. From the data provided in the Final Regulatory Impact Analysis (FRIA),<sup>13</sup> which accompanied the rule, it can be calculated that 25% of the individual tests conducted resulted in excursions of no more than 50 mm, compared with 47% of tests which results in excursions of no more than 100 mm. Nearly 93% of the tests with excursion no more than 50 mm did not involve advanced glazing. By setting the excursion limitation at 100 mm, the agency is only aiming for the “average” capability of current airbag technology.

Therefore, because the 100 mm excursion limit in the final rule was based on testing that was inapposite to the problem of excursion, and since that decision will only ensure that technology will be brought up to the current average success of ejection mitigation technologies, Advocates requests reconsideration of the final rule.

### **The Scope of Coverage to Prevent Partial Ejection is Inadequate**

As stated in the previous section, the agency provides substantial support for establishing a 100 mm limit for openings in and around ejection countermeasures. The agency highlights the importance of window coverage in the preamble of the final rule:

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<sup>12</sup> Advocates Comments, submitted to docket, NHTSA-2009-0183-0022.1.

<sup>13</sup> Final Regulatory Impact Analysis, p. 28-35, NHTSA (Jan. 2011), NHTSA-2011-0004-0003.

full window opening coverage is key to the effectiveness of the curtain in preventing ejection<sup>14</sup>

Yet the final rule fails to ensure that there is adequate coverage and that gaps sufficient to permit partial ejection will not result.

Advocates agrees with the agency's identification of coverage as a primary factor in the effectiveness of countermeasures addressed in this rule. In agreement with the intention of the 100 mm limit on openings in the above-referenced FMVSS and ICC regulations, Advocates believes that limiting the creation and size of openings in and around countermeasures is of utmost importance. It is important to note that in the FMVSS rules, *any* opening created during testing is examined and the size of the opening as well as its resistance to the passage of objects is examined. For example, in FMVSS 217, *any* openings created in window glazing or frame are tested with a 4 inch sphere. Any opening must be able to prevent the sphere from passing through the opening until a specific level of force is attained.<sup>15</sup> The key is that all openings are examined to not only limit their size but to also guarantee that smaller openings are not sufficiently pliable to permit objects equal or larger in size than the opening to pass through unrestricted. In the final rule, no such effort is made to address openings within or along the perimeter of the countermeasure.

The above discussion also highlights the second shortcoming of the final rule as it relates to coverage. The test procedure adopted by NHTSA could permit gaps larger than 100 mm depending on the countermeasure designs chosen by manufacturers.

Advocates understands that the agency has developed the test methodology in order to ensure coverage of the applicable daylight openings. However, under the final rule as proposed, manufacturers would be able to develop countermeasures which specifically address only the test areas, leaving large gaps in coverage. The history of the development of other regulations, specifically FMVSS 214<sup>16</sup> for side impact testing, has illustrated the tendency for countermeasure design to follow the path of least resistance. Recently, FMVSS 214 was updated with the addition of a side impact pole test. The additional test was developed in order to ensure that side impact countermeasure designs extended coverage to protect occupants seated further forward in a vehicle who were not being address by then current countermeasures. Prior to the addition of the pole test, designs of countermeasure were such that only specific portions of the side of the vehicle afforded protection to occupants as dictated by regulatory testing. Given that NHTSA has illustrated that the agency expects the final rule to also address ejections related to side impact, this example is more than fitting. Advocates believes that the agency should reconsider the final rule with the history of FMVSS 214 in mind in order to prevent technically correct interpretations of the rule that can defeat the overall intent. In limiting the test areas and test procedure as adopted in the final rule, the agency allows (if not

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<sup>14</sup> 76 FR 3223.

<sup>15</sup> 49 CFR 571.217 S5.

<sup>16</sup> 49 CFR § 571.214, *Side impact protection*.

invites) the development of countermeasures which will provide less than the bare minimum protection required.

As noted earlier, the agency has indicated the complexity with measuring the size of openings dynamically created during testing. Advocates recommends that the agency consider the above arguments and include in the final rule, language which requires countermeasures to limit the size of openings on deployment and at the conclusion of testing to no more than 100 mm and require that such openings be tested for their ability to resist the motion of objects through them, similar to the testing processes noted by the agency in FMVSS 206 and FMVSS 217.

### **Lack of a Dynamic Rollover Test Procedure**

Finally, as NHTSA noted in the final rule, the lack of a dynamic rollover test procedure prevents the agency from examining a more realistic interaction of an occupant with proposed ejection and other rollover related countermeasures. In addition, without a dynamic rollover test the agency's ability to fully quantify the costs, benefits and practicability of advanced glazing and mitigation of ejection through portals other than side windows is limited. Advocates is convinced that a dynamic rollover test is essential to ensure occupant protection and ejection mitigation in rollover crashes. The agency final rule, nevertheless, appears to have ignored the importance of developing a dynamic test to improve occupant ejection and related safety standards. The agency should include the development of a dynamic rollover test procedure in its strategic plan.

### **Conclusion**

Advocates requests that agency reconsider the final rule for its failure to meet its statutory obligation to reduce complete and partial ejection of occupants of outboard seating positions by:

- 1) Failing to provide a sound basis for the 100 mm excursion limit, and
- 2) Failing to ensure adequate coverage of daylight openings to mitigate, to the extent feasible, complete and partial ejections.

Advocates believes that the following recommendations should factor in the agency's reconsideration of a final rule:

- 1) Limit excursion to, at most, 50 mm. This recommendation is based on:
  - a. The capabilities and performance of the top 25% of current (tested) airbag technology,
  - b. The widely accepted fact that no-excursion / ejection, at all, is the ideal goal of all ejection countermeasures,

- c. The clear distinction between the applicability of the 100 mm limit to excursion vs. openings
- 2) Include testing of all openings present between and within a tested countermeasure and the appropriate daylight opening, both after deployment and before testing and at the conclusion of testing, such that openings are limited to less than 100 mm and resist the passage of a similarly sized object under an appropriately determined level of force so as to ensure the retention of occupants within the vehicle cabin. This recommendation is based on:
- a. Proper application of the referenced 100 mm limit from FMVSS 206 and 217,
  - b. Historical regulatory development which illustrates that countermeasure design is driven by regulation and has been shown to result in minimal designs.

For these reasons, Advocates requests that the NHTSA grant the Petition for Reconsideration and amend the ejection mitigation final rule.

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