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## Economic Commission for Europe

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### World Forum for Harmonization of Vehicle Regulations

**Working Party on Passive Safety**

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Item 2 of the provisional agenda
**Global technical regulation No. 1**
**(Door locks and door retention components)**

# Proposal for Amendment 1

## Submitted by the expert from the United States of America*

The text reproduced below was prepared by the expert from the United States of America to align the text of the gtr with the latest changes introduced during the rulemaking procedure which transposed the global technical regulation (gtr) No. 1 into the final rule of her country. This proposal supersedes ECE/TRANS/WP.29/AC.3/18, ECE/TRANS/WP.29/GRSP/2008/3, ECE/TRANS/WP.29/GRSP/2009/4 and ECE/TRANS/WP.29/GRSP/2010/28. It is based on two documents without a symbol (GRSP-47-08 and GRSP-47-20) distributed during the forty-seventh session of the Working Party on Passive Safety (GRSP). The modifications to the current text of the global technical regulation are marked in bold for new or strikethrough for deleted characters.

* In accordance with the programme of work of the Inland Transport Committee for 2010–2014 (ECE/TRANS/208, para. 106 and ECE/TRANS/2010/8, programme activity 02.4), the World Forum will develop, harmonize and update Regulations in order to enhance the performance of vehicles. The present document is submitted in conformity with that mandate.

# I. Proposal

## A. Statement of technical rationales and justification

*Section IV, first paragraph*, amend to read:

"IV. Discussion of Issues Addressed by the gtr

The proposed gtr provides that certain door retention components on any door leading directly into an occupant compartment, i.e., a compartment containing one or more seating accommodations, must comply with the requirements of the gtr. Tractor trailers are excluded because they do not meet this criterion. Likewise, doors leading into cargo compartments that are separated by a barrier would not be regulated since an individual could not access the occupant compartment through those doors. **The gtr addresses common door types; including side doors that open laterally or slide, and rear doors that open laterally or vertically.** The gtr excludes folding doors, roll-up doors, detachable doors, and doors that provide emergency egress, as these types of doors would require entirely new test procedures and are not in such common use as to justify the development of new requirements and test procedures. **Similarly, the gtr requirements and test procedures have not been evaluated for uncommon door types such as side doors that open vertically (e.g., gull-wing).** Thus, for certain vehicle designs, some, but not all doors would be regulated by the gtr. **Contracting Parties may choose to address these excluded doors at the national level. However, if an excluded door were to become commonly used, it would be appropriate to propose amending the gtr to encourage harmonization of such national regulations.**"

## B. Text of the regulation

*Paragraph 3.1.*, amend to read:

"3.1. "*Auxiliary Door Latch*" is a latch equipped with a fully latched position**, with or without a secondary latch position,** and fitted to a door or door system equipped with a primary door latch system."

*Paragraph 3.18.*, amend to read:

"3.18. "*Primary Door Latch*" is a latch equipped with both a fully latched position and a secondary latched position **and is designated as a "primary door latch" by the manufacturer. The manufacturer may not thereafter change such designation. Each manufacturer shall, upon request, provide information regarding which latches are "primary door latches" for a particular vehicle or make/model.**"

*Paragraph 4.2.2.(b)*, amend to read:

"4.2.2. …

(b) a door latch system with a fully latch position and a door closure warning system. **The door closure warning system shall be located where it can be clearly seen by the driver.**"

*Paragraph 5.1.3.*, amend to read:

"5.1.3. Load Test Three **(applicable only to back doors that open in a vertical direction)**"

*Paragraph 5.1.5.1.(d),* amend to read:

"5.1.5.1. …

(d) On back doors:

**(i) Not separate when a load of 11,000 N is applied perpendicular to the hinge face plate (longitudinal test) such that the hinge plates are not compressed against each other (Load Test One).**

**(ii) Not separate when a load of 9,000 N is applied perpendicular to the axis of the hinge pin and parallel to the hinge face plate (transverse load test) such that the hinge plates are not compressed against each other (Load Test Two).**

**(iii) Not separate when a load of 9,000 N is applied in the direction of the axis of the hinge pin (Load Test Three – only for back doors that open in a vertical direction ).**"

*Paragraph 5.1.5.4. (b),* amend to read:

"5.1.5.4. …

(b) A door closure warning system shall be provided for those doors. **The door closure warning system shall be located where it can be clearly seen by the driver.**"

*Paragraph 5.2.4.2.1.*, amend to read:

"5.2.4.2.1. A separation ~~between the interior of the door and the exterior edge of the doorframe exceeds 100 mm~~ **which permits a sphere with a diameter of 100 mm to pass unobstructed between the exterior of the vehicle and the interior of the vehicle**, while the required force is maintained."

*Annex 1*

*Paragraph 2.1.2.1.1.*, amend to read:

"2.1.2.1.1. ~~Adapt~~**Attach** the test fixture to the mounting provisions of the latch and striker. Align the direction of engagement parallel to the linkage of the fixture. ~~Mount the latch and striker in the fully latched position to the test fixture.~~**Mount the fixture with the latch and striker in the fully latched position in the test machine so as to apply a load perpendicular to the face of the latch.**"

*Paragraph 2.1.2.2.1.*, amend to read:

"2.1.2.2.1. ~~Adapt~~**Attach** the test fixture to the mounting provisions of the latch and striker. Align the direction of engagement parallel to the linkage of the fixture. ~~Mount the latch and striker in the secondary latched position to the test fixture.~~**Mount the fixture with the latch and striker in the secondary latched position in the test machine so as to apply a load perpendicular to the face of the latch.**"

*Paragraph 2.2.2.1.1.*, amend to read:

"2.2.2.1.1. ~~Adapt~~**Attach** the test fixture to the mounting provisions of the latch and striker. ~~Mount the latch and striker in the fully latched position to the test fixture.~~**Mount the fixture with the latch and striker in the fully latched position in the test machine so as to apply a load in the direction of the latch opening.**"

*Paragraph 2.2.2.2.1.*, amend to read:

"2.2.2.2.1. ~~Adapt~~**Attach** the test fixture to the mounting provisions of the latch and striker. ~~Mount the latch and striker in the secondary latched position to the test fixture.~~**Mount the fixture with the latch and striker in the secondary latched position in the test machine so as to apply a load in the direction of the latch opening.**"

*Paragraph 2.3.*, amend to read:

"2.3. Load Test Three (**only for** back doors **that open in a vertical direction**)"

*Paragraph 2.3.2.1.*, amend to read:

"2.3.2.1. ~~Adapt~~**Attach** the test fixture to the mounting provisions of the latch and striker. Mount **the fixture with** the latch and striker in the fully latched position ~~to the test fixture~~ **in the test machine so as to apply a load in the direction specified in paragraph 5.1.3. of this regulation and Figure 1-4.**"

*Figure 1 - 3, the title*, amend to read:

"Figure 1-3 - Door Latch – Tensile Testing Fixture for Load Test 3 (**only for** back doors **that open in a vertical direction**)"

*Annex 2*

*Paragraph 2.3.2.4.*, amend to read:

"2.3.2.4. Ensure that the door latch is in the fully-latched position, that the door is ~~tethered,~~ unlocked **(doors may be tethered to avoid damaging the recording equipment)**, and that the window, if provided, is closed."

*Paragraph 2.3.3.5.*, amend to read:

"2.3.3.5. Vertical Setup 1. (Only for back doors **that open in a vertical direction**)…."

*Paragraph 2.3.3.6.*, amend to read:

"2.3.3.6. Vertical Setup 2. (Only for back doors **that open in a vertical direction**)…."

*Annex 3*

*Paragraph 2.1.3.*, amend to read:

"2.1.3. Vertical load test (**Only for** backdoors ~~Only~~ **that open in a vertical direction**)."

*Annex 4*

*Paragraph 3.2.*, amend to read:

"3.2. Remove seats and any interior components that may interfere with the mounting and operation of the test equipment **and all pillar trim and any non-structural components that overlap the door and cause improper placement of the force application plates**."

*Paragraph 3.3.*, amend to read:

"3.3. Mount the force application devices and associated support structure to the floor of the test vehicle. **Each force application device and associated support structure is rigidly fixed on a horizontal surface on the vehicle floor, while applying the loads.**"

*Paragraph 3.6.1.*, amend to read:

"3.6.1. The force application plate is 150 mm in length, and 50 mm in width, and at least 15 mm in thickness. **The plate edges are rounded to a radius of 6 mm ± 1 mm.**"

*Insert a new paragraph 3.6.1.1.*, to read:

"**3.6.1.1. The plates are fixed perpendicular to the force application devices and move in the transverse direction. For alignment purposes, each plate is attached to the application device in a manner that allows for rotation about the vehicle's y-axis. In this manner, the face of each plate remains parallel to the vertical plane which passes through the vehicle's longitudinal centreline.**"

*Paragraph 3.6.3.*, amend to read:

"3.6.3. The force application plate is positioned **such that the long edge of the plate is** as close to the **interior** edge of the door as possible**, but not such that the forward edge of the forward plate and the rear edge of the rear plate are more than 12.5 mm from the respective interior edges.** ~~It is not necessary for the application plate to be vertical.~~"

*Paragraph 3.7.1.*, amend to read:

"3.7.1. The force application plate is 300 mm in length, and 50 mm in width, and at **least** 15 mm in thickness. **The plate edges are rounded to a radius of 6 mm ± 1 mm.**"

*Insert a new paragraph 3.7.1.1.*, to read*:*

"**3.7.1.1. The plates are fixed perpendicular to the force application devices and move in the transverse direction. For alignment purposes, each plate is attached to the application device in a manner that allows for rotation about the vehicle's y-axis. In this manner, the face of each plate remains parallel to the vertical plane which passes through the vehicle's longitudinal centreline.**"

*Paragraph 3.7.3.*, amend to read:

"3.7.3. The force application plate is positioned **such that the long edge of the plate is** as close to the **interior** edge of the door as possible**, but not such that the forward edge of the forward plate and the rear edge of the rear plate are more than 12.5 mm from the respective interior edges.** ~~It is not necessary for the application plate to be vertical.~~"

*Insert a new paragraph 3.12.*, to read:

"3.12. **Apply a preload of 500 N to each actuator and "zero" the displacement measuring device.**"

*Paragraph 4.1.*, amend to read:

"4.1. **Increase the force on each** ~~Move each~~ force application device **as linearly as practicable until a force of 9,000 N is achieved on each force application device in not less than 90 seconds and not more 120 seconds,** ~~at a rate of 20-90 mm, as specified by the manufacturer, until a force of 9,000 N is achieved on each force application device~~ or until either force application device reaches a total displacement of 300 mm."

*Paragraph 4.4.*, amend to read:

"4.4. Maintain the force application device position of paragraph 4.3.**, and within 30 seconds,** measure the separation between the exterior edge of the doorframe and the interior of the door along the perimeter of the door."

# II. Justification

## A. Introduction

1. The objective of this proposal is to amend the current global technical regulation (gtr) on door locks and door retention components intended to reduce door latch system failures. The global technical regulation (gtr) on Door Locks and Door Retention Components (gtr No. 1) was established under the 1998 Global Agreement, under the World Forum for Harmonization of Vehicle Regulations (WP.29) at the November 18, 2004 session of the Executive Committee. According to this Agreement, on 15 December, 2004, the United States of America (U.S.A.) issued a notice of proposed rulemaking (NPRM) closely based on gtr No. 1. Subsequently, the U.S.A. published two Final Rules on February 06, 2007 (72 FR 5385; Docket No. NHTSA-2006-23882) and 19 February 2010 (75 FR 7370; Docket No. NHTSA-2010-0015) incorporating the requirements of the gtr into their national regulations. Through this rulemaking process, minor changes were made to clarify the regulatory text. Furthermore, as the gtr was incorporated into ECE regulation 11 under the 1958 Agreement, additional clarifications were recommended. The purpose of this proposal is to incorporate these minor changes and clarify the requirements and test procedures of the gtr.

2. In the U.S.A. rulemaking process, the Notice of Proposed Rulemaking is open to public comment; during this time, the U.S.A. received several comments from motor vehicle manufacturers, motor vehicle manufacturer trade associations, vehicle component manufacturers, an advocacy organization, and an individual citizen. Comments were submitted by Nissan North America (Nissan); Porsche Cars North America (Porsche); America Honda Motor Company Limited (Honda); Ford Motor Company (Ford); Thomas Built Buses Inc. (Thomas Built Buses); Blue Bird Body Company, a bus manufacturer (Blue Bird); Alliance of Automobile Manufacturers (Alliance); Association of International Automobile Manufacturers, Inc. (AIAM); Truck Manufacturers Association (TMA); TriMark Corporation, a door latch manufacturer (TriMark); Delphi, a vehicle component manufacturer; Advocates for Highway Safety, an advocacy organization (Advocates); and Barb Sachau, a private citizen.

3. Vehicle component manufacturers, motor vehicle manufacturers, and their representative associations were generally supportive of the proposed rulemaking as well as the gtr process. These commenters did raise issues regarding some of the proposed test requirements and test procedure specifications. Some of these commenters also requested additional clarification of the proposed rule.

4. In light of the recent incorporation of the gtr into the U.S.A. Regulation and the UNECE Regulation (1958 Agreement), we believe that this would be an excellent opportunity for the international community to amend the gtr to ensure that all regulations are harmonized. Everyone could benefit from the clarification of the testing procedures and the wording updates that were found during the drafting and comment period of the door locks and door retention components regulation.

## B. Justification of Changes

### 1. Part A, Technical Rational, Section IV

5. The gtr excluded some door types that are not in common use and which would have required new requirements and test procedures. Subsequent to the adoption of the gtr, the issue of side doors that open vertically arose. Consideration was given to applying the

requirements and test procedures for rear doors that open vertically, however data was not available to determine whether or not this would be appropriate. Therefore this proposal amends Part A to clarify that the gtr was intended to address common door types and that Contracting Parties may address doors not regulated by the gtr at the national level.

**2. Definitions, paragraph 3.1 and paragraph 3.18.**

6. According to paragraph 2. of Informal document No. GRSP-36-5, the vehicle manufacturers are concerned that the definition of the "Auxiliary Door Latch", as stipulated in paragraph 3.1. of gtr No. 1, as well as the hinged door performance requirements, as specified in paragraph 5.1. of gtr No. 1, are not clear. As written, a manufacturer must have all auxiliary door latches meet the same requirements as primary door latches, because there is no way to determine which is primary and which is auxiliary if they all have a secondary latching system. This was not the intent of the global technical regulation. Therefore, paragraphs 3.1. and 3.18 were revised to clarify the definitions.

**3. Hinge requirements for back doors, paragraph 5.1.5.1.(d)**

7. According to the comments received on the NPRM for Federal Motor Vehicle Safety Standard (FMVSS) 206, the Alliance and TMA requested clarification that the vertical load hinge in paragraph 5.1.5.1.(d) applies to back doors only. Upon analysis of this comment, it was found that the proposed revisions must be made in order to clarify the exact definition of the vertical load hinge.

**4. Door latch closure warning system, paragraphs 4.2.2.(b) and 5.1.5.4.(b)**

8. U.S.A. recommends that text be added specifying that the visual warning must be able to be seen by the driver of the vehicle. This text is consistent with the seat belt warning systems regulated in FMVSS 208.

**5. Separation requirement for sliding door test, paragraph 5.2.4.2.1.**

9. In paragraph 5.2.4.2.1., the gtr specified that a test failure can be indicated by a 100 mm separation of the interior of the door from the exterior of the vehicle’s doorframe. At any point, there must not be more than 100 mm of separation, even if the latch holds, to protect against partial ejections. The 100 mm limit is based on a commonly used measurement for maximum allowable open space in the U.S.A. and Canada for school bus opening requirements.

10. Nissan requested clarification as to whether a non-compliance would occur in a case in which a gap separation occurred where the gap measured greater than 100 mm at the exterior opening, but less than 100 mm at the interior of the opening. The intent of the gtr was that, for failure of the requirement, the separation throughout the gap must exceed 100 mm. The example provided by Nissan would not be a failure. This is consistent with the intent to limit ejections through a separation. The U.S.A. recommends amending the text in paragraph 5.2.4.2.1, to clarify that a spherical volume with a 100 mm diameter cannot pass through the opening. This change does not require a physical sphere be passed through the opening to validate the requirement.

**6. Clarifications of the text for paragraph 5.1.3., Annex 1, Annex 2 paragraph 2.3.3.5., Annex 2 paragraph 2.3.3.6., and Annex 3 paragraph 2.1.3.**

11. In the NPRM and consistent with the gtr, the U.S.A. proposed regulatory text that removed any implication that the latch load is applied relative to the vehicle orientation. The Alliance generally agreed with the proposed rule as applied to the hinged doors but

requested additional clarification and corrections to the test procedure. The proposed clarifications to the regulatory text clarify the process of the testing procedure.

**7. Clarifications of the text for Annex 2, paragraph 2.3.2.4.**

12. This change clarifies the test set-up to allow for optional tethering of the door if there are concerns that during the test the door may damage the recording equipment.

**8. Annex 4**

*(a) Test Device and Set-Up*

13. With regard to the force application device as specified in paragraph 3.3. of Annex 4, Nissan and the Alliance favoured mounting the device external to the vehicle, instead of on the vehicle floor. These commenters expressed concern that mounting the force application device inside the vehicle could deform the vehicle floor and allow the device to move from its original position when applying a load. This, they stated, would introduce a significant amount of test variability.

14. The U.S.A. experienced similar concerns with the mounting of the test device, but resolved the issue through use of reinforced plates. The reinforcement plates provided a level surface for the support of the loading device. The plates also distribute loading on the floor of the test vehicle to reduce the movement of the device that could otherwise occur due to localized deformation at the attachment points.

15. During the 11 May 2005 meeting between the U.S.A., Alliance and the Ford Motor Company presented the results of evaluation testing, which demonstrated that use of the reinforcement plates on the vehicle floor avoids problematic displacement while under loading.

16. Both U.S.A. and commenters have demonstrated the ability to apply the requisite load to a vehicle door without causing displacement of the force application device. In order to minimize potential test variability, the U.S.A. recommends the gtr specify that a loading device is to be rigidly mounted when applying a load.

17. In paragraphs 3.6.1. and 3.7.1., the test procedure specifies that the force application plates are to maintain the displacement of the force application device in the transverse direction. This ensures that as force is applied, a door system continues to experience a transverse load. Although NHTSA did not experience penetration of door sheet metal from the loading plates, we recognized that without rounded edges on the plates, this might be a problem. Therefore, we are recommending that the loading plates have edges rounded to a radius of 6 mm ±1 mm.

18. The procedure specifies that the plates are permitted to rotate in the longitudinal direction relative to the loading ram. The loading plates are fixed perpendicularly to the hydraulic loading arms in a manner that does not allow for rotation in a transverse direction. Additionally, the loading plates are connected directly to the hydraulic ram shafts by a threaded stud attached to the back of the plate that allows for longitudinal rotation. This longitudinal rotation allows for better adjustment of the plate to the contour of a vehicle door and provides acceptable results in testing performed by the U.S.A. Paragraphs 3.6.1.1. and 3.7.1.1. of Annex 4 clarify the rotation of the force application plate.

19. The test procedure specified that the loading plates be placed at the "door edge" as in paragraph 3.6.3. and paragraph 3.7.3. of Annex 4. The test procedure also specifies that all the door trim and decorative components are to be removed during test set-up as in paragraph 3.2. of Annex 4. In its comments Nissan stated that the term "door edge" could be prone to misinterpretation and asked that the term be further defined. Nissan also stated

that trim components on a door pillar that overlap a sliding door could interfere with the test set-up. To address these concerns, the U.S.A. recommends that the force application plates are placed within 12.5 mm from the interior edges of the sliding door as is noted in paragraphs 3.6.3 and 3.7.3 of Annex 4. This specification will ensure that force is applied directly to the portion of the door in which the latch mechanism is installed. Typically, a latch mechanism is within 12.5 mm of the interior edge of a vehicle door. Further, we recommend that pillar trim and non-structural components that overlap a door be removed to permit proper placement of the loading plates as is reflected in the recommended changes to paragraph 3.2. of Annex 4.

*(b) Application of Force*

20. The Alliance raised several concerns with the specified procedure for operating the force application devices. First, the Alliance requested that a 500 N preload be applied prior to determining the initial position of the ram arms for the purpose of measuring the transverse displacement of the ram arms. The Alliance stated that a preload of 500 N would ensure that the loading plates are correctly positioned and would improve repeatability of the test by eliminating the effect of free play in the system. Specifying the pre-load is consistent with the force application test procedures specified in GTR 7 on Head Restraint Systems. Paragraph 3.12 of Annex 4 incorporates a preload requirement for the sliding door test procedure specifying that the test loading device achieve a preload of 500 N; once the preload is achieved the displacement measuring devices are then zeroed out.

21. The Alliance recommended that the test procedure control the load force application rather than the displacement. As stated above, the gtr requires that the displacement is controlled (20–90 mm per minute) until a load of 9000 N is reached, and then holding the resulting load for 10 seconds. The commenter stated that controllers currently in use do not allow for simultaneous control of both displacement and load, and that the procedure as specified would raise practicability concerns.

22. In response to the Alliance's concern, the U.S.A. recommends that the procedure specify that 9,000 N force is achieved in not less than 90 seconds and not more than 120 seconds. The 90 – 120 second duration corresponds to loading rates of 4,500 N/min to 6,000 N/min, which according to data from tests conducted by the U.S.A. is comparable to the loading rates of 20 to 90 mm/min as specified originally.[1] Therefore it is recommended to amend paragraph 4.1. of Annex address the concerns of the manufacturers.

*(c) Performance Requirement*

23. In Annex 4 paragraph 4.3., both Nissan and the Alliance expressed concern that the specified period of 10 seconds for maintaining the load was not adequate to permit measurement of separations between a vehicle body and the sliding door. Nissan stated that based on its experience it could take up to a minute to make the necessary measurements. The Alliance recommended a period of 30 seconds. The Alliance stated that this would be adequate to limit deformation of the door sheet metal and still provide enough time for the necessary measurements. The U.S.A. proposes a revision of paragraph 4.4. of Annex 4 to specify that the load be maintained for 30 seconds. As suggested by the Alliance, we believe that it is practical to make the specified measurements in this time.

[1] Federal Register; Vol 75, No. 33; 19 February, 2010, pgs. 7370-7383.