



YAMAHA MOTOR CORPORATION, U. S. A.

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Docket Management Facility
U.S. Department of Transportation
1200 New Jersey Avenue SE,
West Building Ground Floor,
Room W12-140, Washington,
DC 20590-0001

Proposal to amendment to the Federal Motor Vehicles Safety Standard (“FMVSS”)

Dear Sirs or Madams,

Responding to the advance notice of proposed rulemaking published by NHTSA on December 10, 2020, **Docket No NHTSA-2020-0109** (the “ANPRM”), Yamaha Motor Corporation, U.S.A., a California corporation, an importer and distributor of Yamaha brand motorcycles or other motorized products in the United States, respectfully submits the following comments.

I. INTRODUCTION

The ANPRM seeks public comment on whether any test procedures for any FMVSS may be a candidate for replacement, repeal, or modification, for reasons other than procedures relevant only to automated driving systems.

We hereby respectfully submit comments to propose modernizing FMVSS No. 122 by adding a new definition of “Twinned Wheels”, which major advanced countries or areas have adopted. The proposed amendment is intended to clarify the application of relevant brake requirements for new type of motorcycles having three wheels which have gained popularity in the global market in recent years and also are expected to be widely available in the US in coming years.

II. PROPOSED AMENDMENT

II.1 Addition of the “Twinned Wheels” definition

The proposed amendment adds a new definition of “Twinned Wheels” to FMVSS No. 122 to provide clear classification to a new type of motorcycles having three wheels but functions substantially identical with traditional two wheeled motorcycles rather than traditional three

wheeled motorcycles¹, and to remove potential ambiguity over the application of the relevant brake requirements for such a new type of motorcycle.

The proposed “Twinned Wheels” definition should be identical, from a harmonization point of view, with the pertinent Europe Union regulation as quoted below:

“twinned wheels’ means two wheels mounted on the same axle which are considered to be one wheel, whereby the distance between the centres of their areas of contact with the ground is equal to or less than 460 mm.” See EU168/2013 Article 3. Definition (72)²

II.2 Effect of the Proposed Amendment

The proposed “Twinned Wheels” definition allowing narrowly arranged two wheels on the same axle to be treated as one wheel, to the extent they are spaced no further apart than 460 mm, has the effect of allowing some motorcycles having three wheels currently classified as three wheeled motorcycles to be classified as two wheeled motorcycles. Therefore, such motorcycles would be subject to all the technical requirements and test requirements applicable to two wheeled motorcycles rather than three wheeled motorcycles. The only implications this proposed amendment would have, as far as we are aware of, is application of the brake requirements set forth in S.5.1 *Brake system requirements* of FMVSS No.122.

III. JUSTIFICATION OF THE PROPOSED AMENDMENT

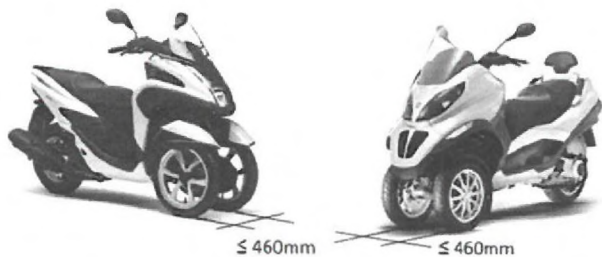
III.1 New type of motorcycles having three wheels but function identical with traditional two wheeled motorcycles

One of the technology innovations in the global motorcycle industry in the last decade is a design of a new type of motorcycles having three wheels (two wheels narrowly arranged at the front – one at the rear and fits the proposed “Twinned Wheels” definition above), and functions substantially identical with traditional two wheeled motorcycles. In addition to the appearance being identical with the traditional two wheeled motorcycle having handlebar as opposed to steering wheel, being equipped with an active front suspension system, such motorcycles are capable of leaning into curves substantially identical with two wheeled motorcycles. This could provide improved stability while negotiating turns at normal speeds. Further, riders operate such motorcycles adapting braking systems and park using side stand, in exactly the same manner as operating traditional two wheeled motorcycles.

¹ Examples of “traditional three wheeled motorcycles” are trike and highway motorcycle with side car

² <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32013R0168>

Yamaha calls this new technology, Leaning Multi Wheel (LMW)³ and Yamaha “Tricity” series⁴ is one of the examples of such new type of motorcycles in which the LMW technology is implemented (Yamaha “Tricity” is the left vehicle of the fig.⁵ below).



III.2 Inconsistency under the current motorcycle categorizations

New technology occasionally creates inconsistency in the existing regulations. The major inconsistency under the current motorcycle categorizations is that such a new type of motorcycle which should be categorized as two wheeled motorcycles from technical or functional perspective are systematically categorized as three wheeled motorcycles based on the number of wheels, and as a consequence they are required to be equipped with brake systems and subject to test requirements which are considered to be intended for traditional three wheeled motorcycles such as trikes and motorcycles fitted with side cars, but not for traditional two wheeled motorcycles.

Under S4. *Definition* of the FMVSS No. 122, motorcycles are classified into 5 categories (3-1 through 3-5) according to certain characteristics including configuration (number and arrangement of wheels), engine size, and maximum design speed. S5.1 *Brake system requirements* provides relevant brake system requirements for each category of motorcycles. Under the current brake system requirements, number of wheels is served as a decisive factor of distinction among 5 categories, without considering any unique technical or functional aspects of each vehicle. For example, if we look at the larger size motorcycles (with an engine cylinder capacity in exceeding 50 cm³ or a maximum design speed exceeding 50 km/h), two wheeled motorcycles are systematically categorized as 3-3, while three wheeled motorcycles are either as 3-4 or 3-5. When categorized as 3-5, motorcycles are required to be equipped with (a) a parking brake system, and (b) a foot actuated service brake system which operates the brakes on all wheels, however, we believe such requirements are inappropriate or overly burdensome for traditional two wheeled motorcycles and this new type of motorcycle discussed above.

III.3 Global harmonization of “Twinned Wheels” definition

By adopting the “Twinned Wheels” definition, the major advanced countries or areas have effectively solved the similar inconsistency discussed in III.2 above in their respective regulations, at the same time have advanced harmonization in the pertinent area of motor vehicle regulations.

³ See LMW technology at <https://global.yamaha-motor.com/business/mc/mc-tech/main-technology/lmw.html>

⁴ See Tricity 300 at <https://www.yamaha-motor.eu/gb/en/products/scooters/urban-mobility/tricity-300/>

Tricity series are not sold in the US as of January 2021

⁵ The figure is seen in the Exhibit B

Followings are some examples of the countries or areas that have adopted the “Twinned Wheels” definition.

- EU: EEC 168/2013
- Australia: Vehicle Standard 2005 Amendment 3 (September 2007)⁶
- Canada: Motor Vehicle Safety Regulations (CRC c. 1038)⁷
- Japan: Road Transport Vehicles Act (dated October 24, 2009)
- United Nations: Consolidated Resolution on the Construction of Vehicles (CRE 3) (January 2019)⁸

The fact of those major advanced countries or areas (such as EU, Australia, Canada and Japan) adopting the “Twinned Wheels” definition itself strongly encourages the US to consider participating in this harmonization effort.

Moreover, the US has long understood the benefits of harmonization and has proactively cooperated in advanced harmonization of relevant vehicle regulations. As an active participant of the United Nations 1998 Global Agreement, the US made contribution to the development of the Global Technical Regulation (GTR). As a part of the harmonization efforts, the FMVSS No.122 was updated in 2012 to reflect GTR No. 3 (Motorcycle Brake Systems) established in 2006. In the federal register publishing the FMVSS No. 122 amendment dated August 24, 2012⁹, NHTSA acknowledged in the I. Executive Summary that the FMVSS No. 122 established in early 1970’s had to keep pace with the modern technologies, and harmonization would bring benefits of decreasing cost for manufacturers and easing market entry, ultimately such benefits would be passed on to consumers.

Considering the global harmonization on the “Twinned Wheels” concept and the US’s own supportive position taken towards harmonization efforts, we cannot find any reasons the US is not able to participate in this global initiative.

III.4 Safety Issue

Without any doubt, safety has to be top priority when considering amendment to any safety standard like FMVSS.

We strongly believe that adoption of the “Twinned Wheels” definition itself would not create any noticeable adverse impacts on safety. As discussed in II.2 above, the proposed “Twinned Wheels” definition allows certain motorcycles having three wheels currently classified as three wheeled motorcycles to be classified as two wheeled motorcycles and consequently to be subject to all the technical and test requirements applicable to two wheeled motorcycles. Regardless of motorcycles having two wheels or three wheels, it should be proper to apply the two wheeled

⁶ See Exhibit A

⁷ https://laws-lois.justice.gc.ca/eng/regulations/C.R.C.,_c._1038/page-2.html#h-478543

Number of Wheels 2.2 For the purpose of determining the number of wheels on a motorcycle or a three-wheeled vehicle, two wheels are considered to be one wheel if they are mounted on the same axle and the distance between the centres of their areas of contact with the ground is less than 460 mm.

⁸ See Exhibit B (ECE-TRANS-WP.29-GRSG-2019-08e) <https://unece.org/DAM/trans/doc/2019/wp29grsg/ECE-TRANS-WP.29-GRSG-2019-08e.pdf>

⁹ <https://www.govinfo.gov/content/pkg/FR-2012-08-24/pdf/2012-20480.pdf>

motorcycles standard to the extent the motorcycles function identical with traditional two wheeled motorcycles.

In this regard, it should be noteworthy that several vehicle riding analysis results stated in a proposal submitted to Inland Transportation Committee of United Nation Economic Commission for Europe (UNECE) provided positive information on this issue (*“The analysis of the results... confirmed that the analysed vehicle is driven very much like an ordinary two-wheeler.”* 2008-32-0061 (SAE)/20084761(JSAE), *Comparison Between Experimental and Numerical Handling Tests for a Three-Wheeled Motorcycle*/ *“A total of 19 proficiency test officers and motorcycle police riders had tested a vehicle equipped with “twinned wheels”. They concluded that it is the same or close to two-wheeled motor vehicles.”* *Public comments regarding the Amendment of the Road Transport Regulation in Japan*). Remarkably, it is also stated that Motorcycle Safety Foundation (MSF) concluded from its testing of the tested vehicle (which meets the “Twinned Wheels” definition) that *“the vehicle should be treated as a two-wheeled motorcycle”*¹⁰.

Finally, the major advanced countries or areas listed in II.3 above have administered the “Twinned Wheels” definitions for several years and we are not aware of any initiative to repeal said definition for safety concern or other reasons.

III.5 Benefits for Business and Consumers

We do not anticipate any development, or that testing cost increase would occur for manufacturers associated directly with adoption of the “Twinned Wheels” definition to the FMVSS No. 122.

Instead, if adopted, it provides manufactures benefit from harmonization, including significant development cost reduction and easing market entry, which ultimately benefits consumers. For example, adoption of the “Twinned Wheels” definition would enable us to introduce a motorcycle having three wheels (which fits within the “Twinned Wheels” definition) like Yamaha “Tricity” (which has been marketed in major advanced countries or areas but not in the US) into the US market with the brake systems required for the two wheeled motorcycles under the FMVSS No.122. On the other hand, without having the “Twinned Wheels” definition, (even if we would decide to introduce) Yamaha’s “Tricity” or similar new type of motorcycles in the US could be priced considerably higher compared to the market which has had the “Twinned Wheels” definition in place, reflecting the relevant development and manufacturing cost associated with parking brake and combined brake required for three wheeled motorcycles.

In essence, the “Twinned Wheels” definition would promote decreasing cost and ease market entry, and the US consumers would receive benefit of having more variety of products to choose from, at competitive prices.

IV. CONCLUSION

¹⁰ See “5. Supporting Information” of Exhibit B (ECE-TRANS-WP.29-GRSG-2019-08e) <https://unece.org/DAM/trans/doc/2019/wp29grsg/ECE-TRANS-WP.29-GRSG-2019-08e.pdf>

As NHTSA acknowledged in its own statement in 2012 FMVSS amendment, the FMVSS No. 122 established in early 1970's is in need to periodically keep pace with the modern technologies. As discussed above, Leaning Multi Wheel (LMW) implemented in a new concept of motorcycles like the Yamaha "Tricity" can be said to be one of the examples of such modern technologies. Moreover, under the recent harmonization adoption of the "Twinned Wheels" definition by the major advanced countries or areas, the US's participation in said efforts is requested more than ever. Not only solving the inconsistency existing in the current vehicle classification, the "Twinned Wheels" definition also provide benefits of considerable development cost reduction and ease of market entry, which ultimately benefit consumers. Having observed the major advanced countries or areas administering the "Twinned Wheels" definition without experiencing noticeable adverse impacts on safety, we strongly hope the US participates in this global harmonization.

We appreciate NHTSA's time and consideration of our proposed amendment.

Best regards,



Brad Franklin
Government Relations & Certification Division Manager
Yamaha Motor Corporation, U.S.A.

[Exhibits]

Exhibit A: Vehicle Standard (Australian Design Rule – Definitions and Vehicle Categories) 2005 Amendment 3 (Dated 12th September 2007)
Exhibit B: ECE-TRANS-WP.29-GRSG-2019-08e

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1. LEGISLATIVE PROVISIONS

1.1. Name of Legislative Instrument

1.1.1. This instrument is the Vehicle Standard (Australian Design Rule – Definitions and Vehicle Categories) 2005 Amendment 3.

1.1.2. This instrument may also be cited as Australian Design Rule — Definitions and Vehicle Categories Amendment 3.

1.2. Commencement

1.2.1. This instrument commences on the day after it is registered.

2. AMENDMENT OF VEHICLE STANDARD

2.1. The changes specified in Schedule 1 amend Vehicle Standard (Australian Design Rule – Definitions and Vehicle Categories) 2005.

SCHEDULE 1

[1] Add the following, in alphabetical order, to 3. DEFINITIONS

TWINNED WHEELS - means two wheels mounted on the same axle, the distance between centres of their areas of contact with the ground being less than 460 mm. Twinned wheels shall be considered as one wheel.



Economic Commission for Europe

Inland Transport Committee

World Forum for Harmonization of Vehicle Regulations**Working Party on General Safety Provisions****116th session**

Geneva, 1–5 April 2019

Item 16 of the provisional agenda

Consolidated Resolution on the construction of vehicles (R.E.3)**Proposal for amendments to the Consolidated Resolution on the construction of vehicles****Submitted by the expert from the International Motorcycle Manufacturers Association***

The text reproduced below was prepared by the expert from the International Motorcycle Manufacturers Association (IMMA) to amend the provisions of the Consolidated Resolution on the construction of vehicles (R.E.3) to allow the application of "twinned wheels" on all vehicles of category L. It is based on informal document GRSG-115-12, presented at the 115th session of the Working Party on General Safety Provisions (GRSG) (see report ECE/TRANS/WP.29/GRSG/94, para. 65). The modifications to the current text of R.E.3 are marked in bold characters.

* In accordance with the programme of work of the Inland Transport Committee for 2018–2019 (ECE/TRANS/274, para. 123 and ECE/TRANS/2018/21/Add.1, Cluster 3.1), the World Forum will develop, harmonize and update UN regulations to enhance the performance of vehicles. The present document is submitted in conformity with that mandate.



I. Proposal

Insert a new paragraph 1.11., to read:

- "1.11. **"Twinned wheels" means two wheels positioned on the same axle, which are considered to be one wheel, whereby the distance between the centres of the areas of contact with the ground is equal to, or less than 460 mm. Twinned wheels can be applied on vehicles of category L."**

Paragraph 2.1.1., amend to read:

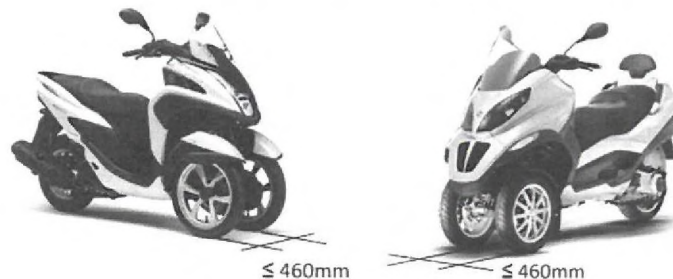
- "2.1.1. **"Category L₁": A two-wheeled vehicle with an engine cylinder capacity in the case of a thermic engine not exceeding 50 cm³ and whatever the means of propulsion a maximum design speed not exceeding 50 km/h. In the case the vehicle is equipped with a "twinned wheels-" configuration, the full vehicle structure or part of the vehicle structure shall tilt when turning."**

Paragraph 2.1.3., amend to read:

- "2.1.3. **"Category L₃": A two-wheeled vehicle with an engine cylinder capacity in the case of a thermic engine exceeding 50 cm³ or whatever the means of propulsion a maximum design speed exceeding 50 km/h. In the case the vehicle is equipped with a "twinned wheels-" configuration, the full vehicle structure or part of the vehicle structure shall tilt when turning."**

II. Justification

1. A new approach to the concept of twinned wheels was introduced by IMMA in ECE/TRANS/WP.29/GRSG/2015/30 (which was not concluded by GRSG), to allow the application of "twinned wheels" on all vehicles of category L.



2. The proposal aims to harmonize the definitions in R.E.3 with those used in:
 - (a) Europe (Whole Vehicle Type Approval, European Union Regulation No. 168/2013 article 3 – 72);
 - (b) Australia (ADR - PART B); and
 - (c) Japan (Road Transport Vehicle Act 2009.10.24).

Note: In the United States of America, the Piaggio MP3 meets the definition of "motorcycle" under United States Department of Transportation regulation ("motorcycle" means a motor vehicle with motive power having a seat or saddle for the use of the rider and designed to travel on not more than three

wheels in contact with the ground (49 CFR Part 571)) and under nearly every State law.

3. In certain countries which apply UN Regulations and not the "twinned wheels" definition under their regional or national framework referenced under point 2, where three-wheeled vehicles as the Piaggio MP3 and Yamaha Tricity are on sale, such vehicles may be classified only as an L₃ (three-wheeler). This would result in major changes in vehicle requirements and specifications (e.g. parking brake) hence the necessity to update R.E.3 with the definition of "twinned wheels" from a harmonization perspective.

4. As a result of this proposal, "twinned wheels" can apply to all L-vehicle categories. If "twinned wheels" are applied on L₁ and L₃ vehicles, it is specified that the vehicles shall incline when turning. For other L category vehicles, there is no tilting requirement.

5. Supporting information:

- (a) 2008-32-0061 (SAE) / 20084761 (JSAE) Comparison Between Experimental and Numerical Handling Tests for a Three-Wheeled Motorcycle. In this paper the handling behaviour of the three-wheeled motor scooter (Piaggio MP3) was investigated on the basis of experiments and simulations. The analyses of the results and previous experience confirmed that the analysed vehicle performs very much like an ordinary two-wheeler.
 - (b) Public comments on the amendment of the Road Transport Regulation in Japan: a total of 19 proficiency test officers and motorcycle police riders tested a vehicle equipped with "twinned wheels". They concluded that it is the same or close to two-wheeled motor vehicles.
 - (c) Piaggio introduced the MP3 in 2006 in the United States of America. This motor vehicle has two independently suspended front wheels with the centre of the tire contact patches of 420 mm (16.5 inches) apart and one rear wheel. The Motorcycle Safety Foundation concluded from its testing of the vehicle that the MP3 should be treated as a two-wheeled motorcycle.
-