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UN Regulation No. 92 (Replacement Exhaust Silencing Systems for Motorcycles)

Proposal for a Supplement 1 to the 02 series of amendments to UN Regulation No. 92

**Submitted by the experts from Germany, the Kingdom of the
Netherlands, Switzerland, the United Kingdom of Great Britain and
Northern Ireland and the European Commission***

The text reproduced below was prepared by a special interest group on UN Regulation No. 92 in accordance with a discussion at the seventy-seventh session of the Working Party on Noise and Tyres (ECE/TRANS/WP.29/GRBP/77, para. 12 and informal document GRBP-77-20) regarding the requirements for non-original replacement exhaust silencing systems (NORESS) in UN Regulation No. 92. The modifications to the current text of the 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 2024 as outlined in proposed programme budget for 2024 (A/78/6 (Sect. 20), table 20.5), the World Forum will develop, harmonize and update UN Regulations in order to enhance the performance of vehicles. The present document is submitted in conformity with that mandate.

I. Proposal

Table of Contents, Annexes, add at the end:

“5 Recommendation to comply with the anti-tampering provisions”

Add new paragraphs 2.8., 2.9., 2.10., 2.11., 2.12., 2.13. and 2.14. to read:

"2.8. **“Exit-cone”** means the final part of the exhaust silencing system outlet through which exhaust gases exit into the air (see figure 1).

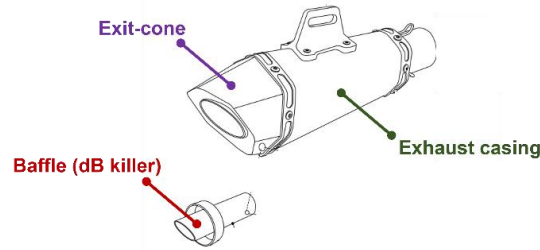


Figure 1: Exhaust silencer

2.9. **“Exhaust casing”** means the shell or main external assembly of the exhaust silencing system.

2.10. **“Baffle”** (commonly called “dB killer”) means the component of the exhaust silencing system that contributes to the attenuation of noise by restricting the flow of the exhaust gases exiting into the air.

2.11. **“Fastener”** means a device used to mechanically join two components.

2.12. **“Tamper proofing”** means the activity:

- to hinder and deter unlawful modifications; and
- to ease the detection of unlawful modifications.

2.13. **“Tampering event”** means any action which puts the exhaust silencing system into a state which is not any more compliant with the approved type.

2.14. **“Irrecoverable damage (related to tamper proofing exhaust silencing systems)”** means damage that constitutes permanent evidence of a tampering event.”

Paragraph 3.2.(a), amend to read:

"3.2. ...
 (a) A description of the vehicle type(s) on which the NORESS or components are intended to be fitted, with regard to the items referred to in paragraph 2.6 above. The numbers and/or symbols identifying the engine type and the vehicle type shall be specified and the ~~motor eye~~ vehicle type approval number, if necessary;
 ..."

Paragraph 3.3.(b), amend to read:

"3.3. ...
 (b) A sample of the original exhaust silencing system with which the ~~motor eye~~ vehicle was equipped when submitted for type approval;
 ..."

Paragraph 4.1.(a), amend to read:

- "4.1. ...
- (a) The trade name or mark of the manufacturer of the NORESS of its components;
- ..."

Paragraph 4.6., amend to read:

- "4.6. The manufacturer shall provide:
- (a) Instructions explaining in detail the correct method of mounting on the vehicle,
- (b) Instructions for handling the silencing system,
- (c) A list of components with the numbers of the corresponding parts, excluding retainers-,
- (d) The approval mark.**"

Paragraph 5.2., amend to read:

- "5.2. An approval number shall be assigned to each NORESS type approved. Its first two digits (at present 01 corresponding to the 01 series of amendments to the UN Regulation) shall indicate the series of amendments incorporating the most recent major technical amendments made to the Regulation at the time of issue of the approval. The same Contracting Party may not assign the same number to another type of NORESS or component designed for, the same type(s) of vehicle. "

Paragraph 5.6., amend to read:

- "5.6. A component may be marked with more than one approval number if it has been approved as a part of more than one NORESS; in this case the circle **does not** need ~~not~~ to be repeated. Annex 2 to this Regulation gives an example of the approval mark. "

Paragraphs 6.1.(b) and (h)., amend to read:

- "6.1. ...
- (b) It displays reasonable resistance to the corrosion ~~phenomena~~ to which it is exposed, with due regard to the normal conditions of use of the vehicle;
- ...
- (h) It is tamper-resistant in a way that is compatible with clearly-defined maintenance and installation requirements;."

Paragraph 6.2., amend to read:

- "6.2. Specifications regarding sound levels:
- The acoustic efficiency of the NORESS or components thereof shall be verified by means of the methods described in UN Regulations ~~Nos.~~ **Numbers** 9, 41 or 63. In particular, for the application of this paragraph reference shall be made to the series of amendments to UN Regulation No. 92 which was in force at the time of type approval of the new vehicle. When the NORESS or its components is fitted to the vehicle described in paragraph 3.3. (c), the sound level values obtained using the two methods (stationary and vehicle in motion) shall satisfy the following condition:
- They shall not exceed **either of** the values measured in conformity with the requirements of paragraph 3.3.(c), for the same vehicle when fitted with the original silencing system during the test with the vehicle in motion and ~~and~~ **during** the stationary test. "

Paragraph 6.3.1., amend to read:

- "6.3.1. Tampering protection provisions

~~The NORESS or its components shall be constructed in a way that does not permit removal of baffles, exit cones and other parts whose primary function is as part of the silencing/expansion chambers. Where incorporation of such a part is unavoidable, its method of attachment shall be such that removal is not facilitated (e.g. with conventional threaded fixings) and shall also be attached such that removal causes permanent / irrecoverable damage to the assembly.~~ **The NORESS and its components shall be designed and constructed considering tamper proofing measures. This is to prevent components that contribute to sound attenuation from being removed or rendered ineffective. Any tampering event shall cause irrecoverable damage to the assembly.**

Software of the NORESS (if any) shall be designed and programmed considering tamper proofing measures.

At the request of the type-approval authority or its technical service, the manufacturer of the NORESS shall describe the tamper proofing measures applied and demonstrate their practical effectiveness.

Compliance with those anti-tampering provisions shall be ensured in any case. It does not depend on the year of production of the vehicle nor on the noise regulation under which the type-approval of the vehicle for which the NORESS was designed was granted. Recommendation to comply with the anti-tampering provisions is provided in Annex 5. For the assessment of designs and constructions that are not listed in this annex, the general principles of this annex still apply. "

Paragraph 6.3.4.3., amend to read:

"6.3.4.3. The ASEP tests regarding 6.3.4.2. ~~hasve~~ to be done in comparison on a vehicle, which is equipped with the original exhaust silencer and the NORESS (back-to-back-test). The ASEP tests, of the vehicle equipped with the original exhaust silencer, have to be done in normal operation mode for road use of the based sound emission approval of the vehicle. These test results build only the base of comparison with the ASEP test results of the NORESS equipped vehicle.

During these tests, the sound-pressure level of the NORESS for each test condition can have in its maximum the same sound-pressure level as the measurement of the vehicle equipped with the original exhaust silencer in its approved mode."

Paragraph 6.3.4.9.1., amend to read:

"6.3.4.9.1. The additional documentation package required by paragraph 6.3.4.8. enabling the approval authority to evaluate the sound emission control strategy or strategies to ensure the correct operation of the NORESS. ~~It~~ shall be made available in the two following parts:

- (a) the 'formal additional documentation package' that may be made available to interested parties upon request;
- (b) the 'extended additional documentation package' that shall remain strictly confidential. "

Paragraphs 12.1., 12.2., 12.3. and 12.4., amend to read:

"12.1. As from the official date of entry into force of **Supplement 1 to the 02 series of amendments** to this Regulation, no Contracting Party applying this Regulation shall refuse to grant or refuse to accept type approvals under the Supplement 1 to the 02 series of amendments to this Regulation.

12.2. As from 12 months after the date of entry into force, Contracting Parties applying this Regulation shall grant approvals only if the type of component or separate technical unit to be approved meets the requirements of **Supplement 1 to the 02 series of amendments** to this Regulation.

- 12.3. As from 24 months after the date of entry into force, Contracting Parties applying this Regulation shall grant extensions to existing approvals only if the type of component or separate technical unit to be approved meets the requirements of **Supplement 1 to the 02 series of amendments** to this Regulation.
- 12.4. Even after the entry into force of **Supplement 1 to the 02 series of amendments** to this Regulation, approvals of the components and separate technical units to the preceding series of amendments to the UN Regulation shall remain valid and Contracting Parties applying this Regulation shall continue to accept them."

Annex 1, items 16.1., 16.2., 16.3. and 16.4., amend to read:

- "16.1. Wide-open-throttle test result L_{wot} : **dB(A)**"
- "16.2. Constant speed test results L_{crs} : **dB(A)**"
- "16.3. Partial power factor k_p : **dB(A)**"
- "16.4. Final test result L_{urban} : **dB(A)**"

Annex 3, paragraph 4, amend to read:

- "4. Before the system is tested in accordance with paragraph 6.2. of this UN Regulation it shall be put into a normal state for road use by one of the conditioning methods in accordance with and as described in paragraph 5.1.4. of Annex 3 of UN Regulations ~~Nos~~**Numbers** 9 or 63 or in paragraph 1.3. of Annex 5 of UN Regulation ~~Number~~**er** 41, whatever is applicable."

Add a new Annex 5 to read:

"Annex 5

Recommendation to comply with the anti-tampering provisions

(See paragraph 6.3.1. of this Regulation)

1. Introduction

This Annex is a recommendation to be considered: manufacturers should either comply with it or justify why they use alternative solutions to reach the same objective.

This Annex:

- **provides support to interpret the definitions where anti-tampering of exhaust silencing systems is concerned,**
- **provides guidance and lists good practices for existing NORESS designs, constructions and manufacturing methods.**

This Annex is based on construction methods that are commonly used to date (2024) and does not claim to be complete. For the assessment of designs and constructions not listed in this Annex, the general principles of 3.1. still apply.

2. Interpretation of the definitions

2.1. Definition of "tamper proofing"

Paragraph 2.12. of this UN Regulation reads:

"Tamper proofing" means the activity:

- **to hinder and deter unlawful modifications, and**

- to ease the detection of unlawful modifications.

Tamper proofing presupposes the existence of a tamper proofing design.

A tamper proofing design refers to a design that specifies the tamper proofing measures that the NORESS manufacturer will set to comply with this regulation.

The tamper proofing design shall be part of an integrated design of the complete NORESS.

The effectiveness of the design to meet the anti-tampering requirements is part of the product validation (for example, ISO 9001:2015, clause 8.3). To confirm the effectiveness of the design, or to identify the need for further optimization, the NORESS shall be evaluated, in line with ISO 9001:2015, clause 8.5 or comparable quality systems.

Unlawful modification

In the context of this regulation, an unlawful modification is any deliberate action that makes the exhaust silencing system less effective or puts it in a shape or condition which is not any more compliant with the approved type.

The deterioration by intended use of the vehicle is not deemed to be “unlawful”.

2.2. Definition of “irrecoverable damage”

Paragraph 2.14. of this Regulation reads:

“Irrecoverable damage (related to tampering exhaust silencing systems)” means damage that is permanent evidence of a tampering event.

Permanent evidence

- permanent evidence for hardware is easily visible damage to parts of the silencer system that cannot be erased with general tools
 - General tools are standard tools that are available in general tool shops, like standard hex and torx wrenches, screwdrivers, pliers and other hand tools.
- permanent evidence for software change (if used) of the NORESS must be easily detectable.

3. Guidance for the implementation of requirements

Paragraph 6.3.1. of this Regulation reads:

Tampering protection provisions:

The NORESS and its components shall be designed and constructed considering tamper proofing measures. This is to prevent components that contribute to sound attenuation from being removed or rendered ineffective. Any tampering event shall cause irrecoverable damage to the assembly.

Software of the NORESS (if any) shall be designed and programmed considering tamper proofing measures.

At the request of the type-approval authority or its technical service, the manufacturer of the NORESS shall describe the tamper proofing measures applied and demonstrate their practical effectiveness.

3.1. General Principles

3.1.1. Manufacturers of exhaust silencing systems shall apply tamper proofing measures to avoid impairment of NORESS integrity.

- 3.1.2.** The performance of the NORESS shall not be capable of being modified into a state that does not conform to the type approval by end-consumers without applying extensive effort (e.g. grinding, welding, milling).
- 3.1.3.** Unlawful modifications shall be easily detectable.
- 3.2.** Good practices for components of the NORESS whose main function is to contribute to the sound attenuation performance
- 3.2.1.** Welding is considered a primary tamper proofing construction method for metals and alloys.
- 3.2.2.** Possible tamper-proofing attachment methods:
- (a) welding of a sufficient perimeter to avoid removals
 - (b) permanent gluing of a sufficient perimeter to avoid removals
 - (c) use of sufficient and expedient stainless-steel rivets
- 3.2.3.** The following attachment methods are in any case deemed insufficient:
- (a) threaded fixing
 - (b) aluminium rivets
 - (c) circlips
 - (d) conventional fasteners
- 3.2.4.** Possible attachment points:
- (a) the exhaust casing
 - (b) the exhaust pipe in the exhaust silencing system
 - (c) the exit cone only when the two following conditions are satisfied:
 - the exist cone is a fixed part of the exhaust silencing system, and
 - the exit cone does not allow the removal of any of its parts.
- 3.3.** Good practices for components of the NORESS that do not contribute to the sound attenuation performance
- 3.3.1.** Cosmetic end caps may be attached with conventional fasteners if:
- (a) the removal of the end cap does not facilitate removal of baffles or other attenuation devices, and
 - (b) the cosmetic end caps are not part of the silencing or expansion chambers.
- 3.4.** Good practices for software of the NORESS (if any)
- 3.4.1.** Possible tamper proofing methods for software:
- (a) use of a sealed control box that shows signs of opening when software is changed
 - (b) protection of the interfaces to update software
 - via access control measures
 - via the logging of version management (to compare the last safe date with the initial software version safe date)."

II. Justification

1. Paragraph 6.3.1. is intended to prevent tampering with NORESS and therefore protect people against excessive and illegal noise. For this reason, paragraph 6.3.1. is expanded and supported by Annex 5 that provides guidance and lists good practices based on acceptable anti-tampering measures in 2024. Definitions 2.8. to 2.14. are added, along with new transitional provisions in paragraphs 12.1. to 12.4.
2. The reference to a specific date (2024) will serve as a reminder of the need to update the Annex on a regular basis as new technologies emerge.
3. This proposal aims at remaining technologically neutral.
4. In paragraphs 3.2.(a), 3.3.(b), 4.1.(a), 4.6., 5.2., 5.6., 6.1.(b), 6.1.(h), 6.2., 6.3.4.3., 6.3.4.9.1., Annex 1 (paragraphs 16.1., 16.2., 16.3. and 16.4.) and in Annex 3, paragraph 4. corrections were done, without any influence on the intention of the paragraphs.
