

## Proposal for a new series of amendments to UN Regulation No. 41 (Noise of L<sub>3</sub> category of vehicles)

The text reproduced here below was prepared by the expert from the International Motorcycle Manufacturers Association (IMMA) to amend the ASEP requirements of Regulation No. 41. The modifications to Regulation No. 41 are marked in bold for new or strikethrough for deleted characters.

### I. Proposal

*Paragraph 2.13*, amend to read:

2.13. Following is a table containing all symbols used in this Regulation:

<i>Symbol</i>	<i>Units</i>	<i>Explanation</i>	<i>Reference</i>
AA'	–	virtual line on the test track	Annex 4 – Figure 1
a <sub>wot</sub>	m/s <sup>2</sup>	calculated acceleration	Annex 3 – 1.4.2.
a <sub>wot,ref</sub>	m/s <sup>2</sup>	prescribed reference acceleration	Annex 3 – 1.3.3.3.1.2.
a <sub>urban</sub>	m/s <sup>2</sup>	prescribed target acceleration	Annex 3 – 1.3.3.3.1.2.
BB'	–	virtual line on the test track	Annex 4 – Figure 1
CC'	–	virtual line on the test track	Annex 4 – Figure 1
k	–	gear weighting factor	Annex 3 – 1.4.3.
k <sub>p</sub>	–	partial power factor	Annex 3 – 1.4.4.
L	dB(A)	sound pressure level	Annex 3 – 1.4.1.
L <sub>wot(i)</sub>	dB(A)	L at wot condition	Annex 3 – 1.4.6.
<b>L<sub>ASEP</sub></b>	<b>dB(A)</b>	<b>L at ASEP additional operating conditions</b>	<b>Annex 7 – 3.3.3.1.1.</b>
l <sub>PA</sub>	m	pre-acceleration length	Annex 3 – 1.3.3.1.1.
m <sub>kerb</sub>	kg	kerb mass of the vehicle	2.6.
m <sub>t</sub>	kg	test mass of the vehicle	Annex 3 – 1.3.2.2.
n	min <sup>-1</sup>	engine speed	
n <sub>PP'</sub>	min <sup>-1</sup>	engine speed at PP'	Annex 7 – 2.6.
n <sub>idle</sub>	min <sup>-1</sup>	engine speed at idle	–
n <sub>wot(i)</sub>	min <sup>-1</sup>	n <sub>PP'</sub> measured at L <sub>wot(i)</sub> detection	Annex 7 – 2.6.
PP'	–	virtual line on the test track	Annex 4 – Figure 1
PMR	–	power-to-mass ratio index	2.9.
P <sub>n</sub>	kW	rated maximum net power	2.7.

<i>Symbol</i>	<i>Units</i>	<i>Explanation</i>	<i>Reference</i>
S	min <sup>-1</sup>	rated engine speed	2.8.
v	km/h	measured vehicle speed	–
V <sub>max</sub>	km/h	maximum speed	2.10.
V <sub>test</sub>	km/h	prescribed test speed	Annex 3 – 1.3.3.1.1.

The following indices are used for engine speeds "n" and vehicle speeds "v" to indicate the location or rather time of the measurement:

- (a) AA' denoting that the measurement corresponds to the point in time when the front of the vehicle passes the line AA' (see Annex 4 – Figure 1); or
- (b) PP' denoting that the measurement corresponds to the point in time when the front of the vehicle passes the line PP' (see Annex 4 – Figure 1); or
- (c) BB' denoting that the measurement corresponds to the point in time when the rear of the vehicle passes the line BB' (see Annex 4 – Figure 1).

The following indices are used for calculated full throttle accelerations  $a_{wot}$  and measured sound pressure levels L to indicate the gear used for the test:

- (a) "(i)" denoting, in the case of a two-gear test, the lower gear (i.e. the gear with the higher gear transmission ratio) and otherwise referring to the single test gear or gear selector position used; or
- (b) "(i + 1)" denoting, in the case of a two-gear test, the higher gear (i.e. the gear with the lower gear transmission ratio).

Measured sound pressure levels L also carry an index indicating the type of the respective test:

- (a) "Wot" denoting a full throttle acceleration test (see paragraph 1.3.3.1.1. of Annex 3); or
- (b) "CRS" denoting a constant speed test (see paragraph 1.3.3.2. of Annex 3); or
- (c) "Urban" denoting a weighted combination of a constant speed test and a full throttle acceleration test (see paragraph 1.4.6.2. of Annex 3).

The index "j" referring to the number of the test run can be used in addition to the indices mentioned above.

*Paragraph 3.5.*, amend to read:

3.5. A test report from the Technical Service conducting the type approval test shall be submitted to the Type Approval Authority. This test report shall at least include the following information:

- (a) Details of the test site (e.g. surface temperature, absorption coefficient, etc.), test site location, site orientation and weather conditions including wind speed and air temperature, direction, barometric pressure, humidity;
- (b) The type of measuring equipment including the windscreen;
- (c) The A-weighted sound pressure level typical of the background noise;

- (d) The identification of the vehicle, its engine, its transmission system, including available transmission ratios, size and type of tyres, tyre pressure, type approval number of the tyres (if available) or tyre manufacturer and commercial description of the tyres (i.e. trade name, speed index, load index), rated maximum net power, test mass, power to mass ratio index,  $a_{wot\ ref}$ ,  $a_{urban}$ , vehicle length;
- (e) The transmission gears or gear ratios used during the test;
- (f) **For tests according to Annex 3 of this regulation and for the reference points tests of Annex 7 paragraph 3.2.** The vehicle speed and engine speed at the beginning of the period of acceleration and the location of the beginning of the acceleration per gear used;
- (g) **For tests according to Annex 3 of this regulation and according to the reference points test of Annex 7 paragraph 3.2.** The vehicle speed and engine speed at PP' and at the end of the acceleration per valid measurement;
- (h) **For tests according to Annex 7, paragraph 3.3. the vehicle speed and the engine speed at lines AA', PP' and BB';**
- (i) **For tests according to Annex 7, point 3.3. the approach condition to line AA' (acceleration, deceleration or constant speed) and the prescribed throttle control position (in % of throttle control opening) between lines AA' and BB';**  

**Note: This is a description of the prescribed throttle control operation. The actual throttle control operation during a test run will not be recorded but assessed by observation only;**
- ~~(h)~~(j) The method used for calculation of the acceleration;
- ~~(i)~~(k) The intermediate measurement results  $a_{wot(i)}$ ,  $a_{wot(i+1)}$ ,  $L_{wot(i)}$ ,  $L_{wot(i+1)}$ ,  $L_{crs(i)}$  and  $L_{crs(i+1)}$ , if applicable;
- ~~(j)~~(l) The weighting factors  $k$  and  $k_p$  and the final measurement results  $L_{wot}$ ,  $L_{crs}$ , ~~and~~  $L_{urban}$  **and**  $L_{ASEP}$ ;
- ~~(k)~~(m) The auxiliary equipment of the vehicle, where appropriate, and its operating conditions;
- ~~(l)~~(n) All valid A-weighted sound pressure level values measured for each test, listed according to the side of the vehicle and the direction of the vehicle movement on the test site; and
- ~~(m)~~(o) All relevant information necessary to obtain the different sound emission levels.

Paragraph 6.3.2., amend to read:

- 6.3.2. The vehicle type to be approved shall meet the requirements of Annex 7 to this Regulation. If the motor cycle has user selectable software programs or modes which affect the sound emission of the vehicle, all these modes shall be in compliance with the requirements in Annex 7. ~~Testing shall be based on the worst case scenario.~~

Paragraph 12, Transitional Provisions, amend to read:

- 12.10. As from the date of entry into force of the 05 series of amendments, Contracting Parties are entitled to issue a UN type approval in accordance with the amended UN Regulation and as from which Contracting Parties are obliged to accept such type approvals.**

**12.11. As from 1 September 2024 Contracting Parties are no longer obliged to accept UN type approvals to the 04 series of amendments which were first issued after this date.**

**12.12. As from 1 September 2025 Contracting Parties shall not be obliged to accept UN type approvals issued pursuant to the 04 series of amendments, regardless of the date of issue.’**

*Annex 1, para. 18, amend to read:*

18. Additional sound emission provisions:

18.1.	<i>ASEP operating conditions</i>	<i>Reference Point (i)</i>	<i>Reference Point (ii)</i>	<i>additional operating condition 1</i>	<i>additional operating condition 2</i>	<i>additional operating condition 3</i>
18.1.1.	Selected gear number					
18.1.2.	Vehicle speeds	-	-	-	-	-
18.1.2.1.	Vehicle speed at the beginning of the period of acceleration (average of 3 runs) (km/h)			<b>n.a.</b>	<b>n.a.</b>	<b>n.a.</b>
18.1.2.2.	Pre-acceleration length (m)			<b>n.a.</b>	<b>n.a.</b>	<b>n.a.</b>
18.1.2.3.	Vehicle speed vAA’ (average of 3 runs <b>for Reference Point (i) and (ii)</b> ) (km/h)					
18.1.2.4.	Vehicle speed vPP’ (average of 3 runs <b>for Reference Points (i) and (ii)</b> ) (km/h)					
18.1.2.5.	Vehicle speed vBB’ (average of 3 runs <b>for Reference Points (i) and (ii)</b> ) (km/h)					
18.1.3.	Engine speeds	-	-	-	-	-
18.1.3.1.	Engine speed nAA’ (average of 3 runs <b>for Reference Points (i) and (ii)</b> ) (min <sup>-1</sup> )					
18.1.3.2.	Engine speed nPP’ (average of 3 runs <b>for Reference Points (i) and (ii)</b> ) (min <sup>-1</sup> )					
18.1.3.3.	Engine speed nBB’ (average of 3 runs <b>for Reference Points (i) and (ii)</b> ) (min <sup>-1</sup> )					
18.1.4.	Wide open throttle test result L <sub>wot</sub> <b>for Reference Points (i) and (ii)</b> (dB(A))			<b>n.a.</b>	<b>n.a.</b>	<b>n.a.</b>
18.1.5.	<b>max. sound pressure level L<sub>ASEP</sub> of the additional operating conditions</b>	<b>n.a.</b>	<b>n.a.</b>			
18.1.5.6.	ASEP limit					

*Annex 1, para. 19, amend to read:*

**19.5. user selectable riding modes and systems or functions with effect on either L<sub>wot(i)</sub> or L<sub>crs</sub> or L<sub>urb</sub> or L<sub>ASEP</sub>**

**19.5.1. List of user selectable riding modes and systems or functions: .....**

**19.5.2. user selectable riding mode and/or system or function used for the L<sub>urb</sub> determination according to Annex 3:.....**

**19.5.3. user selectable riding modes and/or systems or functions used for L<sub>wot</sub> and L<sub>ASEP</sub> determination according to Annex 7:.....**

Annex 3, amend to read:

1.3.3.1. General operating conditions

The path of the centreline of the vehicle shall follow the line CC' as closely as possible throughout the entire test, from the approach to line AA' until the rear of the vehicle passes line BB' +20m (see Annex 4 – Figure 1).

1.3.3.1.1. For full throttle acceleration tests the vehicle shall approach the line AA' at constant speed. When the front of the vehicle passes the line AA' the throttle control shall be shifted to the maximum throttle position as rapidly as possible and kept in this position until the rear of the vehicle passes the BB'. At this moment the throttle control shall be shifted to the idle position as rapidly as possible.

Unless specified otherwise the manufacturer may choose to use pre-acceleration in a full throttle acceleration test for the purpose of achieving a stable acceleration between the lines AA' and BB'. A test with pre-acceleration proceeds as described above except for the fact that the throttle control is shifted to the maximum throttle position already before the vehicle passes the line AA', namely when the front of the vehicle is still at a distance  $l_{PA}$ , the pre-acceleration length, from the line AA'.

The approach velocity shall be chosen such that the vehicle reaches a prescribed test speed  $v_{test}$  when its front passes the line PP'.

1.4.1. General

At least three measurements for each test condition shall be made on each side of the vehicle and for each gear.

The maximum A-weighted sound pressure level "L" indicated during each passage of the vehicle between AA' and **when the rear of the vehicle passes BB' +20m** (see Annex 4 – Figure 1) shall be reduced by 1 dB(A) to account for measurement inaccuracy and mathematically rounded to the nearest first decimal place (e.g. XX.X) for both microphone positions. If a sound peak obviously out of character with the general sound pressure level is observed, that measurement shall be discarded.

The first three valid consecutive measurement results for each test condition, within 2.0 dB(A), allowing for the deletion of non-valid results, shall be used for the calculation of the appropriate intermediate or final result.

The speed measurements at AA' ( $v_{AA'}$ ), BB' ( $v_{BB'}$ ), and PP' ( $v_{PP'}$ ) shall be mathematically rounded to the nearest first decimal place (e.g. XX.X) and noted for further calculations.

Annex 7, amend to read:

2.4. General operating conditions

~~The general operating conditions are identical to those defined in paragraph 1.3.3.1. of Annex 3 for the tests of the motor cycle in motion.~~

2.4.1. **For ASEP reference test conditions of paragraph 3.2. of this annex the general operating conditions are identical to those defined in paragraph 1.3.3.1. of Annex 3 for the tests of the motorcycle in motion.**

2.4.2. **For the additional operating conditions of paragraph 3.3. of this annex the path of the centreline of the vehicle shall follow the line CC' as closely as**

possible throughout the entire test, from the approach to line AA' until the rear of the vehicle passes line BB' +20m (see Annex 4 – Figure 1).

- 2.4.2.1.1. The vehicle shall approach the line AA' at constant speed or at variable speed according to the throttle operation which may be requested by the technical service.

The approach velocity shall be chosen as such that the vehicle reaches a prescribed test speed  $v_{test} \pm 5$  kph when its front passes the line AA'.

When the front of the vehicle passes the line AA' the throttle control shall be adjusted as rapidly as possible to a position (partial throttle, wide open throttle) or maintain present throttle control position, which may be defined by the technical service and shall be kept in this position until the rear of the vehicle passes line BB'.

When the rear of the vehicle passes line BB' the throttle control shall be shifted to the idle position as rapidly as possible.

The throttle position between lines AA' and BB' shall not result in a deceleration of the vehicle.

The throttle operation before line AA' and between lines AA' and BB' shall be defined and described in a way that it can be performed by a skilled rider who has made himself familiar with the riding characteristics of the test vehicle and that the correct execution can be assessed by observation without the necessity of technical equipment on the vehicle or at the test site other than the equipment which is required for the tests according to Annex 3.

- 2.5. ASEP control range

The requirements of this annex apply to any vehicle operation with the following restrictions:

- (a)  $v_{AA'}$  shall be at least  $\geq 10$  km/h
- (b)  $v_{BB'}$  shall not exceed 80 km/h for vehicles with  $pmr \leq 150$   
 $v_{BB'}$  shall not exceed 100 km/h for vehicles with  $pmr > 150$
- (c)  $n_{AA'}$  shall be at least  $0.1 * (S - n_{idle}) + n_{idle}$
- (d)  $n_{BB'}$  shall not exceed  
 ~~$0.85 * (S - n_{idle}) + n_{idle}$  for  $PMR \leq 66$  and~~  
 ~~$3.4 * PMR^{-0.33} * (S - n_{idle}) + n_{idle}$  for  $PMR > 66$~~

**0.8 x S**

~~Note: If the vehicle has more than one gear, the first gear shall not be used.~~

The values for the ASEP control range shall be seen as absolute values and shall not be increased or lowered by addition or subtraction of the tolerance for  $v_{test}$  as indicated in paragraph 2.4.2.1.1.

- 2.6. ASEP limits<sup>42</sup>

<sup>1</sup> It is recommended that the rider who is performing the tests is making himself familiar with the riding characteristics of the test vehicle before he performs the test runs.

The maximum noise level recorded during the passage of the motorcycle through the test track shall not exceed:

$$L_{wot,(i)} + (1 * (n_{pp'} - n_{wot,(i)}) / 1,000) + 3 \quad \text{for } n_{pp'} < n_{wot,(i)} \text{ and}$$

$$L_{wot,(i)} + (5 * (n_{pp'} - n_{wot,(i)}) / 1,000) + 3 \quad \text{for } n_{pp'} \geq n_{wot,(i)}$$

Where  $L_{wot,(i)}$  and  $n_{pp'}$  have the same meaning as in paragraph 1. of Annex 3 and  $n_{wot,(i)}$  refers to the corresponding engine speed when the front of the vehicle passes the line PP'.

**If the tests according to Annex 3 of this UN Regulation and the ASEP tests are performed with the same vehicle in immediate sequence, the values for  $L_{wot}(i)$  and  $n_{wot}(i)$  from the Annex 3 test may be used, if agreed by the type approval authority. Otherwise, when compliance with these limits is checked, values for  $L_{wot}(i)$  and  $n_{wot}(i)$  shall be newly determined by measurements as defined in paragraph 1. of Annex 3, however using the same gear (i) and the same pre-acceleration distance as during type approval.**

## 2.7. Facilities

**Due to limitations of test facilities and in respect of safety, not every test condition may be safely performed on every test facility.**

**Notwithstanding such restrictions, the type approval shall be granted on these test facilities, however the vehicle has to comply to all provisions of this Annex 7. In these cases, the vehicle manufacturer shall explain to the satisfaction of the authority present at type approval that the vehicle fulfils the requirements which could not be tested due to the restriction of the test facility.**

**Tests for Annex 7 may be carried out on different test facilities<sup>1</sup> in case of facility limitation(s). However, it is recommended to carry out all tests on one test facility and under similar environmental conditions to reduce measurement uncertainties.**

### 3.1. General

The Type Approval Authority as well as the technical service shall request tests to check the compliance of the motorcycle with the requirements of paragraph 2 above. To avoid undue work load, testing is restricted to the reference points defined in paragraph 3.2. below and ~~two~~ **[nine]** additional operating conditions

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<sup>1</sup> Tests for Annex 3 and Annex 7 may be carried out on different test facilities if documentation exists that demonstrates that the differences in sound performance are neglectable.

other than the reference points but inside the ASEP control range, as defined in paragraph 3.3.

3.2.1. Test procedure<sup>1</sup>

When the front of the vehicle reaches AA', the throttle shall be fully engaged and held fully engaged until the rear of the vehicle reaches BB'. The throttle shall then be returned as quickly as possible to the idle position. Pre-acceleration may be used if acceleration is delayed beyond AA'. The location of the start of the acceleration shall be reported.

3.2.2. Test speed and gear selection

The vehicle shall be tested at each of the following operating conditions:

- (i)  $v_{PP'} = 50 \text{ km/h}$

The selected gear (i) and pre-acceleration condition shall be the same as those used in the original type approval test of Annex 3 of this Regulation.

- (ii)  $v_{BB'}$  corresponding to

$$n_{BB'} = 0.85 * (S - n_{idle}) + n_{idle} \text{ for } PMR \leq 66; \text{ and}$$

$$n_{BB'} = 3.4 * PMR^{-0.33} * (S - n_{idle}) + n_{idle} \text{ for } PMR > 66$$

**0.8 x S**

$v_{BB'}$  shall not exceed ~~80km/h~~ **the values as specified in paragraph 2.5 (b) above.**

The selected gear shall be 2nd. If the 3rd gear satisfies requirements of  $n_{BB'}$  and  $v_{BB'}$ , 3rd shall be used. If the 4th gear satisfies requirements of  $n_{BB'}$  and  $v_{BB'}$ , 4th shall be used. **If the 5th gear satisfies requirements of  $n_{BB'}$  and  $v_{BB'}$ , 5th shall be used. If the 6th gear satisfies requirements of  $n_{BB'}$  and  $v_{BB'}$ , 6th shall be used.**

**If with 2<sup>nd</sup> gear the vehicle exceeds 80km/h for vehicles with  $pmr \leq 150$  or 100km/h for vehicles with  $pmr > 150$ , the test shall be performed in 2<sup>nd</sup> gear and a speed of 80km/h for vehicles with  $pmr \leq 150$  or 100km/h for vehicles with  $pmr > 150$  at line BB' shall be reached but not exceeded.**

**If during the test unusual riding conditions (such as apparent wheel spin or front wheel lift up) occur, the test shall be performed in the next higher gear. If in that gear  $n_{BB'} = 0,8 * S$  cannot be achieved, a speed of 80km/h for vehicles with  $pmr \leq 150$  or 100km/h for vehicles with  $pmr > 150$  at line BB' shall be reached but not exceeded.**

3.3. Additional operating conditions

3.3.1. Test procedure<sup>2</sup>

<sup>1</sup> It is recommended that the rider who is performing the tests is making himself familiar with the riding characteristics of the test vehicle before he performs the test runs.

<sup>2</sup> It is recommended that the rider who is performing the tests is making himself familiar with the riding characteristics of the test vehicle before he performs the test runs.



The vehicle shall approach the line AA' at constant speed or in acceleration or deceleration, according to the throttle operation which may be requested by the technical service.

The approach velocity shall be chosen as such that the vehicle reaches a prescribed test speed  $v_{\text{test}} \pm 5$  kph when its front passes the line AA'.

When the front of the vehicle passes the line AA' the throttle control shall be adjusted as rapidly as possible to a position (partial throttle, wide open throttle or maintain present throttle control position) which may be defined by the technical service and shall be kept in this position until the rear of the vehicle passes line BB'.

When the rear of the vehicle passes line BB' the throttle control shall be shifted to the idle position as rapidly as possible.

The throttle position between lines AA' and BB' shall not result in a deceleration of the vehicle.

The throttle operation before line AA' and between lines AA' and BB' shall be defined and described in a way that it can be performed by a skilled rider who has made himself familiar with the riding characteristics of the test vehicle and that the correct execution can be assessed by observation without the necessity of technical equipment on the vehicle or at the test site other than the equipment which is required for the tests according to Annex 3.

### 3.3.2. Test speed, gear selection and throttle operation

The test speed  $v_{\text{test}}$  may be any speed within the ASEP control range as defined in paragraph 2.5. above.

The vehicle may be tested in any of the available gears, including 1<sup>st</sup> gear.

The vehicle may be tested in any of the available user selectable software programs or modes which affect the sound emissions of the vehicle.

The throttle operation shall be in accordance with paragraph 3.3.1. of this Annex.

If the requested operating conditions lead to an unusual vehicle behaviour (i.e. front wheel lift up, apparent wheel spin, chain slap, engine lugging) or any other riding condition which may not be expected to occur when the vehicle is operated in real traffic, that measurement shall be discarded and a test run with different operating conditions shall be performed.

### 3.3.3. Data processing and reporting

The maximum A-weighted sound pressure level "L" indicated during each passage of the vehicle between AA' and when the rear of the vehicle passes BB' +20m (see Annex 4 – Figure 1) shall be reduced by 1 dB(A) to account for measurement inaccuracy and mathematically rounded to the nearest first decimal place (e.g. XX.X) for each microphone position.

If a sound peak obviously out of character with the general sound pressure level is observed, the measurement shall be discarded, and the test run shall be repeated with the same operating conditions.

**3.3.3.1. Processing of the sound pressure measurements and calculation of the final test results**

**3.3.3.1.1. for a test with two microphones at line PP' at both sides of line CC'**

$$L_{ASEP} = \text{MAX} (L_{ASEP,\text{left}}; L_{ASEP,\text{right}})$$

Where the index "left, "right" refers to the microphone position (left or right).

**3.3.3.1.2. For a test with only one microphone at line PP' on one side of line CC'**

**$L_{ASEP}$  shall be measured at that side of the vehicle where during the reference point test (i) the highest sound pressure level was recorded. If during the reference test (i) there was no clear indication if left or right side of the vehicle was dominant, the result from reference point (ii) shall be considered. If also the results of the reference point (ii) test does not clearly indicate the side of the vehicle with the highest sound pressure level, the technical service may define the vehicles' driving direction for passing the microphone.**

**The determined or defined driving direction shall be maintained for all additional ASEP test points and the side of the vehicle for which  $L_{ASEP}$  was measured shall be recorded in the test report.**

**All sound pressure levels are mathematically rounded to the nearest first decimal place (e.g. XX.X).**

**3.3.3.2. The engine speed values at AA', BB', and PP' in units of  $\text{min}^{-1}$  shall be mathematically rounded to the nearest integer for further calculations.**

**The final sound pressure levels for the additional operating conditions shall not exceed the limits specified in paragraph 2.6. above.**

## **II. Justification**

- See accompanying ppt presentation
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