21st Asia Experts Meeting on Noise (ECE R41 and R51) and Safety Glass (ECE R43)
Date: 1-2 October 2009
Place: LTO Bulwagan Edsa, East Avenue, Quezon City, Philippines

<table>
<thead>
<tr>
<th>Day 1</th>
<th>Time</th>
<th>Agenda</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>08:30- 09:00</td>
<td>Registration of Participants</td>
</tr>
<tr>
<td></td>
<td>09:00- 09:15</td>
<td>Invocation and Philippine National Anthem</td>
</tr>
<tr>
<td></td>
<td>0915- 09:30</td>
<td>Welcome Remarks - Gen. Arturo C. Lomibao, Assistant Secretary, LTO</td>
</tr>
<tr>
<td></td>
<td>09:30- 09:45</td>
<td>Message – Hon. Anneli R. Lontoc, Undersecretary for Road Transport, DOTC</td>
</tr>
<tr>
<td></td>
<td>09:45- 10:15</td>
<td>Coffee Break</td>
</tr>
<tr>
<td></td>
<td>10:15- 11:15</td>
<td>Noise Regulation: General information</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mr. Yoshihiro Shirahashi, Noise Subcommittee, JASIC</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mr. Shigeki Yonezawa, Noise Subcommittee, JASIC</td>
</tr>
<tr>
<td></td>
<td>12:15- 13:15</td>
<td>Lunch</td>
</tr>
<tr>
<td></td>
<td>13:15- 14:45</td>
<td>R51 (Noise: Motor Vehicles with 4 wheels and more): Technical Requirements</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mr. Yoshihiro Shirahashi, Noise Subcommittee, JASIC</td>
</tr>
<tr>
<td></td>
<td>14:45- 15:15</td>
<td>Coffee Break</td>
</tr>
<tr>
<td></td>
<td>15:15- 15:45</td>
<td>R41 &amp; R51: Testing Method &amp; Equipments (video)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mr. Shigeki Yonezawa, Mr. Yoshihiro Shirahashi, Noise Subcommittee, JASIC</td>
</tr>
<tr>
<td></td>
<td>15:45- 16:30</td>
<td>Q &amp; A</td>
</tr>
<tr>
<td>Day 2</td>
<td>Time</td>
<td>Agenda</td>
</tr>
<tr>
<td></td>
<td>08:30- 09:00</td>
<td>Registration</td>
</tr>
<tr>
<td></td>
<td>09:00- 09:45</td>
<td>R43: General Information</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mr. Masaru Morikawa, General Safety Subcommittee, JASIC</td>
</tr>
<tr>
<td></td>
<td>09:45 - 10:15</td>
<td>Coffee Break</td>
</tr>
<tr>
<td></td>
<td>10:15- 10:45</td>
<td>R43: Safety Glazing</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mr. Masaru Morikawa, General Safety Subcommittee, JASIC</td>
</tr>
<tr>
<td></td>
<td>10:45-11:45</td>
<td>R43: Technical requirement and Testing Method for Glass</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mr. Masaru Morikawa, General Safety Subcommittee, JASIC</td>
</tr>
<tr>
<td></td>
<td>11:45-12:15</td>
<td>Q &amp; A</td>
</tr>
<tr>
<td></td>
<td>12:15-12:30</td>
<td>Closing Remarks – Atty. Jimmy G. Pesigan, Executive Director, LTO</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lunch</td>
</tr>
</tbody>
</table>
ECE R41, R51
NOISE on motorcycles and passenger cars

Y. Shirahashi
S. Yonezawa
JASIC Noise-sub committee
General information

ECE R41, R51
NOISE on motorcycles and passenger cars

Yoshihiro Shirahashi
JASIC Noise Subcommittee
Contents

1. WP29 and GRB

2. Common Information on R41/R51
   1) Vehicle categories
   2) Histories
   3) Application
   4) Approval
   5) Marking
   6) COP
   7) Penalties
• ECE noise regulations are taken care by the group of UN/WP29/GRB.
Object ECE regulations of GRB

ECE R  9  Noise (Three-Wheeled Vehicles)
ECE R  28 Audible Warning Devices
ECE R  41  Noise (Motor Cycle)
ECE R  51  Noise (Motor Vehicles having at least four wheels)
ECE R  59  Replacement Silencing System
ECE R  63  Noise (Moped)
ECE R  92  Replacement Silencing System (Motor Cycle)
ECE R117  Tyres with regard to rolling sound emissions

Calendar of meeting of GRB for 2009

# 49th  16-18  February, 2009
# 50th  1-3  September, 2009

<Main Topics>

New Test Methods(R41/R51) are being drafted considering the Urban driving conditions
WP29/GRB discussed on a issue what a reason why sufficient effect in reduction of traffic noise is not shown however noise limit value for new vehicle was reduced.

EU commission also point out this issue in their directive 2007/34/EC, it mentions,

Since the entry into force of Directive 70/157/EEC of 6 February 1970, the noise limits for motor vehicles have been reduced several times, most recently in 1995. The last reduction (R41/03, R51/02) did not have the expected effects and subsequent studies have shown that the measurement method no longer reflects the real life driving behavior.

It is therefore necessary to introduce a new test cycle and bring the driving conditions for carrying out the noise test closer into line with real life driving operations. The new test cycle is contained in UN/ECE Regulation No 51, 02 series of amendments (3).
Typical Driving Behaviour of a Passenger Car in Urban Traffic

Statistical Background for a New Test Procedure
Driving Conditions in Urban Traffic
PROPOSAL FOR SUPPLEMENT 4 TO THE 02 SERIES OF AMENDMENTS TO REGULATION No. 51
(Noise emissions)
Transmitted by the representative of the European Community (EC)

Note: The text reproduced below was prepared by the representative of the EC with a view to introduce an additional test method for noise of motor vehicles which is intended to reproduce the noise levels generated by vehicles during normal driving in urban traffic.

This document is an alternative proposal to ECE/TRANS/WP.29/2006/4.
This document is a working document circulated for discussion and comments.
The use of this document for other purposes is the entire responsibility of the user.

Documents are also available via the INTERNET: http://www.unece.org/trans/main/welcwp29.htm

The list of Contents,
Annex 3, amended to read:
“Annex 3 - Methods and instruments for measuring the noise made by motor vehicles
(Measurement Method A)

Insert new Annexes 9 and 10, to read:
"Annex 9 - Vehicle Test Data pursuant to Measurement Method B
Annex 10 - Methods and instruments for measuring the noise made by motor vehicles
(Measurement Method B)"
1. WP29 and GRB

2. Common Information on R41/R51
   1) Vehicle categories
   2) Histories
   3) Application
   4) Approval
   5) Marking
   6) COP
   7) Penalties
# 2-1) Vehicle categories

## (1) Motorcycles and Tricycles

<table>
<thead>
<tr>
<th></th>
<th>L1</th>
<th>L2</th>
<th>L3</th>
<th>L4</th>
<th>L5</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of wheels</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Asymmetrical</td>
<td>Symmetrical</td>
</tr>
<tr>
<td>Seating capacity</td>
<td></td>
<td></td>
<td></td>
<td>N.A.</td>
<td></td>
</tr>
<tr>
<td>Vehicle mass</td>
<td></td>
<td></td>
<td></td>
<td>N.A.</td>
<td></td>
</tr>
<tr>
<td>Eng. displacement</td>
<td></td>
<td>≤50cm³</td>
<td></td>
<td>&gt;50cm³</td>
<td></td>
</tr>
<tr>
<td>Type of body</td>
<td></td>
<td></td>
<td></td>
<td>N.A.</td>
<td></td>
</tr>
<tr>
<td>Other criteria</td>
<td></td>
<td></td>
<td>Max.speed≤50kmh</td>
<td>Max.speed&gt;50kmh</td>
<td></td>
</tr>
<tr>
<td>Applied noise</td>
<td>R63</td>
<td>R9</td>
<td>R41-03</td>
<td>R9</td>
<td>regulation</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The **CLASSIFICATION OF VEHICLES** is specified by the Annex 4.
(2) Passenger cars:
**CATEGORY M** - POWER-DRIVEN VEHICLES HAVING AT LEAST FOUR WHEELS AND USED FOR THE CARRIAGE OF PASSENGERS

<table>
<thead>
<tr>
<th></th>
<th>M1</th>
<th>M2</th>
<th>M3</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of wheels</td>
<td></td>
<td>4≤</td>
<td></td>
</tr>
<tr>
<td>Seating capacity</td>
<td>≤9</td>
<td>9&lt;</td>
<td>9&lt;</td>
</tr>
<tr>
<td>Vehicle mass</td>
<td>N.A.</td>
<td>GVM(*) ≤ 5 tons</td>
<td>5 tons &lt; GVM</td>
</tr>
<tr>
<td>Applied noise regulation</td>
<td></td>
<td></td>
<td>R51-02</td>
</tr>
</tbody>
</table>

(*)GVM : Gross Vehicle Mass
2-1) Vehicle categories

(3) Trucks:

**CATEGORY N:**
POWER-DRIVEN VEHICLES HAVING AT LEAST FOUR WHEELS AND USED FOR THE CARRIAGE OF GOODS

<table>
<thead>
<tr>
<th></th>
<th>N1</th>
<th>N2</th>
<th>N3</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of wheels</td>
<td></td>
<td>4≤</td>
<td></td>
</tr>
<tr>
<td>Seating capacity</td>
<td></td>
<td>N.A.</td>
<td></td>
</tr>
<tr>
<td>Vehicle mass</td>
<td>GVM ≤ 3.5 ton</td>
<td>3.5 &lt; GVM ≤ 12 ton</td>
<td>12 ton &lt; GVM</td>
</tr>
<tr>
<td>Applied noise regulation</td>
<td></td>
<td></td>
<td>R51-02</td>
</tr>
</tbody>
</table>
## 2-2) Histories

### (1) R41

<table>
<thead>
<tr>
<th>Series</th>
<th>R41</th>
<th>R41-01</th>
<th>R41-02</th>
<th>R41-03</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date of entry into force</td>
<td>Jun 1, 1980</td>
<td>July 24, 1984</td>
<td>Apr. 1, 1994</td>
<td>Feb 5 2000</td>
</tr>
<tr>
<td>Limit value</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>86 (&lt;500cc)</td>
<td>83 (&lt;175cc)</td>
<td>80 (&lt;175cc)</td>
<td>80 (&lt;175cc)</td>
</tr>
<tr>
<td></td>
<td>85 (350≤500cc)</td>
<td>80 (80≤175cc)</td>
<td>77 (80≤175cc)</td>
<td>77 (80≤175cc)</td>
</tr>
<tr>
<td></td>
<td>83 (175≤350cc)</td>
<td>77 (≤80)</td>
<td>75 (≤80)</td>
<td>75 (≤80)</td>
</tr>
<tr>
<td>Updated contents</td>
<td></td>
<td>+ Over-run(*) provision</td>
<td>+ Durability requirement for silencer using fibrous materials</td>
<td>+ ISO road surface</td>
</tr>
<tr>
<td></td>
<td></td>
<td>+ Transitional provisions</td>
<td>+ Providing stationary noise information on vehicle</td>
<td>+ Back ground noise coefficient</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Classification</td>
<td>• Engine speed of stationary noise test</td>
<td>+ “E” Marking on silencing systems</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Gear choice</td>
<td></td>
<td>• Value calculation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Approach speed</td>
<td></td>
<td>• Over-run provision</td>
</tr>
</tbody>
</table>

(*)Over-run means the engine speed at the exit of acceleration area exceeding defined value.

[Table shows the dates of entry into force and limit values for different series of R41, along with updated contents including changes and additions.]
### 2-2) History

#### (2) R51

<table>
<thead>
<tr>
<th>Series</th>
<th>Date of entry into force</th>
<th>Limit value M1 [dB(A)]</th>
<th>Limit value N3 (&gt;150kW) [dB(A)]</th>
<th>Updated contents</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>[dB(A)]</td>
<td>[dB(A)]</td>
<td></td>
</tr>
<tr>
<td>R51-00</td>
<td>July 15. 1982</td>
<td>80</td>
<td>88</td>
<td></td>
</tr>
<tr>
<td>R51-01</td>
<td>Apr 27. 1988</td>
<td>77</td>
<td>84</td>
<td>+ Durability requirement for silencer using fibrous materials</td>
</tr>
<tr>
<td>R51-02</td>
<td>Apr 18. 2005</td>
<td>74</td>
<td>80</td>
<td>+ ISO road surface</td>
</tr>
</tbody>
</table>

- Test method
- Over-run provision
- In case of the category other than M1 and having >225kW engine
- Difference between calibrations on before and after measurements; +/-0.5dB
- Tolerance of approach speed; +/-1km/h
- Environmental condition:
  - Air temp: 0〜40℃
  - Wind speed < 5m/s

**Updated contents**
- ; Modified
+ ; Added

**Series**
- R51-00
- R51-01
- R51-02

**Date of entry into force**
- July 15. 1982
- Apr 27. 1988
- Apr 18. 2005

**Limit value**
- M1: [dB(A)] 80
- M1: [dB(A)] 77
- M1: [dB(A)] 74
- N3 (>150kW): [dB(A)] 88
- N3 (>150kW): [dB(A)] 84
- N3 (>150kW): [dB(A)] 80
REGULATION
1. Scope
2. Definitions
3. Application for approval
4. Markings
5. Approval
6. Specifications
7. Modification and extension of the approval of the motorcycle type or the type of exhaust or silencing system(s)
8. Conformity of Production
9. Penalties for non-conformity of production
10. Production definitely discontinued
11. Names and addresses of technical services responsible for conducting approval tests, and of administrative departments
12. Transitional provisions

ANNEXES
Annex 1-Communication concerning the approval or extension or refusal or withdrawal of approval of production definitely discontinued of a motor cycle type with regard to noise emitted by motor cycles pursuant to Regulation No. 41
Annex 2-Arrangements of approval marks
Annex 3-Methods and instruments for measuring the noise made by motor cycles
Annex 4-Test track specifications
Annex 5-Exhaust system (silencer)
Annex 6-Maximum limits of sound level (new motor cycles)
REGULATION
1. Scope
2. Definitions
3. Application for approval
4. Markings
5. Approval
6. Specifications
7. Modification and extension of approval of a vehicle type
8. Conformity of Production
9. Penalties for non-conformity of production
10. Production definitely discontinued
11. Transitional provisions
12. Names and addresses of technical services responsible for conducting approval tests, and of administrative departments

ANNEXES
Annex 1 - Communication concerning the approval or extension or refusal or withdrawal of approval or production definitely discontinued of a vehicle type with regard to its noise emission pursuant to Regulation No.51
Annex 2 - Arrangements of the approval mark
Annex 3 - Methods and instruments for measuring the noise made by motor vehicles
Annex 4 - Classification of vehicles
Annex 5 - Exhaust systems containing fibrous materials
Annex 6 - Compressed air noise
Annex 7 - Checks on conformity of production
Annex 8 - Specifications for the test site
Overview of presentations

Application

R41/R51 Test

Procedures

Approval

Marking, Label

Penalties

COP

Common item

Individual item
3.1. The application for approval of a vehicle type with regard to noise shall be submitted by its manufacturer or by his duly accredited representative.

3.2. It shall be accompanied by the under mentioned documents and the following particulars in triplicate:

3.2.1. a description of the vehicle type with regard to the items mentioned in paragraph 2.2. above. The numbers and/or symbols identifying the engine type and the vehicle type shall be specified;

3.2.2. a list of the components, duly identified, constituting the noise reduction system;
3.2.3. a drawing of the assembled noise reduction system and an indication of its position on the vehicle;

3.2.4. detailed drawings of each component to enable it to be easily located and identified, and a specification of the materials used.

3.5. The competent authority shall verify the existence of satisfactory arrangements for ensuring effective control of the conformity of production before type approval is granted.
Annex 1: Contents to be filled in application documents are defined in a communication form.

<table>
<thead>
<tr>
<th>Serial No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Trade name or mark of the motor cycle</td>
</tr>
<tr>
<td>2.</td>
<td>Motor cycle type</td>
</tr>
<tr>
<td>3.</td>
<td>Manufacturer's name and address</td>
</tr>
<tr>
<td>4.</td>
<td>If applicable, name and address of manufacturer's representative</td>
</tr>
<tr>
<td>5.</td>
<td>Kind of engine</td>
</tr>
<tr>
<td>6.</td>
<td>Cycles: two-stroke or four-stroke (if applicable)</td>
</tr>
<tr>
<td>7.</td>
<td>Engine capacity</td>
</tr>
<tr>
<td>8.</td>
<td>Engine power (state how measured)</td>
</tr>
<tr>
<td>9.</td>
<td>Speed at which maximum power is developed (rpm)</td>
</tr>
<tr>
<td>10.</td>
<td>Number of gears</td>
</tr>
<tr>
<td>11.</td>
<td>Gear used</td>
</tr>
<tr>
<td>12.</td>
<td>Final drive ratio(s)</td>
</tr>
<tr>
<td>13.</td>
<td>Type and dimensions of tyres</td>
</tr>
<tr>
<td>14.</td>
<td>Maximum permissible gross weight</td>
</tr>
<tr>
<td>15.</td>
<td>Brief description of the silencing system</td>
</tr>
<tr>
<td>16.</td>
<td>Lead conditions of motor cycle during test</td>
</tr>
<tr>
<td>17.</td>
<td>For stationary motor cycle: location and orientation of the microphone (by reference to diagrams in Appendix to Annex 1)</td>
</tr>
<tr>
<td>18.</td>
<td>Sound levels:</td>
</tr>
<tr>
<td></td>
<td>Motor cycle in motion: ( V ) at steady speed before acceleration of ( 0 ) to ( 0 ) mph, rotation speed of the engine ( \omega ) rpm, motor cycle stationary: ( V ) at ( \omega ) with engine running at ( \omega ) rpm</td>
</tr>
<tr>
<td>19.</td>
<td>Deviations in calibration of sound level meter</td>
</tr>
<tr>
<td>20.</td>
<td>Motor cycle submitted for approval on</td>
</tr>
<tr>
<td>21.</td>
<td>Technical service responsible for conducting approval tests</td>
</tr>
<tr>
<td>22.</td>
<td>Date of report issued by that service</td>
</tr>
<tr>
<td>23.</td>
<td>Number of report issued by that service</td>
</tr>
<tr>
<td>24.</td>
<td>Approval given or withdrawn with that document</td>
</tr>
<tr>
<td>25.</td>
<td>Position of approval mark on the motor cycle</td>
</tr>
<tr>
<td>26.</td>
<td>Place</td>
</tr>
<tr>
<td>27.</td>
<td>Date</td>
</tr>
<tr>
<td>28.</td>
<td>Signatures</td>
</tr>
</tbody>
</table>

The following documents, bearing the approval number shown above, are annexed...
2-3) Application document

General information

• Trade name or mark of the vehicle
• Vehicle Type
• Name and address of vehicle manufacturer
• Engine Type
• Engine model
• Name and address of engine manufacturer
**Vehicle information**
- Maximum permissible mass
- Transmission type
- Number of gears
- Final drive ratio (For motorcycle)

**Engine information**
- Rated maximum engine power
- Kind of engine
- Cycles
- Cylinder capacity
2-3) Application document (cont’d)

**Equipments information**
- Exhaust silencer:
  Manufacturer, Model, Type: in accordance with drawing No.
- Intake silencer
  Manufacturer, Model, Type: in accordance with drawing No.
- Type and dimensions of tires

**Diagrams and plans of**
- The engine and the noise reduction system

**Photographs**
- The engine and the noise reduction system
- List of components constituting the noise reduction system.
2.5. "Noise reduction system component" means one of the individual constituent parts whose assembly constitutes the noise reduction system. These components are, in particular: the exhaust pipings, the expansion chamber(s), the silencer(s) proper.

2.5.2. Manifolds are not considered components of the noise reduction system.
Noise reduction system of motorcycle

Intake system

Intake suction noise

Intake diffusion noise

Exhaust system

Muffler Exhaust noise

Muffler diffusion noise
Overview of presentations

Application

R41/R51 Test

Procedures

Approval

Penalties

Marking, Label

COP

Common item

Individual item
2-4) **Marking (R41 / R51)**

4.1. *The components of the noise reduction system,* excluding fixing hardware and piping, *shall bear:*  
   
   4.1.1. *the trade name or mark* of the manufacturer of the noise reduction system and of its components; and  
   
   4.1.2. the manufacturer‘s trade description;  
   
   *(4.1.3, 4.1.4, 4.1.5 for R41 = see next slide)*

4.2. *These markings shall be clearly legible and be indelible even after fitting.*

4.3. A component may carry several approval numbers if it has been approved as component of several replacement silencing systems.
2-4) Marking (only for R41)

4.1.3. the approval mark and the ECE approval number according to annex 2 of the Regulation. The approval number must correspond to the number of the ECE type approval certificate issued for the type of exhaust or silencing system in question.

4.1.4. All original silencers must be bear the 'E' mark followed the identification of the country which granted the component type-approval. This reference must be legible and indelible and also visible in the position at which it is to be fitted.

4.1.5. Any packing of original replacement silencer systems must be marked legibly with the words 'original part' and the make and type references integrated together with the 'E'mark and also the reference of the country of origin.
Overview of presentations

Application

R41/R51 Test

Procedures

Approval

Marking, Label

Penalties

COP

Common item

Individual item
5.1. *If the vehicle type* submitted for approval pursuant to this Regulation *meets the requirements* of paragraph 6. and 7. below, *approval of that vehicle type shall be granted.*

5.2. *An approval number shall be assigned to each type approved.* Its first two digits (at present 02 corresponding to the 02 series of amendments which entered into force on 18 April 1995) 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 the same vehicle type* equipped with another type of noise reduction system or to another vehicle type.

5.3. *Notice of approval* or of extension or of refusal or withdrawal of approval or Of production definitely discontinued of a vehicle type pursuant to this Regulation *shall be communicated to the Parties to the Agreement applying this Regulation,* by means of a form conforming to *the model in annex 1 to this Regulation.*

(see annex 1 = next slide)
COMMUNICATION
issued by: Name of administration:

........................
........................
........................

concerning:

APPROVAL GRANTED
APPROVAL EXTENDED
APPROVAL REFUSED
APPROVAL WITHDRAWN
PRODUCTION DEFINITELY DISCONTINUED

of a vehicle type with regard to its noise emission pursuant to ECE Regulation No. 51.

Approval No.: ............................................................................................
Extension No.: ............................................................................................

2/; Strike out what does not apply.
5.4. There shall be affixed, conspicuously and in a readily accessible place specified on the approval form, to every vehicle conforming to a vehicle type approved under this Regulation an international approval mark consisting of:

5.4.1. *a circle surrounding the letter "E"* followed by the *distinguishing number of the country* which has *granted approval*;

5.4.2. the number of this Regulation, followed by the letter "R", a dash and the approval number to the right of the circle prescribed in paragraph 5.4.1.

5.5. If the vehicle conforms

5.6. The approval mark shall be clearly legible and be indelible.

5.7. The approval mark shall be placed close to or on the vehicle data plate affixed by the manufacturer.

5.8. *Annex 2* to this Regulation gives *examples of arrangements of the approval mark.*

*Let’s see Annex 2*
2/
1 for Germany, 2 for France, 3 for Italy, 4 for the Netherlands, 5 for Sweden,
6 for Belgium, 7 for Hungary, 8 for the Czech Republic, 9 for Spain,
10 for Yugoslavia, 11 for the United Kingdom, 12 for Austria, 13 for Luxembourg,
14 for Switzerland, 15 (vacant), 16 for Norway, 17 for Finland, 18 for Denmark,
19 for Romania, 20 for Poland, 21 for Portugal, 22 for the Russian Federation, 23 for Greece,
24 for Ireland, 25 for Croatia, 26 for Slovenia, 27 for Slovakia,
28 for Belarus, 29 for Estonia, 30 (vacant), 31 for Bosnia and Herzegovina,
32 for Latvia, 33 (vacant), 34 for Bulgaria, 35-36 (vacant), 37 for Turkey, 38-39 (vacant),
40 for The former Yugoslav Republic of Macedonia, 41 (vacant),
42 for the European Community (Approvals are granted by its Member States using their
respective ECE symbol),
43 for Japan, 44 (vacant), 45 for Australia, 46 for Ukraine and 47 for South Africa.

*Subsequent numbers* shall be assigned to other countries in the chronological
order in which they ratify or accede to the Agreement
Concerning the Adoption of Uniform Technical Prescriptions for Wheeled Vehicles,
Equipment and Parts which can be Fitted and/or be Used on Wheeled Vehicles
and the Conditions for Reciprocal Recognition of Approvals Granted on the Basis of
these Prescriptions, and *the numbers* thus assigned shall be communicated by the
Secretary-General of the United Nations to the Contracting Parties to the Agreement.
The above approval mark affixed to a motor cycle shows that the motor cycle type concerned has, with regard to noise, been approved in the Netherlands (E 4) pursuant to Regulation No. 41 under approval number 032439.

The approval number indicates that the approval was granted according to the requirements of Regulation No. 41 as amended by the 03 series of amendments.
The above approval mark affixed to a vehicle shows that the vehicle type concerned has, with regard to its noise emission, been approved in the Netherlands (E 4) pursuant to Regulation No. 51 under approval No.022439.

The first two digits of the approval number indicate that Regulation No. 51 already included the 02 series of amendments when the approval was granted.

< Question : What does the bellow approval mark mean? >
Overview of presentations

Application

R41/R51 Test

Procedures

Approval

Penalties

Marking, Label

COP

Common item

Individual item
Basic Concept of COP

8.1. Vehicles approved to this Regulation shall be so manufactured as to conform to the type approved by meeting the requirements set forth in paragraph 6. above.

Aim

8.2. In order to verify that the requirements of paragraph 8.1. are met, suitable controls of the production shall be carried out (by Manufacturer).
Activity

8.3. *The holder of the approval* shall in particular

8.3.1. ensure existence of procedures for the effective control of the quality of products;

8.3.2. have access to the control equipment necessary for checking the conformity of each approved type;

8.3.3. ensure that data of test results are recorded and that annexed documents shall remain available for a period to be determined in accordance with the administrative service;

8.3.4. analyze the results of each type of test, in order to verify and ensure the stability of the product characteristics making allowance for variation of an industrial production;
Activity

8.3.5. ensure that for each type of product at least the tests prescribed in annex 7 to this Regulation are carried out;

8.3.6. ensure that any sampling or test pieces giving evidence of non-conformity with the type of test considered shall give rise to another sampling and another test. All the necessary steps shall be taken to re-establish the conformity of the corresponding production.

See annex 7:
CHECKS ON CONFORMITY OF PRODUCTION
1. General
These requirements are consistent with the test to be held to check conformity of production according to paragraphs 8.3.5. and 8.4.3. of this Regulation.

2. Testing procedure
The test site and measuring instruments shall be those as described in annex 3.

3. Sampling
One vehicle has to be chosen. If after the test of paragraph 4.1. the vehicle is not considered to conform to the requirements of this Regulation, two more vehicles have to be tested.
4. Evaluation of the results

4.1. If the sound level of the vehicle tested pursuant to paragraphs 1 and 2 does not exceed by more than 1 dB (A) the limit value prescribed in paragraph 6.2.2. of this Regulation, for measurement according to paragraph 2.1. above, and in paragraph 3 of annex 6 to this Regulation, for measurement according to paragraph 2.2. above, the vehicle type shall be considered to conform to the requirements of this Regulation.

4.2. If the vehicle tested according to paragraph 4.1. does not satisfy the requirements laid down in that paragraph, two more vehicles of the same type have to be tested pursuant to paragraphs 1 and 2.
4.3. If the sound level of the second and/or third vehicle of paragraph 4.2. exceeds by more than 1 dB(A) the limit values prescribed in paragraph 6.2.2. of this Regulation, the vehicle type shall be considered not to conform to the requirements of this Regulation and **the manufacturer shall take the necessary measures to re-establish the conformity.**
Be careful:

for R41:

In order to test conformity as required above, a sample motorcycle will be taken from the production line of the type approved pursuant to this Regulation.

**Production will be regarded as conforming to the provisions** of this Regulation if the sound level measured using the method described in annex 3 **does not exceed more than 3 dB(A) the value measured at the time of type-approval,**

nor by more than 1 dB(A) the limits laid down in annex 6 of this Regulation.
8.4. **The competent authority** which has granted type-approval may at any time verify the conformity control method applicable to each production unit.

8.4.1. In every inspection **the test books and production survey records** shall be presented to the visiting inspector.

8.4.2. **The inspector** may take samples at random which will be tested in the manufacturer's laboratory. The minimum number of samples may be determined according to the results of the manufacturer's own verification.

8.4.3. When the quality level appears unsatisfactory or when it seems necessary to verify the validity of the tests carried out in application of paragraph 8.4.2. the **inspector shall select samples to be sent to the technical service** which has conducted the type approval tests.
8.4.4. The competent authority may carry out any test prescribed in this Regulation.

8.4.5. The normal frequency of inspections by the competent authority shall be one every two years.

If unsatisfactory results are recorded during one of these visits, the competent authority shall ensure that, all necessary steps are taken to re-establish the conformity of production as rapidly as possible.
9. **PENALTIES FOR NON-CONFORMITY OF PRODUCTION**

9.1. *The approval* granted in respect of a vehicle type pursuant to this Regulation *may be withdrawn* if the requirements set forth above are *not met*.

9.2. If a Contracting Party to the Agreement applying this Regulation withdraws an approval it has previously granted, *it shall forthwith so notify the other Contracting Parties* applying this Regulation, by means of *a communication form conforming* to the model in *annex 1* to this Regulation.

**Annex 1: COMMUNICATION**
COMMUNICATION
issued by: Name of administration:

concerning: 2/

APPROVAL GRANTED
APPROVAL EXTENDED
APPROVAL REFUSED
APPROVAL WITHDRAWN
PRODUCTION DEFINITELY DISCONTINUED

of a vehicle type with regard to its noise emission pursuant to ECE Regulation No. 51.

Approval No.: ..........................................................
Extension No.: ..........................................................
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R41/R51 Test

Procedures

Approval

Penalties

Marking, Label

COP

Common item

Individual item
Thank you very much for your attention
ECE R41, R51

NOISE on motorcycles and passenger cars

S. Yonezawa

JASIC Noise-sub committee
Overview of presentations

R41 test procedure

Application

Test Facilities
(Test track, Road surface, Instruments)

Setting of instruments

Preparation of Vehicle
(Fuel, Temperature, Weight, Tire air pressure, Pulsation)

Selection of vehicle
(Definition, Experience)

Correction (R41)

Evaluation
(Calculation, Deviation)

Measuring condition
(Entry speed, Choice of gear ratio)

Miscellaneous

Test (Purpose, method)

Calibration (R51:0.5dB)

Approval

Penalties

Marking, Label

COP

Common item

Individual item

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R41 test procedure

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Test Facilities
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Miscellaneous

Test (Purpose, method)

Calibration (R51:0.5dB)

Approval

Penalties

Marking, Label

COP

Common item

Individual item
Test procedures

Methods of measurement
The noise submitted for approval shall be measured by the two methods

The motorcycle in motion
The motorcycle when stationary

The two values measured shall be entered in the test report and on a form conforming to the model in Annex 1 to this Regulation.
Methods of measurement
The noise submitted for approval shall be measured by the two methods:

- The motorcycle in motion
- The motorcycle when stationary

The two values measured shall be entered in the test report and on a form conforming to the model in Annex 1 to this Regulation.

We call as

**Acceleration noise (test)**
Purpose of noise from vehicle in motion

• Aim of noise measurements of the vehicle in motion are for granting the ECE type approval for motorcycles.
Test procedures

Vehicle in motion  (Sample)
Methods of measurement
The noise submitted for approval shall be measured by the two methods:

- **The motorcycle in motion**
- **The motorcycle when stationary**

The two values measured shall be entered in the test report and on a form conforming to the model in Annex 1 to this Regulation.

We call as

**Stationary noise (test)**
Aim of stationary noise test is mentioned in UN/ECE /WP29 RE3.

1.5.1.2. Methods of measuring the sound level.

..... The test on the vehicle when stationary may usefully be taken as a reference value by technical services wishing to use this method to check vehicles in service.

........

1.5.2.2. In view of the tolerances of measuring instruments, the disturbances that may occur at the time of measurement and the scatter of measurements for vehicles of the same type, it will be necessary to allow for a margin of 5 dB(A) in comparison with the corresponding value recorded at the time of the type approval.

in use noise enforcement in national regulation level. It may be used with at least 5dB for margin.
• Example of enforcement using relative values.

**Type approval**

ABC Motor Co., LTD
Noise: 80dB / 4000rpm

See paragraph 6.1.3

**Vehicle in use**

If regulation accepts stationary noise with 5dB of a margin to the type approval value.

80dB / 4000rpm

Value ≤85dB **Accepted**

Value >85dB **Failed**
Vehicle in stationary (Sample)
Test procedures

**R41 for Motorcycles**

- Acceleration noise
- Stationary noise
Overview of presentations

Application

Test Facilities
(Test track, Road surface, Instruments)

Preparation of Vehicle
(Fuel, Temperature, Weight, Tire air pressure, Pulsation)

Calibration

Miscellaneous

Test (Purpose, method)

Calibration (R51:0.5dB)

Setting of instruments

Selection of vehicle
(Definition, Experience)

Correction (R41)

Measuring condition
(Entry speed, Choice of gear ratio)

Evaluation
(Calculation, Deviation)

Approval

Penalties

Marking, Label

COP
Test facilities

- Test track
  The acceleration section shall be level (From AA’ to BB’)
  Surface shall be dry.

ISO 10844 Road surface

Area of R=50m;
No large objects which reflect sound

NOTE --- There shall be no large acoustically reflective objects within this radius.

Key
- Minimum area covered with test road surface. i.e. test area
- Microphone [height 1.2m]
Test facilities

- Road surface


ISO surface
(maximum chipping size 8mm)

Dense asphalt concrete
(maximum chipping size 13mm)
Test facilities

- Instruments
  Minimum necessary instruments are;

For sound measurement
  Two sets of microphones and sound level meters are used for measurement of sound emitted from moving vehicle from right and left side

For vehicle speed measurement
  Two sets of sensors and indicators are used for vehicle speed measurement at entrance and exit point of test area
Test facilities

- Sound measurement

Location of the instruments shall be as figure.

Requirement of sound meter.
- According to IEC standards.
- "FAST" response
- "A" weighting

Maximum sound level during acceleration shall be measured. (e.g. Using peak hold or using a level recorder)
Test facilities

- Vehicle speed measurement
  Location of instruments is not mentioned in R41. This figure shows location based on actual usage.

For confirmation of provision with regard to gear selection.

Exit vehicle speed at sound measurement is not compulsory.

Accuracy of vehicle speed measurement: +/- 3%
Overview of presentations

Application

Test Facilities
(Test track, Road surface, Instruments)

Preparation of Vehicle
(Fuel, Temperature, Weight, Tire air pressure, Pulsation)

Calibration

Miscellaneous

Test (Purpose, method)

Calibration (R51:0.5dB)

Setting of instruments

Selection of vehicle
(Definition, Experience)

Correction (R41)

Measuring condition
(Entry speed, Choice of gear ratio)

Evaluation
(Calculation, Deviation)

Approval

Marking, Label

Penalties

COP

Common item

Individual item
Selection of vehicle

• Definitions

1. **Type of motorcycle** as regards its sound level and exhaust system:

   **Type of engine**
   - Engine cycle (two-stroke or four-stroke)
   - Reciprocating piston engine or rotary-piston engine
   - number and capacity of cylinders
   - number and type of carburetors or injection systems
   - arrangement of valves
   - Net maximum power and corresponding speed : (S)

   **Transmission systems**
   - Number and ratios of gears

   **Exhaust or silencing systems**
   - Number, type and arrangement of exhaust system (s)
Selection of vehicle

2. Exhaust or silencing system(s)
   - Factory or trade marks
   - Materials of different
   - Different shape or size
   - Operating principles
   - Different combinations.

3. Exhaust or silencing system (s) component
   - Exhaust pipe work,
   - Silencer proper
   - Intake system (air filter) if any.
# Selection of vehicle

<table>
<thead>
<tr>
<th>Item</th>
<th>Contents</th>
<th>Variation to be tested</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine</td>
<td>Type</td>
<td>(See definition)</td>
</tr>
<tr>
<td>Transmission</td>
<td>Number and ratios of gears</td>
<td>Each type</td>
</tr>
<tr>
<td>Exhaust or Silencing</td>
<td>Number, type and arrangement</td>
<td></td>
</tr>
<tr>
<td>Gear ratio</td>
<td>Transmission Gear ratio, reduction gear ratio and tire diameter</td>
<td>Lowest (Selection of the worst case)</td>
</tr>
<tr>
<td>Vehicle mass</td>
<td>Curb mass</td>
<td></td>
</tr>
<tr>
<td>Other part</td>
<td>Not related with noise (i.e. Brakes, Lamps, Name of tire etc.)</td>
<td>No need to be considered for vehicle selection</td>
</tr>
</tbody>
</table>
## Selection of vehicle

### New type approval

<table>
<thead>
<tr>
<th>Vehicle type</th>
<th>Specification</th>
<th>T: Tested</th>
<th>O: Omitted</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Carburetor 5 M/T 190kg</td>
<td>T</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>Fuel injection 6 M/T 195kg</td>
<td>T</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>Fuel injection 6 M/T ABS 200kg</td>
<td>O</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>Same as type B With different Manufacture’s tire.</td>
<td>N/A</td>
<td></td>
</tr>
</tbody>
</table>

### Extension type approval

<table>
<thead>
<tr>
<th>Vehicle type</th>
<th>Specification</th>
<th>T: Tested</th>
<th>O: Omitted</th>
</tr>
</thead>
<tbody>
<tr>
<td>A'</td>
<td>Carburetor 5 M/T 190kg</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Modification of Brake system</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B'</td>
<td>Fuel injection 6 M/T 192kg</td>
<td>T</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Modification of lighting devices</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Motorcycle shall be in **running order**, including

- Coolant
- Fuel
- Spare wheel
- Oils
- Tool
- a Rider

Motorcycle engine shall be brought to the **normal operating temperature**.

Fans with an automatic actuating mechanism shall not be interfered with the sound measurements.

More than one driven wheel, only the drive provided for normal road operation may be used.

Sidecar must be removed.
Motorcycle equip exhaust silencer with fibrous absorbent material. Before the system is tested in accordance with Annex 3, it must be put into a normal state for road use by one of the following condition methods:

- **CONDITIONING BY CONTINUOUS ROAD OPERATION**
  4000 ~ 8000km running

- **CONDITIONING ON A TEST BENCH**
  6 ~ 12 cycles  *Conditioning cycle ; 2.5hours, consisted from 6 phases

- **CONDITIONING BY PULSATION**
  Simulate normal state for road use increasing and release exhaust back pressure for 2500 times.

To simulate damage of fibrous absorbent material in actual usage on road.
Preparation of vehicle

• CONDITIONING BY PULSATION

Exhaust outlet of the vehicle set on the test bench shall be connected to the inlet of test equipment without any leakage.
• CONDITIONING BY PULSATION
Vehicle set on the test bench should be operated under following engine speed and Engine load entire conditioning.

Engine speed must be 75 % of S(*).

The power indicated by the dynamometer must be 50 per cent of the full-throttle power measured at 75% of S.

(*)S ; The engine speed at which the engine develops maximum power
Preparation of vehicle

• CONDITIONING BY PULSATION

Back pressure should reach to 0.35 ~ 0.40 bar (or 90% of maximum (100%=Engine stop)) with closing and opening the valve.

This cycle should be repeated 2500 times. All of the conditioning cycle shall finish within 48 hours.
Overview of presentations

- Application
- Test Facilities (Test track, Road surface, Instruments)
- Selection of vehicle (Definition, Experience)
- Setting of instruments
- Preparation of Vehicle (Fuel, Temperature, Weight, Tire air pressure, Pulsation)
- Correction (R41)
- Measuring condition (Entry speed, Choice of gear ratio)
- Evaluation (Calculation, Deviation)
- Test (Purpose, method)
- Measuring condition
- Calibration (R51:0.5dB)
- Correction
- Evaluation
- Miscellaneous
- Approval
- Marking, Label
- Penalties
- COP
Calibration

• At the **beginning and end of each series of measurements** the sound level meter shall be calibrated in accordance with the manufacturer's instructions, using an appropriate sound source (e.g. **piston phone**).
Overview of presentations

Application

Test Facilities (Test track, Road surface, Instruments)

Preparation of Vehicle (Fuel, Temperature, Weight, Tire air pressure, Pulsation)

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Miscellaneous

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Correction (R41)

Measuring condition (Entry speed, Choice of gear ratio)

Evaluation (Calculation, Deviation)

Penalties

COP
Measurements shall not be made in poor atmospheric conditions. It shall be ensured that the results are not affected by gusts of wind.

Ambient noise shall be **at least 10 dB(A) below the sound level** produced by the motorcycle.

If the **difference between the ambient Noise and the measured noise is Between 10 and 16 dB(A)**, in order to calculate the test results the appropriate correction shall be subtracted from the readings on the sound-level meter, as in the following graph:
Overview of presentations

Application

Test Facilities
(Test track, Road surface, Instruments)

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(Fuel, Temperature, Weight, Tire air pressure, Pulsation)

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(Definition, Experience)

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(Calculation, Deviation)

Penalties

COP

Common item

Individual item
Test

- Fully closing throttle when the rear end of vehicle reaches line B-B’
- Keeping Acceleration with fully opening throttle operation
- Fully opening throttle when the front end of vehicle reaches line A-A’
- Constant speed at specified vehicle speed using specified gear ratio

The **maximum sound level** in dB(A) shall be measured as the motorcycle travels **between lines AA’ and BB’**

Exit  Acceleration  Entry  Approach
Overview of presentations

Application

Test Facilities
(Test track, Road surface, Instruments)

Preparation of Vehicle
(Fuel, Temperature, Weight, Tire air pressure, Pulsation)

Calibration

Miscellaneous

Test (method)

Calibration (R51:0.5dB)

Approval

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Setting of instruments

Selection of vehicle
(Definition, Experience)

Correction (R41)

Measuring condition
(Entry speed, Choice of gear ratio)

Evaluation
(Calculation, Deviation)

Penalties

COP
Measuring conditions for manually operated transmission

• Approach speed

(i) **50 km/h**

or

(ii) speed corresponding to an engine speed equal to 75% of S

The **lower** of these speeds shall be selected.

• Choice of gear ratio

<table>
<thead>
<tr>
<th>Engine Cylinder capacity</th>
<th>Total number of gear ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ 175 cm³</td>
<td>4 or less</td>
</tr>
<tr>
<td>175 cm³&lt;</td>
<td>2⁰rd</td>
</tr>
<tr>
<td></td>
<td>2⁰rd and 3⁰rd</td>
</tr>
</tbody>
</table>

If, during the test carried out **in 2⁰rd gear**, the engine speed at the end of the test track exceeds 100% of S, the test must be carried out **in 3⁰rd gear** and the sound level measured shall be the only one recorded as the test result.

This is cold as **“Over-run”**.
How to check Over-run

Engine speed shall be checked. If engine speed measurement is not available, the following equation should be used.

\[
\text{over-run vehicle speed} = \frac{(\text{rated engine speed (rpm)}) \times \pi \times \text{(tire diameter)}}{60 \times \text{(gear ratio)} \times \text{(Reduction ratio)}}
\]

If engine speed when the rear end of the vehicle reaches to BB’ at the acceleration noise test using 2\text{nd} gear exceeds \(S\), 3\text{rd} gear may be used instead of 2\text{nd} gear.

Vehicle speed at BB’+L > over-run vehicle speed
Measuring conditions for automatic transmission (w/o selector)

- Approach speed
- Choice of gear ratio

30, 40 km/h
and
50 km/h or 75% of S
(if that speed is lower)

The condition giving the highest sound level is chosen.

N/A
Measuring conditions for automatic transmission (with selector)

- Approach speed
  - less than 50 km/h, the engine speed equal to 75 % of $S$
  - or
  - 50 km/h, the engine speed less than 75 % of $S$

If, in the test at a steady speed of 50 km/h, the gears change down to first, the approach speed may be increased to a maximum of 60 km/h to avoid the change down.

- Choice of gear ratio
  If the motorcycle is equipped with a manual selector with X forward drive positions,
  the test shall be carried out with the selector in the highest position; the voluntary device for changing down (e.g. kick down) shall not be used.

If an automatic change down takes place after line AA’, the test shall be begun again using the second highest position or the third highest position if necessary, in order to find the highest position of the selector at which the test can be performed without an automatic change down (without using the kick down).
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(Test track, Road surface, Instruments)

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Miscellaneous

Test (method)

Evaluation
(Calculation, Deviation)

Setting of instruments

Selection of vehicle
(Definition, Experience)

Correction (R41)

Measuring condition
(Entry speed, Choice of gear ratio)

Approval

Penalties
(COP)

Marking, Label

Common item

Individual item

Calibration (R51:0.5dB)
Nature and number of measurements

At least two measurements shall be taken on each side of the motorcycle.

Rounding
Readings shall be rounded off to the nearest decibel.

Variation of value
Variation in two consecutive tests on the same side is less than or equal to 2 dB(A)

To take account of inaccuracies
The result of each measurement shall be deducted 1 dB(A) from the rounded value.

If the average of the four results of the measurements will constitute the result of the test.
### Test results (Example, \( \leq 175\text{cm}^3, 5\text{gears} \))

Making a Judgment of Over-run

- Corresponding vehicle speed to S: 55.0 km/h
- Measured vehicle speed at B-B': 55.6 km/h

**3rd gear shall be used instead of 2nd gear**

<table>
<thead>
<tr>
<th>Measurement</th>
<th>1st</th>
<th>2nd</th>
<th>3rd</th>
<th>4th</th>
<th>Result</th>
<th>Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>2nd gear</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R</td>
<td></td>
<td>N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>3rd gear</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R</td>
<td>76</td>
<td>79</td>
<td>76</td>
<td>77</td>
<td>76</td>
<td>80</td>
</tr>
<tr>
<td>L</td>
<td>76</td>
<td>75</td>
<td>76</td>
<td>75</td>
<td>76</td>
<td></td>
</tr>
</tbody>
</table>

*Comply*
Test procedures

R41 for Motorcycles

- Acceleration noise
- Stationary noise
Test facility

• Test area

No significant acoustic disturbances may be used.
Flat surfaces covered with concrete, asphalt or some other hard material
Test site must be in the form of a rectangle whose sides are at least 3 m from the outer edge of the motorcycle (handlebars excluded). There shall be no significant obstacles, e.g. no persons other than the rider and the observer may stand within this rectangle.
Test facilities

- Instruments

For sound measurement
A precision sound-level meter shall be used. (refer to IEC standard)
- "A" weighting
- "FAST" response
- Peak hold

For engine speed measurement
Engine tachometer

Accuracy +/-3%
Vehicle preparation

• Condition of the motorcycle
  The motorcycle engine shall be brought to the normal operating temperature.

Fans with an automatic actuating mechanism, this system shall not be interfered with during the sound measurements.

During the measurements the gearbox shall be in neutral gear. If it is impossible to disconnect the transmission, the driving wheel of the motorcycle shall be allowed to rotate freely, for example by placing the vehicle on its centre stand.
Selection of vehicle / Calibration

- Same as its for measurement of vehicle in motion.
Operating conditions
The engine speed shall be held steady at one of the following values:

- S is more than 5000 rpm: \( \frac{1}{2}S \)
- S is not more than 5000 rpm: \( \frac{3}{4}S \)

When a constant engine speed is reached, the throttle shall be returned swiftly to the idle position.
Microphone setting

- **Height**
  
  Same as exhaust outlet or 0.2m above ground, which is lower.

- **Distance from exhaust outlet**
  
  0.5m from exhaust outlet.

- **Angle to exhaust outlet**
  
  45 +/- 10° to the exhaust outlet.
Setting of microphone

In case that the exhaust system has more than one outlet at centers less than 0.3 m apart.

The microphone shall be faced towards the outlet which is nearest the motorcycle (handlebars excluded) or towards the outlet which is highest above the surface of the track.

If the centers of the outlets are more than 0.3 m apart.

Separate measurements shall be taken for each of them.

The highest figure recorded being taken as the test value.
Overview of presentations

Application

Test Facilities (Test area, Instruments)

Preparation of Vehicle

Calibration

Miscellaneous

Test (method)

Calibration

Setting of instruments

Selection of vehicle

Measuring condition (Engine speed)

Evaluation (Calculation)

Approval

Penalties

Marking, Label

COP

Common item

Individual item
The sound level shall be measured during an operating cycle consisting of a brief period of constant engine speed and throughout the deceleration period, the maximum sound-level meter reading being taken as the test value.

- Rounding
  Values shall be rounded off to the nearest decibel
  (Same as Acceleration noise test)
- Variation
  Value shall not vary by no more than 2 dB(A)
- Number of measurement
  Three consecutive tests will be carried out.
- Final value
  The highest value of the three measurements.
- Judgment
  There is no limit value due to reference value.
Spec. Max Power; 50kW / 7000min⁻¹

Measuring condition; 3500min⁻¹

<table>
<thead>
<tr>
<th>Measurement</th>
<th>1ˢᵗ</th>
<th>2ⁿᵈ</th>
<th>3ʳᵈ</th>
<th>4ᵗʰ</th>
<th>Result</th>
<th>Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Noise level (dB(A))</td>
<td>91</td>
<td>87</td>
<td>87</td>
<td>88</td>
<td>88</td>
<td>No (Reference)</td>
</tr>
</tbody>
</table>
Thank you for attention

www.jasic.org
R51

Test procedure for vehicles having at least four wheels

Y. Shirahashi
JASIC Noise-sub committee
Overview of R51 Test Procedure

Facilities
(Test track, Road surface, Instruments)

Preparation of Vehicle
(Fuel, Temperature, Weight, Tire air pressure, Pulsation)

Calibration before measurement

Measurement of background noise

Test (Purpose, method)

Calibration after measurement
(R51:0.5dB)

Correction (R41)

Measurement condition
(Entry speed, Choice of gear ratio)

Evaluation
(Calculation, Deviation)

Approval

Penalties

Marking, Label

COP

Selection of vehicle
(Definition, Experience)

Setting of instruments

Annex3,5,6,8

Application

Common

Different
R51 requires same specification as R41 for test site and instruments except for an accuracy of the engine speed and the vehicle speed. They shall be measured with instruments with an accuracy of +/- 2% or better.

ISO10844 road surface

From line C-C' 7.5+/-0.2m

From A-A' or B-B' 10m

Requirement of sound meter.
- According to IEC standards.
- "FAST" response
- "A" weighting

Maximum sound level during acceleration shall be Measured. (e.g. Using peak hold or using a level recorder)

Accuracy of vehicle speed measurement: +/- 2%

(Note: +/-3% in R41)
### Selection of vehicle

<table>
<thead>
<tr>
<th>Item</th>
<th>Contents</th>
<th>Selected test vehicle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine</td>
<td>Type of engine (See next slide)</td>
<td>Each type</td>
</tr>
<tr>
<td>Transmission</td>
<td>Type and number of gears</td>
<td></td>
</tr>
<tr>
<td><strong>Noise reduction system</strong></td>
<td>Exhaust/ intake system etc. (See next slide)</td>
<td></td>
</tr>
</tbody>
</table>

Refer to 2.2, 2.3, 2.4.
Selection of vehicle

1. Type of engine
   - positive or compression ignition
   - two-stroke or four-stroke
   - piston engine or rotary-piston engine
   - number and capacity of cylinders
   - number and type of carburetors or injection systems
   - arrangement of valves
   - rated maximum power and corresponding engine speed
   - type of electric motor

Refer to 2.2.3
Selection of vehicle

2. Noise reduction system(s)
   – trade names or marks
   – the characteristics of the materials constituting a component, shape or size
   – Operating principles
   – the number of the intake and/or exhaust silencers

3. Noise reduction system (s) component
   – the exhaust pipings, the expansion chamber(s), the silencer(s)
   – The air filter is considered as a component only if its presence is essential to ensure observance of the prescribed sound-level limits
   – Manifolds are not considered components of the noise reduction system.
Preparation of test vehicles

**Vehicle mass**

Measurements shall be made on unladen vehicles and, except in the case of nonseparable vehicles, without trailer or semi-trailer.

**Unladen + 75kg without trailer** (or curb mass + 75kg)

**Tire**

The tyres used for the test are selected by the vehicle manufacturer; they shall correspond to one of the tyre sizes designated for the vehicle by the vehicle manufacturer. The tyres must **be inflated to the pressure(s)** appropriate to the test mass of the vehicle.

**Exhaust system**

If the vehicle is equipped with an exhaust system containing fibrous materials, the exhaust system is to be conditioned before the test according to annex 5.

Refer to 2.2.1, 2.2.2, 2.2.6
Preparation of test vehicles

Before the measurements

- The vehicle shall be brought to its normal operating conditions - temperatures etc.
- If the vehicle is fitted with more than two-wheel drive, it shall be tested in the drive which is intended for normal road use.

Refer to 2.2.3, 2.2.4,
Overview of R51 Test Procedure

- **Facilities**
  - (Test track, Road surface, Instruments)

- **Preparation of Vehicle**
  - (Fuel, Temperature, Weight, Tire air pressure, Pulsation)

- **Calibration before measurement**

- **Measurement of background noise**

- **Test (Purpose, method)**

- **Calibration after measurement**
  - (R51:0.5dB)

- **Correction (R41)**

- **Measurement condition**
  - (Entry speed, Choice of gear ratio)

- **Evaluation**
  - (Calculation, Deviation)

- **Approval**

- **Marking, Label**

- **Penalties**

- **COP**

- **Selection of vehicle**
  - (Definition, Experience)

- **Setting of instruments**

- **Annex 3, 5, 6, 8**

- **Application**

- **Common**

- **Different**
### Test Methods in R51

<table>
<thead>
<tr>
<th>Categories</th>
<th>Acceleration (in motion)</th>
<th>Stationary</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MT</td>
<td>AT</td>
</tr>
<tr>
<td>M1</td>
<td>Method 1</td>
<td>Method 2</td>
</tr>
<tr>
<td>High performance&lt;sup&gt;(1)&lt;/sup&gt;</td>
<td>Method 1'</td>
<td></td>
</tr>
<tr>
<td>N1</td>
<td>Method 1</td>
<td>Method 2</td>
</tr>
<tr>
<td>M2,M3</td>
<td>Method 3</td>
<td>Method 2</td>
</tr>
<tr>
<td>N2,N3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(1) The vehicles fitted with a gear box having more than four forward gears and equipped with an engine developing a maximum power greater than 140 kW and having a maximum-power/maximum mass ratio greater than 75 kW/t, and the speed at which the rear of the vehicle passes the line BB' in third gear is greater than 61 km.

(2) For the vehicles having a maximum permissible mass exceeding 2,800 kg and having compressed air brake. This method was introduced in R51/02.
Flow of test procedure

Start test

Calibration before measurements

Check background noise

Measurements

No

Difference > 10dB

Yes

Difference between measurement and background noise

Calibration after measurements

No

Difference < 0.5dB

Yes

Difference between before and after measurements

Record results

End test
Common procedures

Approach Speed: The lower of 50km/h or 3/4S (or 1/2S)

Gear Position:
- M/T: depending on category
- A/T: D range

The vehicle shall approach the line AA' at a steady speed with a tolerance +/- 1km/h; except where the controlling factor is engine speed the tolerance shall be the larger of +/- 2\% or +/- 50min^-1.
Test procedures

Vehicle in motion (Sample)
Approach speed

\[ V_A = 50 \text{ km/h} \quad \text{or} \quad N_A = \frac{3}{4} S \]

whichever is the lower vehicle speed

Gear position

- Vehicles fitted with a gearbox having four or less forward gears shall be tested in second gear.
- Vehicles fitted with a gearbox having more than four gears shall be tested successively in second and third gear.

If during the test in second gear, the engine speed exceeds the rated engine speed, \( S \), at which the engine develops its rated maximum power, the test must be repeated with an approach speed and/or approach engine speed reduced by steps of 5%\( S \), until the engine speed attained no longer exceeds \( S \).

- If the engine speed \( S \) is still attained with an approach speed corresponding to the idle speed, then the test will be performed only in third gear.

Refer to 3.1.2.3.1, 3.1.2.3.2.1., 3.1.2.3.2.2.
How to check Overrun

Engine speed shall be checked. If engine speed measurement is not available, the following equation should be used.

\[
\text{Overrun vehicle speed} = \frac{(\text{rated engine speed (rpm)}) \times \pi \times (\text{tire diameter})}{60 \times (\text{gear ratio}) \times (\text{reduction ratio})}
\]

Vehicle speed at \(BB' + L\) > over-run vehicle speed

If engine speed exceeds \(S\) when the rear end of the vehicle reaches to \(BB'\), have to consider \(V_A\) and gear position.

<table>
<thead>
<tr>
<th>Categories</th>
<th>Acceleration</th>
</tr>
</thead>
<tbody>
<tr>
<td>MT</td>
<td>AT</td>
</tr>
<tr>
<td>M1</td>
<td>1</td>
</tr>
<tr>
<td>N1</td>
<td>1</td>
</tr>
<tr>
<td>M2,M3</td>
<td>3</td>
</tr>
<tr>
<td>N2,N3</td>
<td>3</td>
</tr>
</tbody>
</table>
High performance vehicles with manual transmission

The vehicles of category M1 having more than four forward gears and equipped with an engine developing a maximum-power greater than 140 kW and a permissible maximum-power/maximum-weight ratio greater than 75 kW/t shall be tested only in third gear, provided that the speed at which the rear of the vehicle passes the line BB' in third gear is greater than 61 km/h.

Refer to 3.1.2.3.2.2.
Test procedure for M1 and N1

Automatic transmissions with manual selector

Approach speed
\[ V_A = 50 \text{ km/h} \quad \text{or} \quad N_A = \frac{3}{4} S \]
whichever is the lower vehicle speed

Gear position

- **Position of the manual selector**
  The test shall be conducted with the selector in the position recommended by the manufacturer for 'normal' driving (\(=\) D range).

- **Auxiliary gears**
  If the vehicle is fitted with an auxiliary manual transmission or a multi-gear axle, the position used for normal urban driving shall be used.

- **External downshifting** (for example kick down) shall be excluded.

Refer to 3.1.2.4.2.1. 3.1.2.4.2.2., 3.1.2.4.2.3., 3.1.2.4.2.4.,
AT with manual selector
Test procedure for M1 and N1

Automatic transmissions with manual selector

Approach speed

\[ V_A = 50 \text{ km/h} \quad \text{or} \quad N_A = \frac{3}{4} S \]
whichever is the lower vehicle speed

Gear position

• **Position of the manual selector**
  The test shall be conducted with the selector in the position recommended by the manufacturer for 'normal' driving (= D range).

• **Auxiliary gears**
  If the vehicle is fitted with an auxiliary manual transmission or a multi-gear axle, the position used for normal urban driving shall be used.

• **External downshifting** (for example kick down) shall be excluded.

Refer to 3.1.2.4.2.1, 3.1.2.4.2.2, 3.1.2.4.2.3, 3.1.2.4.2.4, 3.1.2.4.2.5, 3.1.2.4.2.6, 3.1.2.4.2.7.
External downshifting

The example of the kick down switch for external downshifting.

Kick down switch
Prevention of downshift

If during the test, in the case of vehicles having more than two separate gears, there is an automatic **down-shift to first gear**, this down-shift may be avoided, at the manufacturer's choice. In these cases the operator may select any of the following modifications:

a) increase the vehicle speed \( v \) to a maximum of 60km/h;
b) maintain the vehicle speed \( v \) at 50km/h and limit the fuel supply to the engine to 95% of the supply necessary for full load; this condition is considered to be satisfied;
   (i) in the case of a spark-ignition engine, when the angle of the throttle opening is 90% of the full angle,
   (ii) in the case of a compression-ignition engine, when the fuel supply to the injection pump is limited to 90% of its maximum supply;
c) establish and use an electronic control that will prevent a downshift to gears lower than those used in normal urban driving as defined by the manufacturer.

Refer to 3.1.2.4.2.4.,
Prevention of downshift

If during the test, in the case of vehicles having more than two separate gears, there is an automatic down-shift to first gear, this down-shift may be avoided, at the manufacturer's choice. In these cases the operator may select any of the following modifications:

Some vehicles equipped with an automatic transmission (two or more discrete ratios) may downshift to a gear ratio not normally used in urban driving, as defined by the manufacturer. In these cases the operator may select any of the following modifications:

EU Directive R51/02

Refer to 3.1.2.4.2.4.,
Test procedure for M2, M3, N2, and N3

Approach speed

- The rated engine power not greater than 225kW
  \[ V_A = 50 \text{ km/h} \quad \text{or} \quad N_A = \frac{3}{4} S \]
  whichever is the lower vehicle speed

- The rated engine power greater than 225kW
  \[ V_A = 50 \text{ km/h} \quad \text{or} \quad N_A = \frac{1}{2} S \]
  whichever is the lower vehicle speed

Refer to 3.1.2.3.1, 3.1.2.3.2.3.
Test procedure for M2, M3, N2, and N3

Manual transmissions

Gear position

- Vehicles, in which the total number of forward gear ratios is \( x \) (including those obtained by way of an auxiliary transmission or a multi-gear axle) will be tested sequentially, using the ratio equal to or higher than \( x/n \).
  
  Where: \( n = 2 \) for vehicles having an engine power not greater than 225 kW
  \( n = 3 \) for vehicles having an engine power greater than 225 kW

- If \( x/n \) does not correspond to a whole number, the nearest higher ratio must be used.

- The testing shall continue from the gear \( (x/n) \) to the next higher gear.

- Shifting up gear ratios from \( (x/n) \) shall be terminating when in the gear \( X \) in which the rated engine speed is reached just before the rear of the vehicle has passed the line BB'.

Refer to 3.1.2.3.1, 3.1.2.3.2.3.
Test procedure for M2, M3, N2, and N3

Example of selection of gear ratio

- Sample Calculation for Testing: There are 16 forward ratios for drive train having a transmission with 8 gears and an auxiliary transmission with 2 gears. If the engine has 230kW then \((x/n) = (8 \times 2)/3 = 16/3 = 5 \frac{1}{3}\). The initial test gear ratio is 6th (includes the gears from both the main transmission and auxiliary which is 6th out of the 16 total gear ratios), with the next gear ratio is 7th up to ratio X.

- The highest sound level is obtained between the extreme ratios tested.

<table>
<thead>
<tr>
<th>Categories</th>
<th>Acceleration</th>
</tr>
</thead>
<tbody>
<tr>
<td>MT</td>
<td>AT</td>
</tr>
<tr>
<td>M1</td>
<td>1</td>
</tr>
<tr>
<td>N1</td>
<td>H.P.</td>
</tr>
<tr>
<td>1'</td>
<td>1</td>
</tr>
<tr>
<td>M2, M3</td>
<td>3</td>
</tr>
<tr>
<td>N2, N3</td>
<td></td>
</tr>
</tbody>
</table>

Refer to 3.1.2.3.2.3.
Test procedure for M2, M3, N2, and N3

Automatic transmissions with manual selector

Approach speed

- The rated engine power not greater than 225kW
  \[ V_A = 50 \text{ km/h} \quad \text{or} \quad N_A = \frac{3}{4} S \]
  whichever is the lower vehicle speed
- The rated engine power greater than 225kW
  \[ V_A = 50 \text{ km/h} \quad \text{or} \quad N_A = \frac{1}{2} S \]
  whichever is the lower vehicle speed

Gear position

Same as M1 and N1

Refer to 3.1.2.4.2.1, 3.1.2.4.2.2, 3.1.2.4.2.3, 3.1.2.4.2.4,
Test procedure for all categories

Approach speed

- The vehicle shall approach the line AA' at various uniform speeds of 30, 40, 50 km/h or at 3/4 of the maximum on-road speed if this value is lower.

- The condition giving the highest noise level shall be retained.

Automatic transmissions without manual selector

Refer to 3.1.2.4.1
Test procedure for All categories

Electrical motor vehicles (with no gearbox)

In the case of vehicles powered by an electric motor

\[ V_A = \frac{3}{4} V_{\text{max}} \text{ or } V_A = 50 \text{ km/h,} \]

whichever is the lower.

V\text{max}:  maximum speed declared by the vehicle manufacturer.

Refer to 3.1.2.2., 3.1.2.3.2.1. 3.1.2.4.2.1.
Interpretation of test results

• The measurement of noise emitted by the vehicle in motion shall be considered valid if the difference between the two consecutive measurements on the same side of the vehicle is not more than 2dB(A).
• The figure recorded shall be that corresponding to the highest sound level.
• To allow for lack of precision in the measuring instrument the figures read from it during measurement shall each be reduced by 1dB.

Refer to 3.1.3,
**Demonstration (Acceleration test)**

<table>
<thead>
<tr>
<th>Gear</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>Max Sound Level</th>
<th>Intermediate result</th>
</tr>
</thead>
<tbody>
<tr>
<td>2nd</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>V_A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>V_B</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L/H</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R/H</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3rd</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>V_A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>V_B</td>
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<tr>
<td>L/H</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>R/H</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Method 1**

Diagram showing a schematic with points B, P, A, B', P', and V_B'.
Demonstration (Acceleration test)

<table>
<thead>
<tr>
<th>Method 1</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Gear</th>
<th>VA</th>
<th>VB</th>
<th>L/H</th>
<th>R/H</th>
</tr>
</thead>
<tbody>
<tr>
<td>2nd</td>
<td>50.5</td>
<td>60.0</td>
<td>75.5</td>
<td>74.8</td>
</tr>
<tr>
<td>3rd</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Demonstration (Acceleration test)

### Method 1

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>Max Sound Level</th>
<th>Intermediate result</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>2nd gear</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(V_A)</td>
<td>50.5</td>
<td>52.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(V_B)</td>
<td>60.0</td>
<td>62.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L/H</td>
<td>75.5</td>
<td>76.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
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<td>74.8</td>
<td>75.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>3rd gear</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(V_A)</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>(V_B)</td>
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<tr>
<td>L/H</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>R/H</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>
## Demonstration (Acceleration test)

<table>
<thead>
<tr>
<th>Gear</th>
<th>1</th>
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<th>Max Sound Level</th>
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<tbody>
<tr>
<td><strong>2nd gear</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( V_A )</td>
<td>50.5</td>
<td>52.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( V_B )</td>
<td>60.0</td>
<td>62.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( L/H )</td>
<td>75.5</td>
<td>76.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( R/H )</td>
<td>74.8</td>
<td>75.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>3rd gear</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( V_A )</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( V_B )</td>
<td></td>
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</tr>
<tr>
<td>( L/H )</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( R/H )</td>
<td></td>
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</tr>
</tbody>
</table>

*Method 1*

![Diagram of method 1](image)
### Demonstration (Acceleration test)

#### Method 1

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>Max Sound Level</th>
<th>Intermediate Result</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>2nd gear</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( V_A )</td>
<td>50.5</td>
<td>52.0</td>
<td>51.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>( V_B )</td>
<td>60.0</td>
<td>62.0</td>
<td>61.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>( L/H )</td>
<td>75.5</td>
<td>76.0</td>
<td>75.5</td>
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</tr>
<tr>
<td>( R/H )</td>
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<td>75.0</td>
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<tr>
<td><strong>3rd gear</strong></td>
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<tr>
<td>( V_A )</td>
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<tr>
<td>( V_B )</td>
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<tr>
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</tbody>
</table>
## Demonstration (Acceleration test)

### Method 1

<table>
<thead>
<tr>
<th></th>
<th>Max Sound Level</th>
<th>Intermediate result</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td><strong>2nd gear</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VA</td>
<td>50.5</td>
<td>52.0</td>
</tr>
<tr>
<td>VB</td>
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<td>62.0</td>
</tr>
<tr>
<td>L/H</td>
<td>75.5</td>
<td>76.0</td>
</tr>
<tr>
<td>R/H</td>
<td>74.8</td>
<td>75.5</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>VA</td>
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<td></td>
</tr>
<tr>
<td>VB</td>
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<td></td>
</tr>
<tr>
<td>L/H</td>
<td>69.0</td>
<td></td>
</tr>
<tr>
<td>R/H</td>
<td>70.0</td>
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</tr>
</tbody>
</table>
### Demonstration (Acceleration test)

<table>
<thead>
<tr>
<th></th>
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<th>2</th>
<th>3</th>
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<th>Intermediate result</th>
</tr>
</thead>
<tbody>
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<td></td>
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<tr>
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<td>50.5</td>
<td>52.0</td>
<td>51.0</td>
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<td>62.0</td>
<td>61.0</td>
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</tr>
<tr>
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<td>75.5</td>
<td>76.0</td>
<td>75.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>R/H</td>
<td>74.8</td>
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<td>75.0</td>
<td></td>
<td></td>
</tr>
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<td></td>
<td></td>
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</tr>
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</tr>
<tr>
<td>VB</td>
<td>58.5</td>
<td>59.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L/H</td>
<td>69.0</td>
<td>71.5</td>
<td></td>
<td></td>
<td>&gt;2dB</td>
</tr>
<tr>
<td>R/H</td>
<td>70.0</td>
<td>71.5</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Demonstration (Acceleration test)

<table>
<thead>
<tr>
<th>Gear</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>Max Sound Level</th>
<th>Intermediate result</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>2nd gear</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$V_A$</td>
<td>50.5</td>
<td>52.0</td>
<td>51.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$V_B$</td>
<td>60.0</td>
<td>62.0</td>
<td>61.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>L/H</td>
<td>75.5</td>
<td>76.0</td>
<td>75.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>R/H</td>
<td>74.8</td>
<td>75.5</td>
<td>75.0</td>
<td></td>
<td></td>
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<td></td>
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<td>58.5</td>
<td>59.0</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>L/H</td>
<td>&gt;2dB</td>
<td>71.5</td>
<td>71.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>R/H</td>
<td>70.0</td>
<td>71.5</td>
<td>71.0</td>
<td></td>
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</tr>
</tbody>
</table>

Method 1

![Diagram of Method 1](Method1Diagram.png)
**Demonstration (Acceleration test)**

| Method 1 |

<table>
<thead>
<tr>
<th>Gear</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>Max Sound Level</th>
<th>Intermediate result</th>
</tr>
</thead>
<tbody>
<tr>
<td>2nd</td>
<td></td>
<td></td>
<td></td>
<td>75.5</td>
<td>75.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Max of two runs on the same side</td>
<td></td>
</tr>
<tr>
<td>V_A</td>
<td>60.0</td>
<td>62.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>V_B</td>
<td>75.5</td>
<td>76.0</td>
<td>75.5</td>
<td>75.5</td>
<td></td>
</tr>
<tr>
<td>L/H</td>
<td>74.8</td>
<td>75.5</td>
<td>75.0</td>
<td>75.0</td>
<td></td>
</tr>
<tr>
<td>R/H</td>
<td>50.0</td>
<td>50.8</td>
<td>50.5</td>
<td></td>
<td>71.5</td>
</tr>
<tr>
<td>3rd</td>
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<tr>
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<td>58.5</td>
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<td></td>
<td></td>
</tr>
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<td>V_B</td>
<td>69.0</td>
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<td></td>
</tr>
<tr>
<td>L/H</td>
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<td>71.5</td>
<td>71.0</td>
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<td></td>
</tr>
<tr>
<td>R/H</td>
<td>69.0</td>
<td>71.5</td>
<td>71.0</td>
<td>71.5</td>
<td></td>
</tr>
</tbody>
</table>

**Final Result:** \[rac{75.5 + 71.5}{2} = 73.5\]
## Limit Values R51/02

<table>
<thead>
<tr>
<th>Categories</th>
<th>Limit values</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>M1</strong> Passenger car (number of seat ≤ 9)</td>
<td>74</td>
<td>+1</td>
<td>+1</td>
<td>+1</td>
</tr>
<tr>
<td><strong>M2</strong> Buses (number of seat &gt; 9)</td>
<td>76</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>77</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>78</td>
<td></td>
<td>+1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>80</td>
<td>+2</td>
<td>+2</td>
<td>+2</td>
</tr>
<tr>
<td><strong>N1</strong> Trucks</td>
<td>76</td>
<td>+1</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>N2</strong></td>
<td>77</td>
<td>+1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>77</td>
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<td></td>
<td></td>
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<tr>
<td></td>
<td>78</td>
<td></td>
<td>+1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>80</td>
<td></td>
<td>+2</td>
<td></td>
</tr>
<tr>
<td><strong>N3</strong></td>
<td>80</td>
<td></td>
<td>+2</td>
<td></td>
</tr>
</tbody>
</table>

(1) High performance car (See test method)  
(2) Direct injection diesel engine  
(3) Off-road which is defined in R.E.3 and 2t <GVM
Vehicle in stationary (Sample)
Aim of stationary noise test is mentioned in UN/ECE /WP29 RE3.

1.5.1.2. Methods of measuring the sound level.

..... **The test on the vehicle when stationary** may usefully be taken as a reference value by technical services wishing **to use this method to check vehicles in service.**

........

1.5.2.2. In view of the tolerances of measuring instruments, the disturbances that may occur at the time of measurement and the scatter of measurements for vehicles of the same type, it will be necessary to **allow for a margin of 5 dB(A) in comparison** with the corresponding value recorded at the time of the type approval.

**in use noise enforcement in national regulation level. It may be used with at least 5dB for margin.**
Test instruments

For sound measurement
A precision sound-level meter shall be used. (refer to IEC standard)
- “A” weighting
- “FAST” response
- Peak hold (or maximum hold)

For engine speed measurement
Engine tachometer

Accuracy +/-2%
(Note: +/- 3% in R41)

Refer to 1.1, 1.2.
**Setting of Microphone**

**The height:** same as the height of the outlet pipe but minimum value of 0.2 m.

**Distance:** 0.5 m from the exhaust orifice

**Angle:** 45 degrees +/- 10 degrees in the direction of the gas flow.

(1) Two or more outlets spaced less than 0.3 m apart, only one measurement is made; the microphone position is related to the outlet nearest to one extreme edge of the vehicle.

(2) Outlets spaced more than 0.3 m apart, one measurement is made for each outlet.

Refer to 3.2.5.3.1
(3) Vertical exhaust
  **Height:** height of the exhaust outlet.
  **Axis:** vertical and oriented upwards.
  **Distance:** 0.5 m from the side of the vehicle nearest to the exhaust.

Refer to 3.2.5.3.1.
Test procedure

Operating condition

The engine is operated at a **constant speed of 3/4 S.** When constant engine speed is reached, the throttle shall be returned swiftly to the idle position. The sound level shall be measured during a period of constant engine speed and throughout the entire deceleration period. **The maximum sound level** meter reading being taken as the test value.

Interpretation of test results

Readings, **rounded off to the nearest decibel**, shall be taken from the measuring instrument. Only those values obtained from **three consecutive measurements** which do not differ by more than 2 dB(A). **The highest of these three values** shall constitute the test result.

Refer to 3.2.5.3.2., 3.2.6.
Operating condition

The highest A-weighted noise level is registered during venting the pressure regulator and during ventilating after the use of both the service and parking brakes.

The noise during venting the pressure regulator is measured with the engine at idling speed.

The air-compressor unit has to be brought up to the highest permissible operating pressure, and then the engine switched off. The ventilating noise is registered while operating the service and parking brakes.

Refer to Annex6
Compressed air noise

Interpretation of test results

For all microphone positions two measurements are taken. In order to compensate for inaccuracies of the measuring equipment, the meter reading is reduced by 1 dB(A). The highest value measured is taken as the results.

Limit value

Limit value: 72dB(A)

Refer to Annex6
The important points for correct noise data

1. Carrying out calibration of the sound level meter in every test.

2. Taking care of low and stable ambient noise

3. Reducing the factors for variation of noise level;
   • Approach speed (± 1km/h)
   • Timing (place) of wide-open throttle (as close to AA’ line as possible)
   • Stability of opening the throttle during measurement to in stationary test

4. Selection and maintenance of road surface for noise test
Comparison of Road Surfaces

ISO surface
(maximum chipping size 8mm)

Dense asphalt concrete
(maximum chipping size 13mm)
Road surface

The road surface for noise test was standardized by ISO (ISO10844). Then, ECE adopted ISO10844 for R51/02.

- **The purpose of specified test surface** (so called ‘ISO surface’)
  Reducing the variation of noise level, because the road surface is one of most important factor for noise level.

- **Requirements for road surface**
  <Materials> 8mm of maximum chipping size
  Straight asphalt for the binder
  <Characteristics> Texture depth $\geq 0.4\text{mm}$,
  Void content $\leq 8\%$ (Absorption coefficient $\leq 0.1$)
  <Maintenance> Texture depth shall be checked every year.

- **Remarks**
  Problem of durability in the high temperature areas due to using straight asphalt
  Under revising ISO 10844 (We expect to be able to use modified asphalt)
Thank you very much for your attention
General information

R43

Asia Expert Meeting

Masaru Morikawa
JASIC
What is R43

• R43 is a
  “UNIFORM PROVISIONS CONCERNING THE APPROVAL OF SAFETY GLAZING MATERIALS AND THEIR INSTALLATION ON VEHICLES”

Original version was adopted in 1981.
• R43 is discussed by UN/ECE/WP29/GRSG

Chaired by Mr. Antonio Erario from Italy

Experts from:
Belgium; Canada; Czech Republic; Finland; France; Germany; Hungary; India; Italy; Japan; Luxembourg; Netherlands; Norway; China; Poland; Korea; Russia; South Africa; Spain; Sweden; Switzerland; Thailand; UK; USA; EU

Participation from NGO
OICA; IMMA; IRU, CLCCR and VERONICA project
Adoption of R43

• R43 has been adopted by 41 contracting party.

• There are 34 administrative department and 53 technical services.

(ECE/TRANS/WP.29/343/Rev.16)
Contents of R43

1. SCOPE
2. DEFINITIONS
3. APPLICATION FOR APPROVAL
4. MARKINGS
5. APPROVAL
6. GENERAL REQUIREMENTS
7. PARTICULAR REQUIREMENTS
8. TESTS
9. MODIFICATION OR EXTENSION OF APPROVAL OF A TYPE OF SAFETY GLAZING MATERIAL
10. CONFORMITY OF PRODUCTION
11. PENALTIES FOR NON-CONFORMITY OF PRODUCTION
12. TRANSITIONAL PROVISIONS
13. PRODUCTION DEFINITELY DISCONTINUED
14. NAMES AND ADDRESSES OF TECHNICAL SERVICES RESPONSIBLE FOR CONDUCTING APPROVAL TESTS, AND OF ADMINISTRATIVE DEPARTMENTS
Contents of R43

Annex 1 - Communication concerning approval (or extension or refusal or withdrawal of approval or production definitely discontinued) of a type of safety glazing material pursuant to Regulation No. 43

Annex 1A - Communication concerning approval (or extension or refusal or withdrawal of approval or production definitely discontinued) of a vehicle type with regard to its safety glazing

Annex 2 - Arrangements of approval marks for components

Annex 2A - Arrangements of approval marks for vehicles

Annex 3 - General test conditions

Annex 4 - Toughened-glass windscreens

Annex 5 - Uniformly-toughened glass panes

Annex 6 - Ordinary laminated-glass windscreens

Annex 7 - Laminated-glass panes other than windscreens

Annex 8 - Treated laminated-glass windscreens

Annex 9 - Safety-glass panes faced with plastics material (on the inside)

Annex 10 - Glass-plastics windscreens

Annex 11 - Glass-plastics panes other than windscreens

Annex 12 - Double-glazed units

Annex 13 - Grouping of windscreens for approval testing

Annex 14 - Rigid plastic glazings other than windscreens
Scope

This Regulation applies to:

(a) safety glazing materials intended for installation as windscreens or other panes, or as partitioning, on vehicles of category L, M, N, O, and T

(b) vehicles of category M, N and O with regard to the installation of these materials;
## Category

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>L</td>
<td>MOTOR VELOCIES WITH LESS THAN FOUR WHEELS</td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>POWER-DRIVEN VEHICLES HAVING AT LEAST FOUR WHEELS AND USED FOR THE CARRIAGE OF PASSENGERS</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>POWER-DRIVEN VEHICLES HAVING AT LEAST FOUR WHEELS AND USED FOR THE CARRIAGE OF GOODS</td>
<td></td>
</tr>
<tr>
<td>O</td>
<td>TRAILERS (INCLUDING SEMI-TRAILERS)</td>
<td></td>
</tr>
<tr>
<td>T</td>
<td>AGRICULTURAL AND FORESTRY TRACTORS</td>
<td></td>
</tr>
</tbody>
</table>

Today's discussion focused on the category M and N.
Definitions of type of each glazing specification are defined in the following annexes of this regulation:

- Annex 4: Toughened-Glass Windscreens
- Annex 5: Uniformly-Toughened Glass Panes
- Annex 6: Ordinary Laminated-Glass Windscreens
- Annex 7: Laminated-Glass Panes Other Than Windscreens
- Annex 8: Treated Laminated-Glass Windscreens
- Annex 9: Safety Glass Panes Faced With Plastics Material
- Annex 10: Glass-Plastics Windscreens
- Annex 11: Glass-Plastics Panes Other Than Windscreens
- Annex 12: Double-Glazed Units
- Annex 14: Rigid Plastic Glazings Other Than Windscreens
- Annex 15: Flexible Plastic Glazings Other Than Windscreens
- Annex 16: Rigid Plastic Double Glazed Units

Today’s discussion focused on these glazings. These shall be considered to belong to different types if they differ in at least one of the principal or secondary characteristics.
Overview of the certification procedure

Administrative Department

Approval

COP (Verification)

MODIFICATION
Necessity of further certification

Manufacturing

Application

Documents

Sample

Marking

Withdrawal

Contracting party

Informing

Modification

Discontinued

Notification

Manufacture

Technical service

Application

Sample

Documents

Marking

COP

43 R - 002439

Withdrawal

Modify
Application for a glazing

The application for approval of a type of glazing shall be submitted by the manufacturer or by his duly accredited representative in the country where the application is made.

Application documents
- A technical description comprising all principal and secondary characteristics (Refer to Annex1 and its Appendix 1 to 9)
- Technical specifications and drawings required each type of glazing. (Para.3.2.1.1 to 3.2.1.3)

The applicant shall submit a sufficient number of test pieces and samples of the finished pieces of the models considered.

Applicants shall submit application documents consists of technical description, specification and drawings and samples.
The application for approval of a vehicle type with regard to the installation of its safety glazing shall be submitted by the vehicle manufacturer or by his duly accredited representative.

Application documents

- **Drawings of the vehicle**
  - The position of the windscreen relative to the R point
  - The inclination angle of the windscreen,
  - The inclination angle of the seat back;
- **Technical details** concerning the windscreen and all other glazings
  - The materials used,
  - Approval numbers,
  - Any additional markings

A vehicle representative of the vehicle type to be approved shall be submitted to the technical service responsible for conducting the approval tests.

**Applicants shall submit application documents consists of drawings of the vehicles and technical details and a vehicle.**
Approval

If the samples submitted for approval meet the requirements of paragraphs 6. to 8. of this Regulation, approval of the pertinent type of safety glazing material shall be granted. An approval number shall be assigned to each type as defined in annexes 5, 7, 11, 12, 14, 15 and 16 or, in the case of windscreens, to each group approved.

Notice of approval or extension of approval or refusal of approval of a type of safety glazing material pursuant to this Regulation shall be communicated to the Parties to the Agreement applying this Regulation.

Approval number is granted to each type of grazing.
Approval shall be notified to contracting party using the communication.
Overview of the certification procedure

Administrative Department

Technical service

Manufacture

Approval

COP (Verification)

MODIFICATION
Necessity of further certification

Contracting party

Informing

Notification

Modification

Discontinued

Documents

Sample

Marking

Application

Withdrawal

43 R - 002439

Manufacturing
Markings on glazing

There shall be affixed conspicuously to every piece of glazing and double-glazed unit conforming to a type approved under this Regulation, in addition to the marking prescribed in paragraph 4.1., an international approval mark. Any specific approval mark assigned to each pane forming a double-glazed unit may also be affixed.

1. "E"
2. Country Code Number
3. Circle surrounding “E”
4. Regulation number
5. “R”
6. “-”
7. Series of the regulation “00”
8. Approval number
Markings on glazing

For the wind screen, the additional symbols shall be affixed near the above approval mark.

The additional symbols can be combined.

<table>
<thead>
<tr>
<th></th>
<th>Mark Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Toughened glass windscreens</td>
</tr>
<tr>
<td>I/P</td>
<td>Toughened glass faced with plastic material</td>
</tr>
<tr>
<td>II</td>
<td>Ordinary laminated glass windscreen</td>
</tr>
<tr>
<td>II/P</td>
<td>Ordinary laminated glass faced with plastic material</td>
</tr>
<tr>
<td>III</td>
<td>Treated laminated glass windscreen</td>
</tr>
<tr>
<td>IV</td>
<td>Glass-plastics windscreen</td>
</tr>
<tr>
<td>V</td>
<td>Glass panes other than windscreens having a regular light transmittance &lt; 70 per cent</td>
</tr>
<tr>
<td>VI</td>
<td>Double-glazed units</td>
</tr>
<tr>
<td>VII</td>
<td>Uniformly-toughened glass panes which can be used as windscreens for slow-moving vehicles</td>
</tr>
<tr>
<td>VIII</td>
<td>Rigid plastic glazing other than windscreens Symbol /A to /M depend on purpose of use and light scatter characteristics</td>
</tr>
<tr>
<td>IX</td>
<td>Flexible-plastic glazing other than windscreens</td>
</tr>
<tr>
<td>X</td>
<td>Rigid plastic double-glazed units Symbol /A to /M depend on purpose of use and light scatter characteristics</td>
</tr>
<tr>
<td>XI</td>
<td>Laminated glass pane other than windscreen</td>
</tr>
</tbody>
</table>
Markings on vehicles

For the approved glazing; There shall be affixed conspicuously to every piece of glazing.

For the approved vehicle; The approval mark shall be clearly legible, be indelible, be placed close to or on the vehicle data plate affixed by the manufacturer.

- “E”
- Country Code Number
- Circle surrounding “E”
- Regulation number
- “R”
- “-”
- Series of the regulation “00”
- Approval number
Overview of the certification procedure
Conformity of production

The conformity of production procedures shall comply with those set out in the Agreement, appendix 2 (E/ECE/324-E/ECE/TRANS/505/Rev.2), with the following requirements:

The checks shall include compliance with the requirements of annex 20 to this Regulation.

**COP procedures for the administrative authority and the manufacture (the approval holders) are provided in Appendix 2 of the 1958 agreement in general and Details for COP sampling test done by manufacture are provided in annex 20 of R43 in particular.**

The normal frequency of inspection as referred to in paragraph 2.4. of appendix 2 of the Agreement shall be **one per year**.
PENALTIES FOR NON-CONFORMITY OF PRODUCTION

The approval granted in respect of a type of safety glazing material may be withdrawn if the requirement is not complied with.

If a Party to the Agreement which applies this Regulation withdraws an approval it had previously granted, it shall forthwith so notify the other Contracting Parties applying this Regulation thereof by means of a copy of a communication form conforming to the model in annex 1 to this Regulation.
MODIFICATION OR EXTENSION OF APPROVAL

Every modification of a type shall be notified to the administrative department which approved the type of safety glazing material.

**Definition of Type is mentioned in annexes of R43 for each specification of glazing.**

The department may then either consider that

- the modifications made are *unlikely to have an appreciable adverse effect* and, in the case of windscreens, that the **new type comes within the approved group** of windscreens, and that in any case **the safety glazing material still complies** with the requirements

**Approval may cover modification without additional certification.**

- require a further test report from the technical service responsible for conducting the tests.

**Certification tests are require for extension of approvals.**
Overview of the certification procedure

1. **Administrative Department**
   - Approval
   - COP (Verification)

2. **Technical service**
   - Application
   - Withdrawal

3. **Manufacture**
   - Documents
   - Sample
   - Marking

4. **MODIFICATION**
   - Necessity of further certification
   - Modification
   - Discontinued

- Contracting party
- Informing
- Notification
- Discontinued
If the holder of the approval completely ceases to manufacture a type of safety glazing material approved in accordance with this Regulation, he shall so inform the authority which granted the approval.

Upon receiving the relevant communication, that authority shall inform thereof the other Parties to the Agreement which apply this Regulation by means of a copy of a communication form conforming to the model in annex 1 to this Regulation.

It shall be notified to the administrative authority granted approval if manufacture completely ceases manufacturing approved glazing.

The administrative authority shall inform other contracting party using the communication.
TRANSITIONAL PROVISIONS

• As from the date of entry into force of Supplement 8 to this Regulation in its original form, no Contracting Party applying this Regulation shall refuse an application for approval under this Regulation as amended by Supplement 8 to the Regulation in its original form.

• As from 24 months after the official date of the entry into force of Supplement 8, the Contracting Parties applying this Regulation may refuse to recognize the approval of safety glazing not bearing the symbols prescribed in paragraph 5.5. of this Regulation.
Thank you for your attention.
ECE R43
Safety Glazing

Asia Expert Meeting

Masaru Morikawa
JASIC
PURPOSE

The glazing should have a safe performance during the vehicle in use
SCOPE

Safety glazing materials:
Category L, M, N, O, T

Installation:
Category M, N, O

Exclusion of:
- Glazing for lighting
- Instrument panels
- Bullet-proof glazing
- Light-signalling devices
- Double windows
R43  Applied category

M : Motor vehicles with at least four wheels designed and constructed for the carriage of passengers
R43  Applied category

N: Motor vehicles with at least four wheels designed and constructed for the carriage of goods
R43  Applied category

L: Motor vehicles with less than four wheels

O: Trailers

T: Agricultural and forestry tractors
R43

REQUIREMENTS

1. General requirements
2. Installation on vehicles
3. Safety glazing performance
1. GENERAL REQUIREMENTS

1. Reduce the danger of body injury in the event of shuttering
2. Sufficiently resistant in normal traffic, temperature, chemical, abrasion
3. Sufficiently transparent
3. INSTALLATION ON VEHICLES

Purpose

Ensure the driver with a high degree of visibility in all traffic conditions
3. INSTALLATION ON VEHICLES

WINDSCREENS

The light transmittance:
not less than 70%

※Amendments (75%→70%) has been approved by WP29 (2008.Nov.)
Reduced test area B for windscreen (1)

R43

C_L: trace of the longitudinal median plane of the vehicle
P_i: trace of the relevant plane (see text)

Figure 2: Reduced test area "B" (example of a left-hand steering control vehicle) - upper obscuration area as defined in paragraph 2.4.2.2.
Reduced test area B for windscreen (2)

R43

Symmetry

Reduced test area B

: ①a or ①b

: ②

: ③

Datum points (6points)
R43
3. INSTALLATION ON VEHICLES

Safety glazing other than windscreen

1. Driver’s forwards field of vision
   - At least 70%

2. Requisite for the driver’s rearward vision
   - At least 70%, but where two exterior rear view mirrors are fitted, allowed below 70%
ECE R43

Technical Requirement
and Testing Method for Glass

Asia Expert Meeting

Masaru Morikawa
JASIC
Type of glass for Automotive
(Laminated Glass and Toughened Glass)

(M, N category)

- **Laminated glass** is used for **Windscreen**
- **Laminated glass** or **Toughened glass** are used for **Glass panes other than windscreens**

<table>
<thead>
<tr>
<th>Windscreen</th>
<th>Glass panes other than windscreens</th>
</tr>
</thead>
<tbody>
<tr>
<td>:Laminated glass</td>
<td>:Toughened glass</td>
</tr>
<tr>
<td>:Toughened glass</td>
<td>:Laminated glass</td>
</tr>
<tr>
<td>:Treated laminated glass</td>
<td>:Glass plastics</td>
</tr>
<tr>
<td>:Glass plastics</td>
<td></td>
</tr>
</tbody>
</table>
Float glass production line flow

Raw material mixing → Dissolution → Float bath → Cooling down

Cleaning → Dryer → Auto inspection → Cutting → Inspection → packing → shipping
Laminated Glass process

- Top side
- Masking
- Cutting
- Marking
- Grinding
- Cleaning
- Printing
- Bending
- Matching with interlayer (PVB)
- Inspection
- Permanent bonding in the autoclave
- Temporary Bonding
- Clean room
In order to realize safety life, Toughened glass is made. The glass manufacturing process are cutting, grinding, cleaning, and furnace. The toughened glass furnace is include bending (heat up), forming, and cooling down process. After heat up the glass, it will be rapid cooling down. The glass surface is harden at first, and glass inside will be cooling down gradually. So we can make the compression strength on glass surface. Its hardness is 3–5 times.
# List of Test requirements in ECE R43

<table>
<thead>
<tr>
<th>Test items</th>
<th>Windscreen</th>
<th>Glass panes other than windscreens</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Laminated glass</td>
<td>Toughened glass</td>
</tr>
<tr>
<td>(A) Mechanical strength test</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(1) Fragmentation test</td>
<td>-</td>
<td>Yes</td>
</tr>
<tr>
<td>(2) 227 g ball impact</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>(3) 2,260 g ball impact</td>
<td>Yes</td>
<td>-</td>
</tr>
<tr>
<td>(4) Head form</td>
<td>Yes</td>
<td>-</td>
</tr>
<tr>
<td>(B) Resistance to the environment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(5) Abrasion</td>
<td>Yes</td>
<td>-</td>
</tr>
<tr>
<td>(6) High temperature</td>
<td>Yes</td>
<td>-</td>
</tr>
<tr>
<td>(7) Radiation</td>
<td>Yes</td>
<td>-</td>
</tr>
<tr>
<td>(8) Humidity</td>
<td>Yes</td>
<td>-</td>
</tr>
<tr>
<td>(C) Optical test</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(9) Light transmission</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>(10) Optical distortion</td>
<td>Yes</td>
<td>-</td>
</tr>
<tr>
<td>(11) Secondary image</td>
<td>Yes</td>
<td>-</td>
</tr>
<tr>
<td>(12) Identification of colors</td>
<td>Yes</td>
<td>-</td>
</tr>
</tbody>
</table>
(A) Mechanical strength Test

(1) Fragmentation Test
(2) 227g ball impact Test
(3) 2260g ball impact Test
(4) Head Form Test
(1) Fragmentation

Test purpose
Toughened glass is using a heat tempering that increases the mechanical strength, so it resists breakage.

To determine whether the glazing is less likely to cause injury if it does fracture. In the case of breakage, it is desired that the glazing will shatter into very small, blunt pieces rather than large, sharp fragments, thereby significantly reducing the risk of serious injuries.

Assessment criteria
A, Number of fragments in 50x50mm
\[ 40 \leq N_f \leq 400 \]
\[ 40 \leq N_f \leq 450 \text{ (below 3.5t)} \]
B, Largest fragment \( \leq 3 \text{ cm}^2 \)
C, Longest fragment \( \leq 75\text{mm} \)
D, Fragment ends are not knife-edged
E, if fragment extend to the edge of the glass pane, Fragment do not form an angle of more than 45°
(2)-A. Mechanical strength;
Ball-impact (227g) for Toughened glass

Test purpose
To assess the resistance of the glazing to impact from stones or other flying objects that might be encountered in everyday use.

Assessment criteria
A. Toughened glass
   - Test piece at 20 +/-5 degree C.
   - Test piece does not break (N=6)
   - > 3.5mm thickness; 2.5m ball height
   - ≤ 3.5mm thickness; 2.0m ball height

Test equipment
(2)-B. Mechanical strength; Ball-impact (227g) for Laminated glass

Test purpose

To assess the resistance of the glazing to impact from stones or other flying objects that might be encountered in everyday use.

Assessment criteria
B, Laminated glass
- Test piece at +40 degree C and -20 degree C (N=10 each)
- Test piece dose not penetrate or break into several piece
- Detached fragment shall not exceed the appropriate values.
- Ball height 8.5 ~ 12 m depend on thickness

Test equipment
(3) Mechanical strength; Ball-impact (2260g)

Test purpose

To assess the penetration resistance of laminated glazing materials for windscreens to impact from a heavy object.

Assessment criteria
Laminated glass only
- Test piece at at 20 +/-5 degree C (N=6)
- Test piece dose not penetrate in 5 seconds
- Ball height 4.0 m
(4) Head-form test

Test purpose

To verify the compliance of glazing with the requirements relating to the limitation of injury in the event of impact of the head against the windscreen.

Assessment criteria

- Laminated glass only
- Test piece at at 20 +/-5 degree C (N=4)
- Laminated windscreen must be broken but not penetrated and must exhibit numerous circumferential and radial cracks.
- Head-form height
  1.5 m for windscreen and 4.0 m for flat sample
(B) Resistance to the environment Test

(5) Abrasion Test
(6) High temperature Test
(7) Radiation Test
(8) Humidity Test
(5) Resistance to abrasion

Test purpose
To determine whether the safety glazing material will withstand exposure to the environmental conditions normally experienced, without deterioration in appearance and performance.

This test is to determine whether the resistance of a safety glazing to abrasion exceeds a specified value.

Assessment criteria  (N=3)  1000 rotations
- Abrasive wheel rotate at 65 to 75 rpm with 500g pressure.
- Abrasive wheel shall have a hardness of 72 +/- 5 IRHD.
- Light transmission change shall be less than 2 %.
(6) Resistance to high temperature

Test purpose

The purpose of these tests is to determine whether the safety glazing material will withstand exposure to the environmental conditions normally experienced, without deterioration in appearance and performance.

This test is to verify that no bubbles, discoloration or other defects occur in the interlayer in laminated glass when exposed to high temperatures.

Assessment criteria  \((N=3)\)

- Heat 100 degree C for a period of 2 hours.
- Glass does not have bubbles or other defects.
(7) Resistance-to-radiation

Test purpose
The purpose of these tests is to determine whether the safety glazing material will withstand exposure to the environmental conditions normally experienced, without deterioration in appearance and performance. This test is an accelerated life test using UV light sources. After exposure to radiation, the test pieces are examined for visual degradation and changes in light transmittance.

Assessment criteria
- UV lamp; 750W (N=3)
- Temperature keep at 45 degree C
- The exposure time shall be 100 hours.
- After exposure to radiation, the test pieces are examined for visual degradation and changes in light transmittance. Light transmittance should be above 95% compare with before, and WS should be above 75%, Other than WS should be above 70% after exposure.
Test purpose
The purpose of these tests is to determine whether the safety glazing material will withstand exposure to the environmental conditions normally experienced, without deterioration in appearance and performance. This test is to verify that no bubbles, discoloration or other defects occur in the interlayer in laminated glass when exposed to high humidity.

Assessment criteria (N=3)
- 50 degree C and 95 %RH, for 2 weeks.
- Glass dose not have significant change, such as bubbles, discoloration or other defects.
(C) Optical Test

(9) Light transmission Test
(10) Optical distortion Test
(11) Secondary image Test
(12) Identification of colours Test
(9) Light-transmission

Test purpose

This test is to determine whether the regular light transmittance of the safety glazing exceeds a specified value in order to ensure that sufficient visual information is available for safe operation of the vehicle.

Assessment criteria \((N=1)\)
- In the case of windscreen, it shall not be less than 75%.
- In the case of side window for using forward field of driver’s vision, such as Front door window, it shall not be less than 70%.
- In the case of glazing defined as Safety glazing material requisite for the driver’s rearward vision, the glazing is allowed to have a light transmittance below 70%, provided that it shall bear the symbol V.
Test purpose
To verify that the distortion of objects as seen through the windscreen is not of such extent as to be likely to confuse the driver.
Limits are specified for distortion and double image.

(10) Optical-distortion
(11) Secondary-image-separation

Image of distortion

Windscreen

Observer

Distortion and Secondary Image

Secondary Image

True Image

Object

True Image
**Optical-distortion measuring system**

Assessment criteria (N=4)
- Optical Zone A and I; below 2' of arc
- Optical Zone B; below 6' of arc

*Secondary-image-separation measuring system*

Assessment criteria (N=4)
- Optical Zone A and I; below 15' of arc
- Optical Zone B; below 25' of arc
**Test purpose**
To verify that there is no risk of confusion of colours as seen through a windscreen.

**Assessment criteria**  
(N=4)  
- Windscreens shall be tested for identification of the following colors: white, selective yellow, red, green, blue, amber..
Thank you for your attention
Ordinary laminated Glass windscreens

4. Mechanical strength test

4.3.3.2. The height of drop for the various thickness categories and the mass of the detached fragments are given in the table below:

<table>
<thead>
<tr>
<th>Thickness of test pieces mm</th>
<th>+40 degrees C</th>
<th>-20 degrees C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Height of fall m *&lt;sup&gt;1&lt;/sup&gt;</td>
<td>Maximum permitted mass of the fragments g</td>
</tr>
<tr>
<td>e ≤ 4.5</td>
<td>9</td>
<td>12</td>
</tr>
<tr>
<td>4.5 &lt; e ≤ 5.5</td>
<td>10</td>
<td>15</td>
</tr>
<tr>
<td>5.5 &lt; e ≤ 6.5</td>
<td>11</td>
<td>20</td>
</tr>
<tr>
<td>e &gt; 6.5</td>
<td>12</td>
<td>25</td>
</tr>
</tbody>
</table>

*<sup>1</sup> A tolerance of +25/-0 mm is allowed in height of fall.

Test conditions
Temperature: 20+/-5 degrees C
Pressure: 860 to 1060 mbar
Relative humidity: 60+/-20 percent
第21回アジア専門家会議概要報告
「ECE R41, ECE R51(騒音)、ECE R43(安全ガラス)に関する専門家会議」

日時：2009年10月1，2日
場所：LTO会議室@フィリピン ケソン
出席：各省庁、業界団体から約60名

JASIC：白橋、米澤、守川、福田

議事：
＜1日目＞
・ECE R41(二輪車)、R51(乗用車)について
（白橋、米澤氏：JASIC騒音分科会）

初めに白橋氏から車両カテゴリー、騒音規制の歴史、基準構成、申請認可、COP等の概要、次に米澤氏からECE R41、白橋氏からECE R51の要件と試験方法について詳細にビデオも使い説明を行いました。参加者から次のような質問があり、UNECE規則の理解を深める貴重な会議となりました。

（主な質問）
1. ECEレギュレーションで言う認証機関は、政府か第三者か？
Ans：ECE では、認証試験を行うのは、第三者機関です。試験結果に基づいて認可を与えるのが政府機関になります。

2. マフラー内にグラスウールを使用している場合に耐久要件があるが、マフラーにアスベストを使っている場合は、何か規定があるか？（二輪マフラー業界？）
Ans：アスベストは先進国の中ほとんどで使用禁止物質となっており、ECEの中では、その使用を前提の規定はありません。使用されないものとの認識です。

3. 排ガス規制のEuro2と騒音規制のバージョンとの対応を知りたい？
Ans：騒音規制の最新VerはR41-03になります。Euro2、Euro3の切替タイミングとR41-02、R41-03のタイミングが異なります。
Euro3車両は、すべてR41-03対応です。
Euro2車両は、R41-02、R41-03の両方が存在します。

4. EURO2システム、EURO燃料で、R51/02の達成が可能か。
Ans：今までの経緯では、排ガス規制、騒音規制は連動してバージョンアップしてきている。組み合わせを変えた場合は、あらたな開発が必要になることになる。その経験がないので、今、回答できない。

5. 騒音試験実施前に充分暖気する事との記述があるが、「何度」というように絶対値での規定がないのか？
Ans：絶対値の規定はありません。EGの水温、油温等が安定した状態を、「十分に暖気
された』と考えます。
また、熱帯地域のフィリピンでは、何度にして試験を実施すればよいか？
Ans：絶対値の温度での規定はなく、安定した騒音データの測定が目的であるので、騒音データに変化がなくなればよい。例えば車載の水温計も目安になる。

6. R 41／R 51ともに加速騒音試験と近接排気騒音試験を実施することになっていないが、どちらの試験がよりよいか？（DOTC）
Ans：どちらの試験法が良いかではなく、目的に応じて試験方法を使い分ける。車両認証の試験としては、車両全体騒音を評価する加速騒音試験の結果によって行います。加速騒音試験は必須事項です。排気騒音の変化を使用過程車両の取り締まり等で行わないのであれば、近接は不要です。（近接試験は、使用過程車両の排気管劣化や損傷による騒音増大、交換マフラー等の取り締まりを目的に参考値として、オリジナル車両データとして取得しています。）

7. 何か、フィリピン政府に提案があるか？
Ans：ECE-R41については、変更なしに取り入れられることを希望します。また、路上等での使用過程車、交換マフラー取り締まりも近接排気騒音の相対値を使用した制度をお勧めします。（絶対値より、相対値の方が捕捉効果が高く、論理的にも説明可能な内容です。）

8. 日本では、使用過程車への騒音規定があるか？
Ans：あります。2010年4月以降、マフラーの部品認証制度が運用となります。

9. 基本的な質問で恐縮だが、「なぜ、騒音規制が必要であるのか？」（DOTC）
Ans：住民が静かな環境での生活できることを保障する上で、騒音の発生源対応の結果、道路交通における騒音改善には、騒音規制が求められています。道路交通における騒音は、車両の加速騒音が基本的に寄与していると考えられ、加速騒音を測定し、それを規制の中に納めることで、環境騒音を低減することが可能になります。

10. ECEでは、どのように騒音の規制値をきめたのか？（DOTC）
Ans：現在の法規が改定されたのが14年前のことであり、このときのことは、わからないが、一般的には、環境騒音から求められる騒音規制の検討と、現状の騒音低減技術の検討を協議するなかで、GRB会議の中で技術検討がなされ、WP29の討議で各国政府当局によって、決定されてきました。

＜2日目＞
・UNECE R43（安全ガラス）について
（守川：JASIC一般安全分科会）
最初にUNECE R 43（安全ガラス）基準の申請から認可、その後の変更申請、CO P等の認証取得手順概要、次に安全ガラスの適用カテゴリ及び車両取り付け、最後に各種安全ガラスの製造方法を含めて試験要件、試験方法等の詳細説明を行いました。参加者から次のような質問があり、UNECE 規則の理解を深める貴重な会議となりました。

（主な質問）
1. 試験環境についてフィリピンは暑いが？
   Ans：温度など環境が指定されているので従う必要がある。環境をコントロールした状態で試験できるように。

2. 強度試験では、何故実際の車でテストしないのか？
   Ans：スレッドテストなどでの結果から現在の試験が決めている。

3. フィルムの貼り付けはどう考える？
   Ans：R43 では前面ガラスなどは NG となる。

4. 衝突物はいろいろあると思うが、何故球なのか？
   Ans：球で代表できると判断した。

以上