Informal document GRB-58-14
(58th GRB, 2-4 September 2013,
agenda item 3(b))

Categorization of Light N1 Vehicles

58th GRB
(2 – 4 September 2013)

JASIC

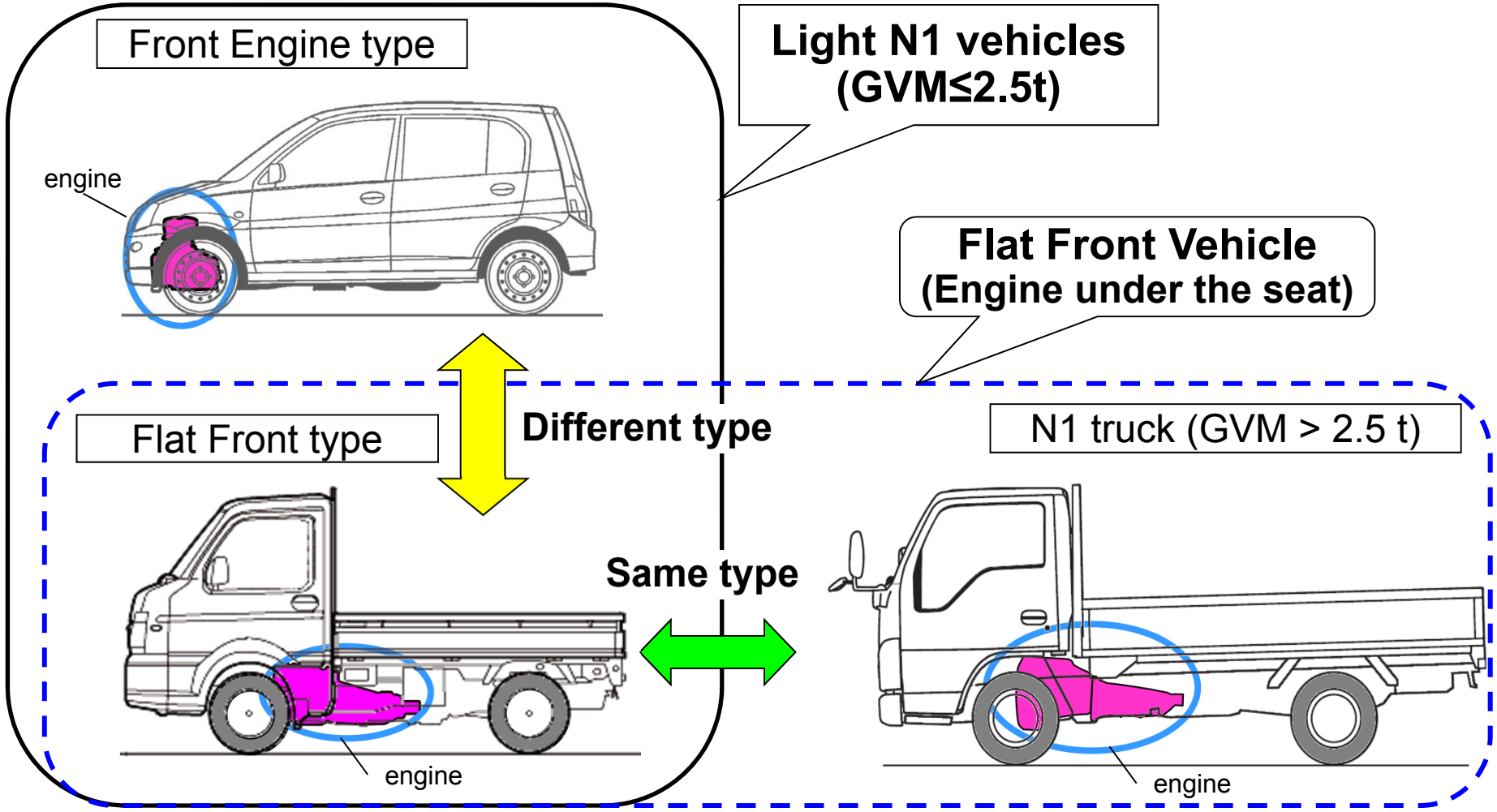
*This is a reference material for "**GRB-58-06** - (Japan) Proposal for the 03 series of amendments to UN Regulation No. 51"*

Contents

1. Characteristics of Flat Front Light N1 Vehicles

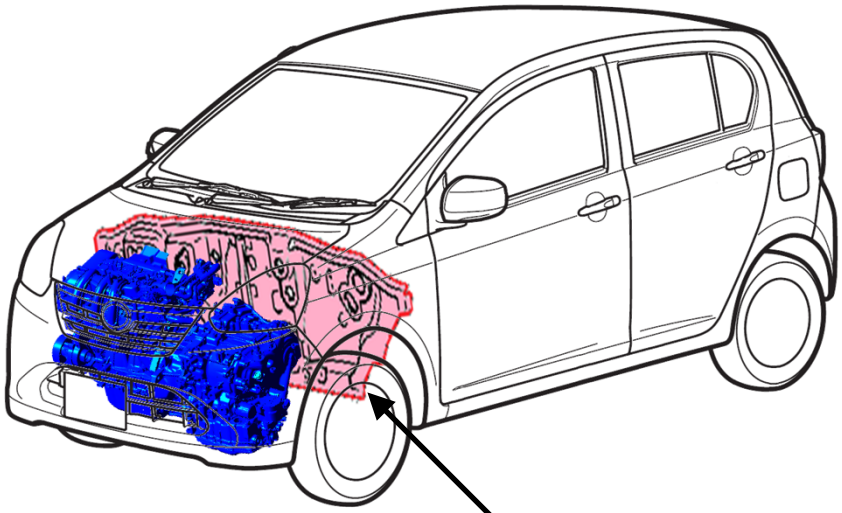
Characteristics of Flat Front Light N1 Vehicles

Flat Front Light N1 vehicles are configured differently from Front Engine Type vehicles (so-called M1-derived N1 vehicles) and have the same configuration as N1 vehicles (trucks) with GVM > 2.5 t.

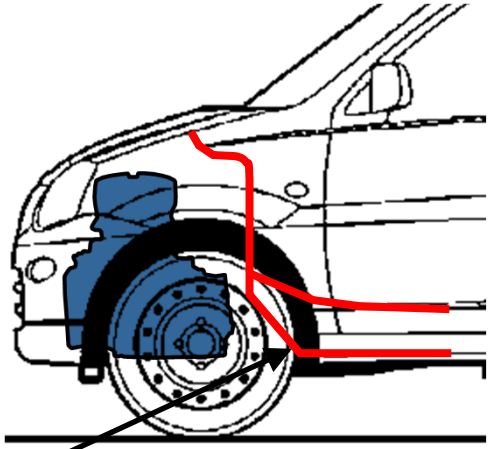


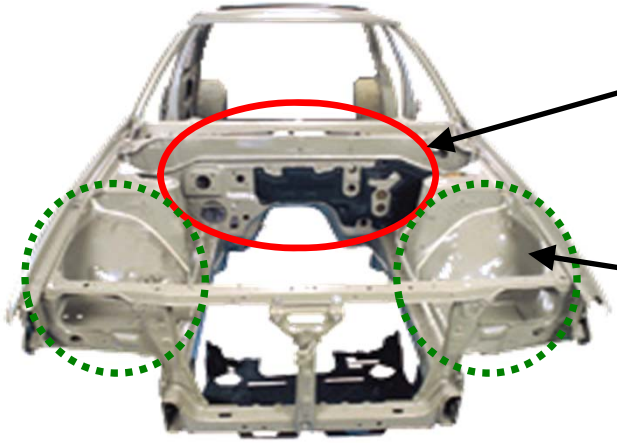
Location of the Engine in Front Engine Type Light N1 Vehicles

The whole engine is inside the engine compartment, surrounded by panels, etc. Shield covers, etc. are provided where sound insulation is needed. In addition, the engine bonnet(hood) silencer, under cover, etc. are installed, as necessary, to seal the engine compartment against noise.



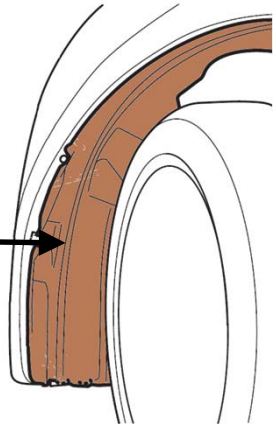
Side view of the engine compartment





Rear: Dashboard
Dash silencer

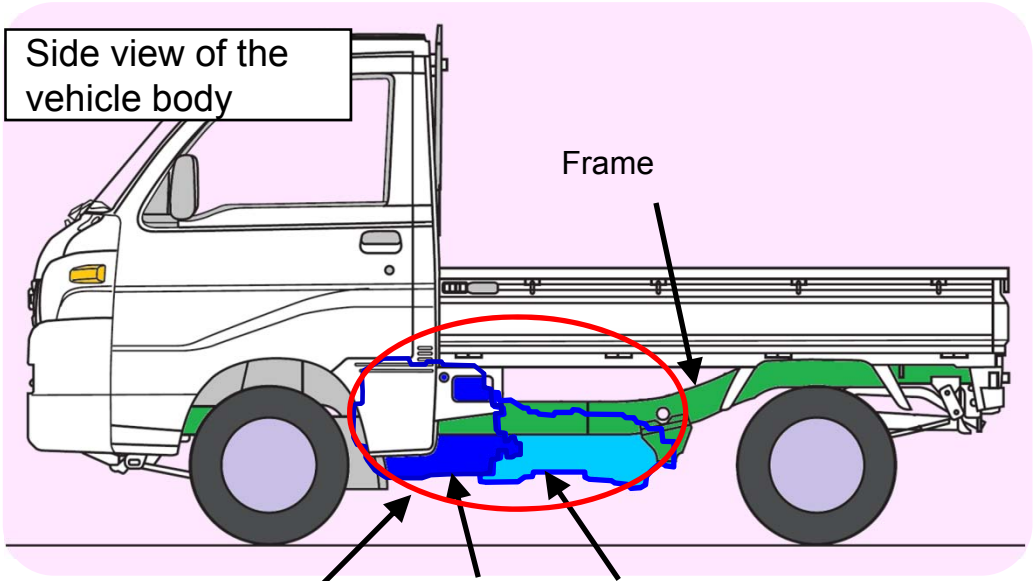
Side: Wheel arch panel
Plastic cover



Location of the Engine in Flat Front Light N1 Vehicles

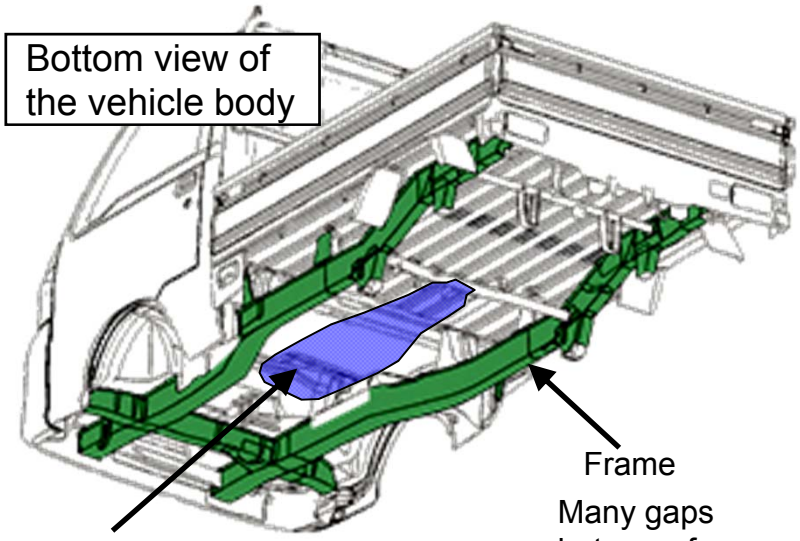
The engine is located between frames and exposed as there is no body panel around it, and its sound is emitted from the bottom.

Side view of the vehicle body



Slightly less than 40% of the engine and slightly more than 60% of the transmission do not overlap with the body panel and frame.

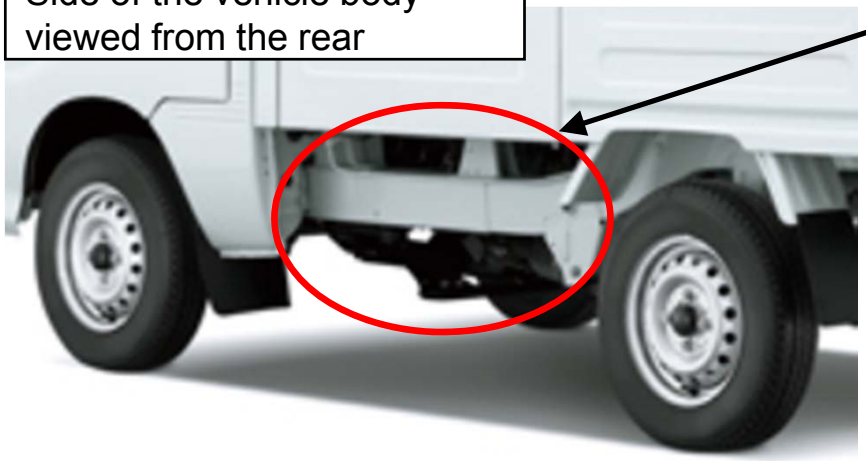
Bottom view of the vehicle body



Many gaps between frame and body panel

No body panel around the engine which is located between frames

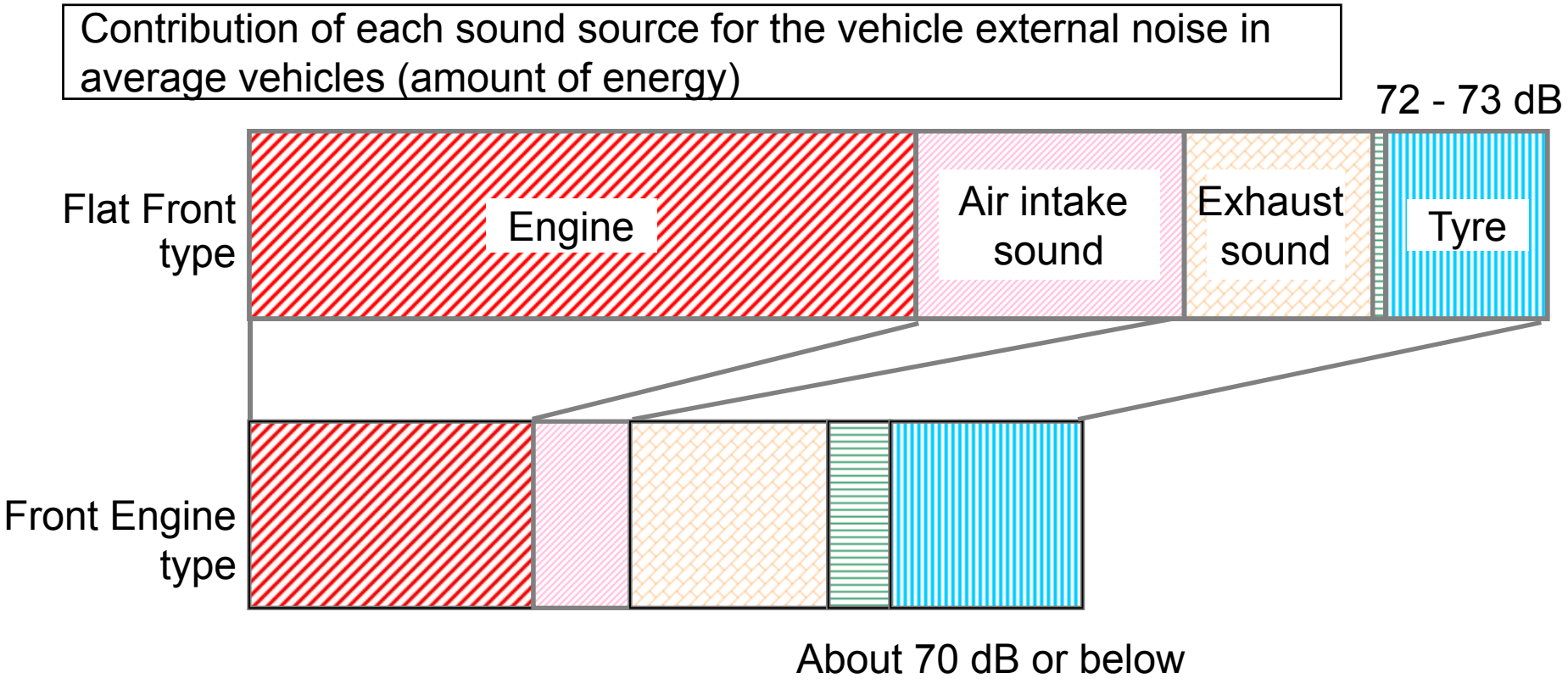
Side of the vehicle body viewed from the rear



Engine and transmission visible between body panel and frame

Reasons Why the Noise Level of Flat Front Light N1 Vehicles is High

Since engines of Flat Front Light N1 vehicles are exposed, the engine radiated sound and air intake sound are emitted directly outside the vehicle. As a result, the vehicle external noise level and the engine sound contribution in Flat Front Vehicles are higher than those in Front Engine Type vehicles.



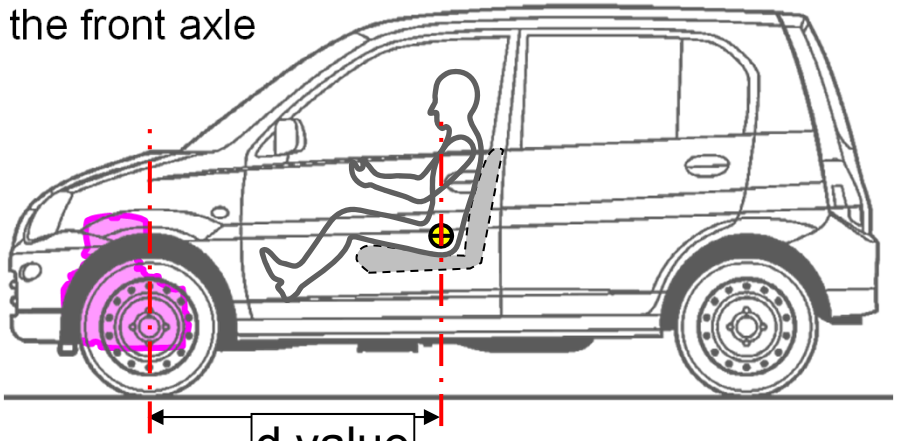
2. How to Separate Flat Front Light N1 Vehicles from Other N1 Vehicles

Characteristics of Flat Front and Front Engine Type Vehicles

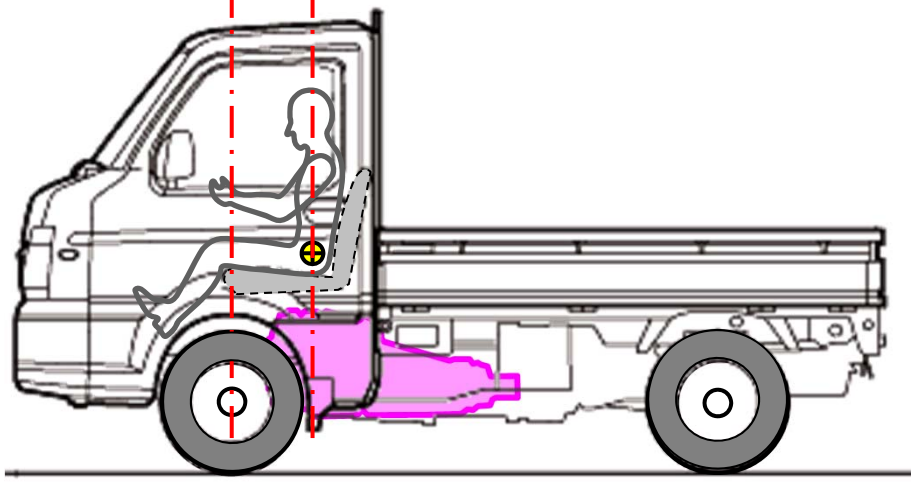
In Flat Front Type, differently from Front Engine Type, the engine and front tyre are located below the occupant to ensure large cargo space. Therefore, d value, which expresses the positional relation between occupant and front tyre can be used to classify these two vehicles.

d value: Longitudinal distance between the hip point (R-point) on the driver's seat and the center of the front axle

Front Engine Type

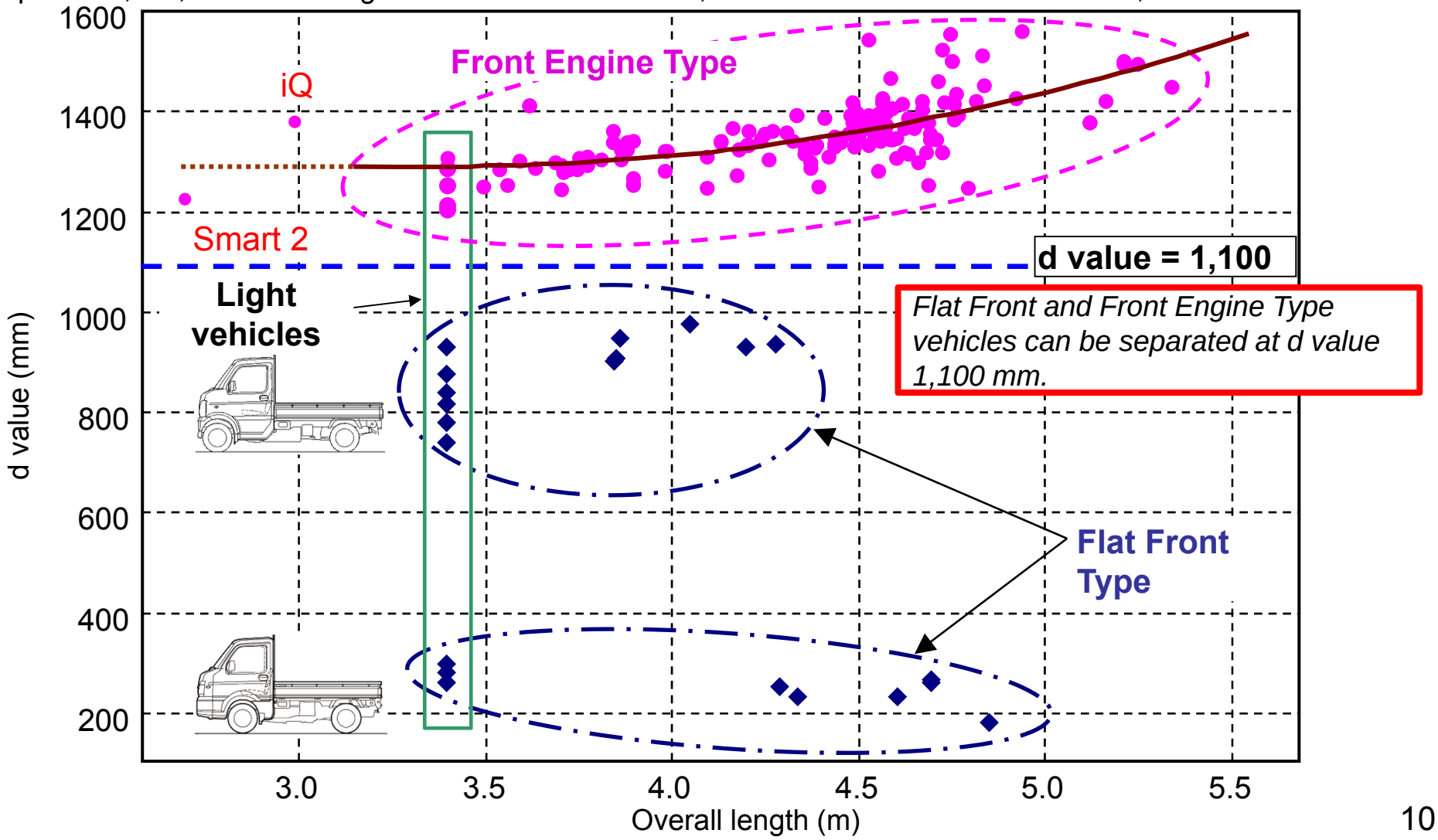


Flat Front Type



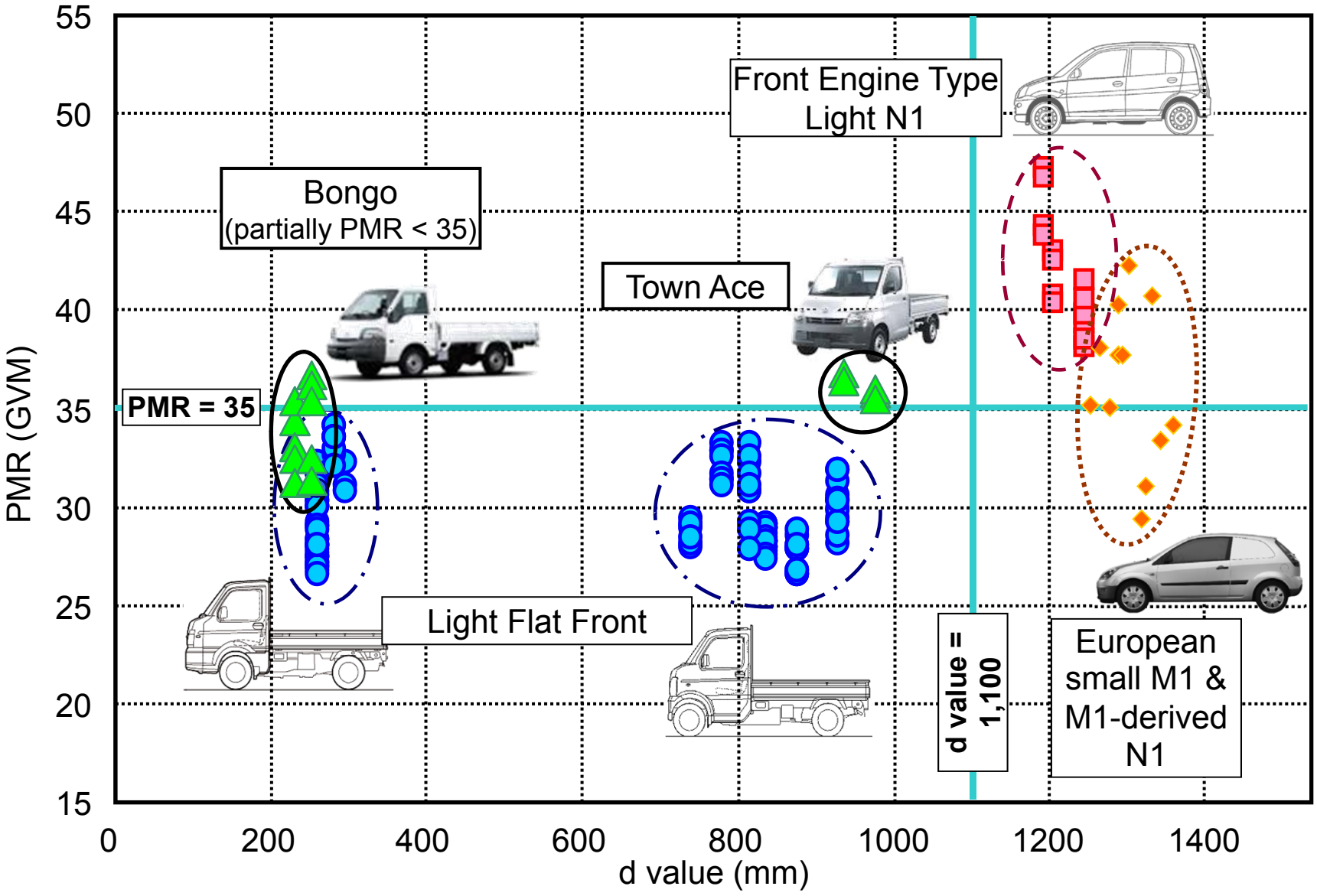
Comparison of d Values Between Flat Front and Front Engine Type Vehicles

In Front Engine Type vehicles, since it is necessary to install the steering wheel, pedals, etc. between front wheel and driver's seat, their d values need to be at least 1,100 mm even in small vehicles.
In Flat Front vehicles, to ensure large cargo space, it is necessary to locate the driver's seat as forward as possible, i.e., above the engine and front wheel. Thus, their d values are no more than 1,100 mm.



Status of Categorization Based on the d Value and PMR (GVM)

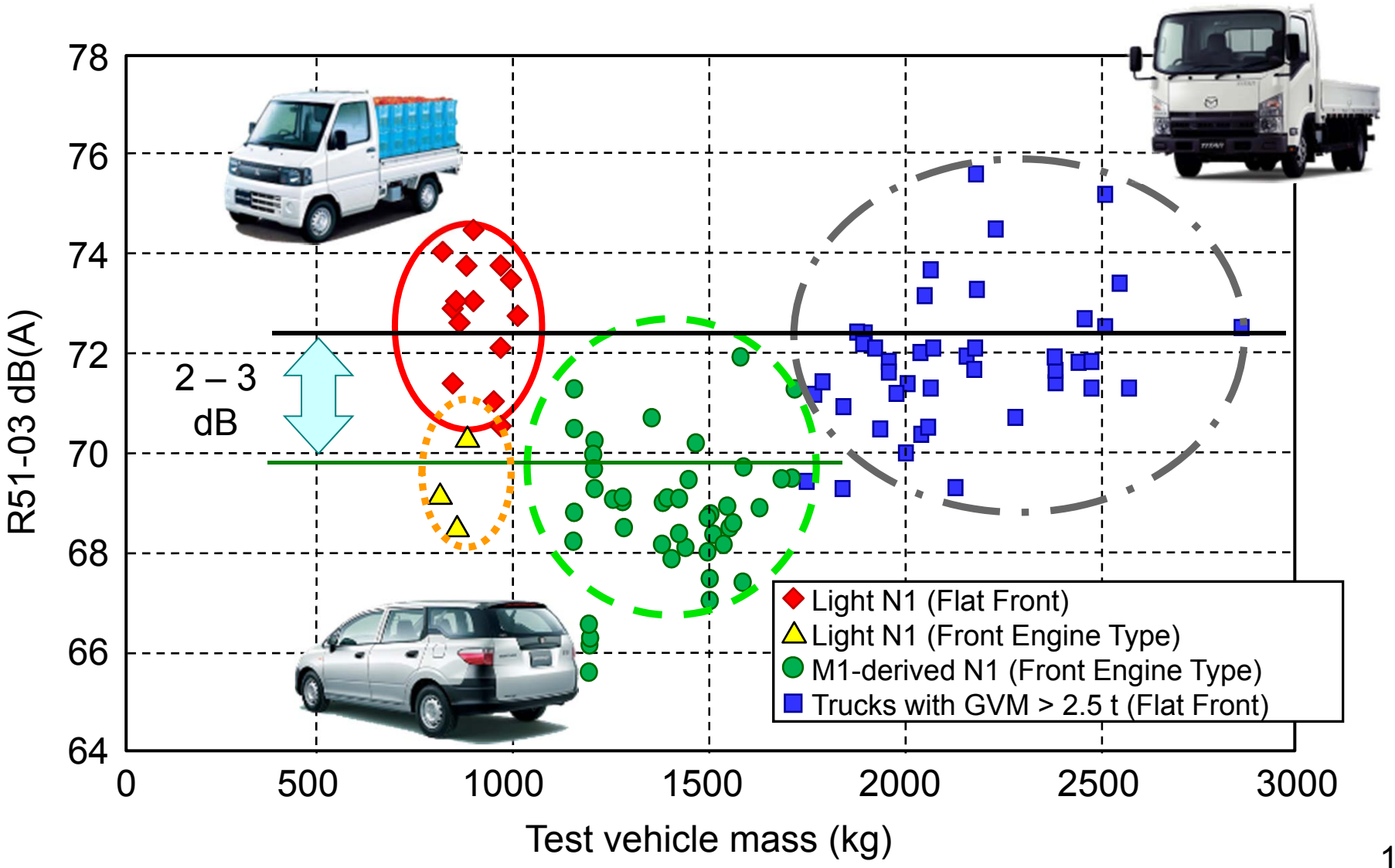
Using the d value < 1,100 mm and PMR (GVM) ≤ 35, Flat Front Light N1 vehicles can be separated from other N1 vehicles.



3. Limit Values for Flat Front Light N1 Vehicles

Noise Levels of Flat Front Light N1 Vehicles in the New Test (R51-03)

The noise levels of Flat Front vehicles are higher than Front Engine Type by about 2 – 3 dB and are almost the same as trucks with GVM > 2.5 t.



Series of Discussions on Limit Values for N1, and Current Japan's Proposal

		Main Type	Stage1	Stage2		Stage3	
			2 years after entry into force of ECE R51.03	4 years after stage 1	6 years after stage 1	[4] years after stage 2	[6] years after stage 2
			Limit Values [dB(A)]				
Japan's original proposal (GRB-56-01)	GVM ≤ 2.5 t, PMR (GVM) ≤ 35 kW/t	Flat Front	74		72 (*1)	-2dB	[70]
	GVM ≤ 2.5 t, 35 kW/t < PMR (GVM)	Front Engine	72	70	+2dB Delayed by 2 years	[68]	
	2.5 t < GVM ≤ 3.5 t	Over 2.5 t	74	72	equal	[71]	
GRB Expert Group (GRB-58-04)	[Engine Cap. < [ ]cc, PMR (GVM) < 35 kW/t]	Flat Front	[74]		[72]		[70]
	GVM ≤ 2.5 t	Front Engine	72	71		[69]	
	2.5 t < GVM	Over 2.5 t	74	73	+1dB Advanced by 2 years	[71]	
Current Japan's Proposal	GVM ≤ 2.5 t, PMR (GVM) ≤ 35 kW/t **, d<1,100mm**	**Flat Front**	**74**	**73(※2)**	-2dB	**[71]**	

+2dB

equal

(*1) Views in the proposal GRB-56-01	While 73 dB was also considered to be sufficiently effective based on the cut-off rate, it was determined that it is appropriate to specify the limit value for Flat Front vehicles to be 72 dB, which is less severe than the limit value for Front Engine Type vehicles (70 dB) just by 2 dB and is the same as the limit value for GVM > 2.5 t. However, since it is difficult to comply with the limit value 72 dB due to the vehicle structure, the applications of Stage 2 and thereafter were delayed by 2 years each, taking into account the time required for development of the new Flat Front chassis.
(*2) Views on GRB-58-04 in the current proposal	As the limit value for Front Engine Type (M1-derived N1) vehicles was specified to be 71 dB in the proposal GRB-58-04 by the Expert Group, it was determined, based on the cut-off rate, that it is appropriate to specify the limit value for Flat Front vehicles to be 73 dB, which is less severe than the limit value for Front Engine Type vehicles (71 dB) just by 2 dB and is the same as the limit value for GVM > 2.5 t. In addition, it is no longer necessary to delay the applications of Stage 2 and thereafter by 2 years each.

4. Difficulty of Implementing the Noise-Reduction Measure for Flat Front Light N1 Vehicles

Possible Noise-Reduction Measure for Flat Front Light N1 Vehicles

In the case of Flat Front light N1 vehicles, in order to lower the vehicle external noise by 2 – 3 dB, it is necessary to insulate the engine sound, whose contribution is large, by fully covering the engine and transmission.

without cover

full cover for engine & T/M (under view)

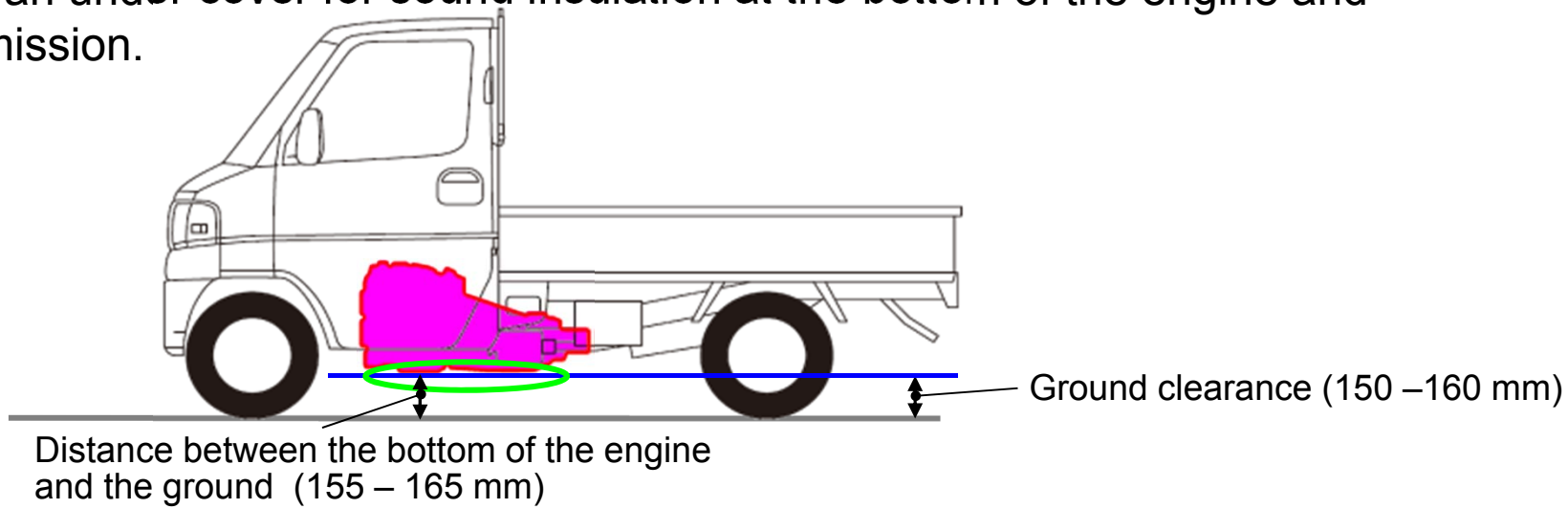
full cover for engine & T/M (left side view)

full cover for engine & T/M (right side view)

Problems with the Noise-Reduction Measure for Flat Front Light N1 Vehicles

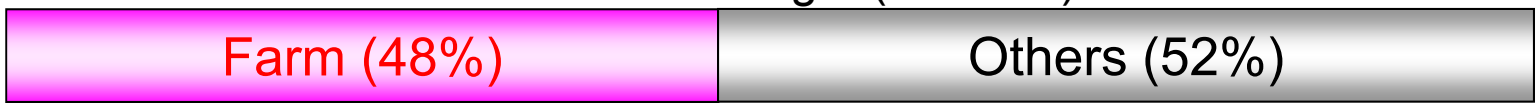
Installation of a sound insulation cover for the engine and transmission

Since the height-above-ground of the engine and transmission in Flat Front Light N1 vehicles is almost at the same level as the ground clearance, it is impossible to install an under cover for sound insulation at the bottom of the engine and transmission.



Purpose of use of Flat Front Light N1 vehicles

Almost half of Flat Front light N1 vehicles are intended for use in agriculture and operated in farm fields, etc. as well. For this reason, the ground clearance cannot be lowered from the current height (150 mm).

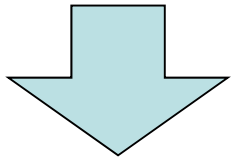


* Excerpt from JAMA's report on a survey about the actual uses of light vehicles

Regulation for Flat Front Light N1 Vehicles taken in consideration of their structures and actual uses

* At present, it is extremely difficult to implement the noise reduction measure together with ensuring the ground clearance at the same time. To implement the measure, complete renovation of the chassis will be necessary, which would cause the sales price to go up and thus result in increased burdens on the users.

* The actual uses of the vehicles need to be considered. That is, originally, they are often used in sparsely populated suburban areas such as farms.



For regulation of Flat Front Light N1 vehicles, it is necessary to separate them from Front Engine Type vehicles.

5. Summary

Summary

With regard to the sub-category and limit values for Flat Front Light N1 vehicles, we propose the following:

6.2.2.1

…	…	…	…	…
Veh.Cat	Vehicles used for the carriage of goods	Phase1	Phase2	Phase3*/
N1	GVW≤2.5t	72	71	69
	GVW>2.5t	74	73	71
	~~[Engine Cap.<[ ]cc, PMR(GVW)≤35kw/t]~~	~~[74]~~	~~[72]~~	~~[70]~~
…	…	…	…	…

6.2.2.2.6 For vehicle types of category N1 having a maximum authorized mass less than or equal to 2.5tons, a PMR (power to mass ratio) of maximum authorized mass less than or equal to 35kW/t and distance “d” between the front axle and the driver‘s seat R-point is less than 1,100 mm, the limits of vehicles types of category N1 having a maximum authorized mass above 2.5 tons apply.

11.3.1. As from [6] years after the date of entry into force of the 03 series of amendments for vehicle types other than ~~[N1[[ ]cc, PMR(GVW) < 35 kW/t]) and]~~ N2 as from [8] years after the date of entry into force of the 03 series of amendments for vehicles types of category ~~[N1[[ ]cc, PMR(GVW) < 35 kW/t]) and]~~ N2, Contracting Parties applying this UNECE Regulation shall grant UNECE type-approvals only if the vehicle type to be approved meets the requirements of this UNECE Regulation as amended by the 03 series of amendments.

11.3.3. (amendments similar to 11.3.1.)

11.4.2. (amendments similar to 11.3.1.)

11.4.4. (amendments similar to 11.3.1.)

*For details of this proposal, please refer to “**GRB-58-06** - (Japan) Proposal for the 03 series of amendments to UN Regulation No. 51”*