

Research on M3 sub-categories of R51-03

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M3 category in China with new energy

- **Totally 491,709 buses and coaches sold in year 2016.**

- Mainly contain M2 and M3 categories.
- Within which, nearly 123, 000 belong to new energy vehicles, which take nearly 25% percent.
- Within which, nearly 172, 000 belongs to M3 categories.

*Data from: <Automotive Information>, www.autoinfo.org.cn

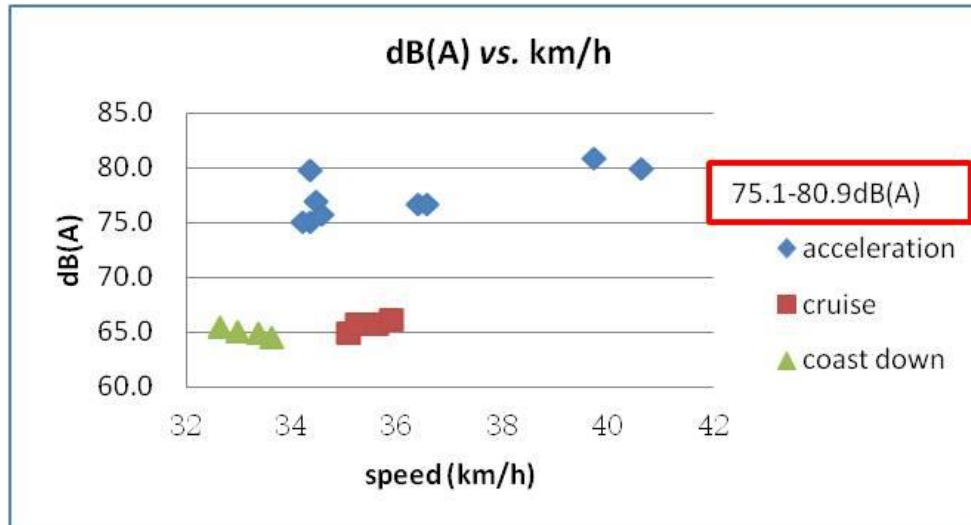
- **Example: Tianjin City**

- Planned to purchase 1000 buses and coaches from 2013 to 2016, within which more than 40% are EV, Hybrid, LNG & CNG, and totally have more than 10, 000 buses and coaches.
- More than 1846 **EV** buses and coaches are purchased from 2012 and is running now.

*Data from: www.tjbus.com, www.tj.xinhuanet.com

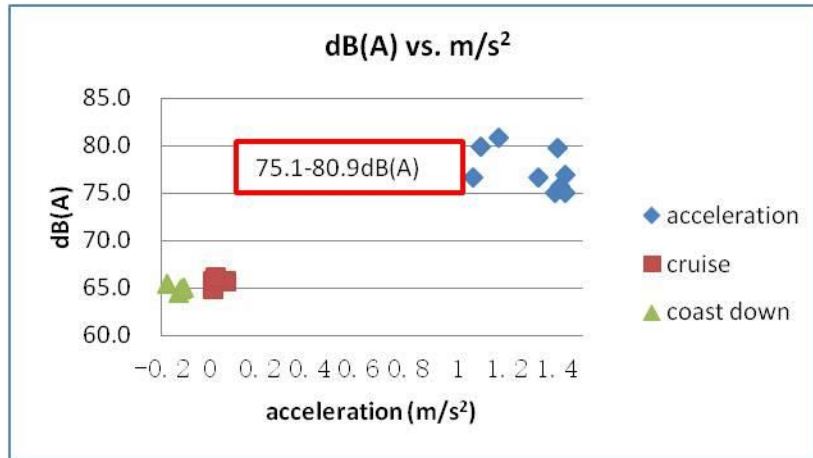
An example of M3 category EV

Kerb mass	12445kg	Front axle	4340kg	Rear axle	8105kg	Test mass	12550kg	Length	12000mm
Gross vehicle mass	19000kg	Front axle	7000kg	Rear axle	12000kg	Payload	0	Locked or non	Non-locked



Problems for new technology

Rated power	124	Rated power (Motor)	110	Peak power (Motor)	220	Torque	3000 N.m	S	1250rpm
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This bus belongs to the sub-category with P_n no more than 150kW, so:

- 1.76dB(A) from 2016;
- 2.74 dB(A) from 2020;
- 3.73 dB(A) from 2020.

1. The rated engine power of EV and hybrid buses are always half of diesel engine.
2. The acceleration of EV is always higher than the diesel engine during the test, even the rated engine power of diesel engine is higher.

Existing problems (diesel engine)

Vehicle category	Vehicles used for the carriage of passengers	Limit Values (dB(A))		
		Phase 1	Phase 2	Phase 3
M ₁	PMR ≤ 120	72	70	68
	120 < PMR ≤ 160	73	71	69
	PMR > 160	75	73	71
	PMR > 200, no. of seats ≤ 4, R-point height < 450mm from the ground	75	74	72
M ₂	M ≤ 2.5 t	72	70	69
	2.5 t < M ≤ 3.5 t	74	72	71
	M > 3.5 t; P _n ≤ 135 kW	75	73	72
	M > 3.5 t; P _n > 135 kW	75	74	72
M ₃	P _n ≤ 150 kW	76	74	73
	150 kW < P _n ≤ 250 kW	78	77	76
	P _n > 250 kW	80	78	77

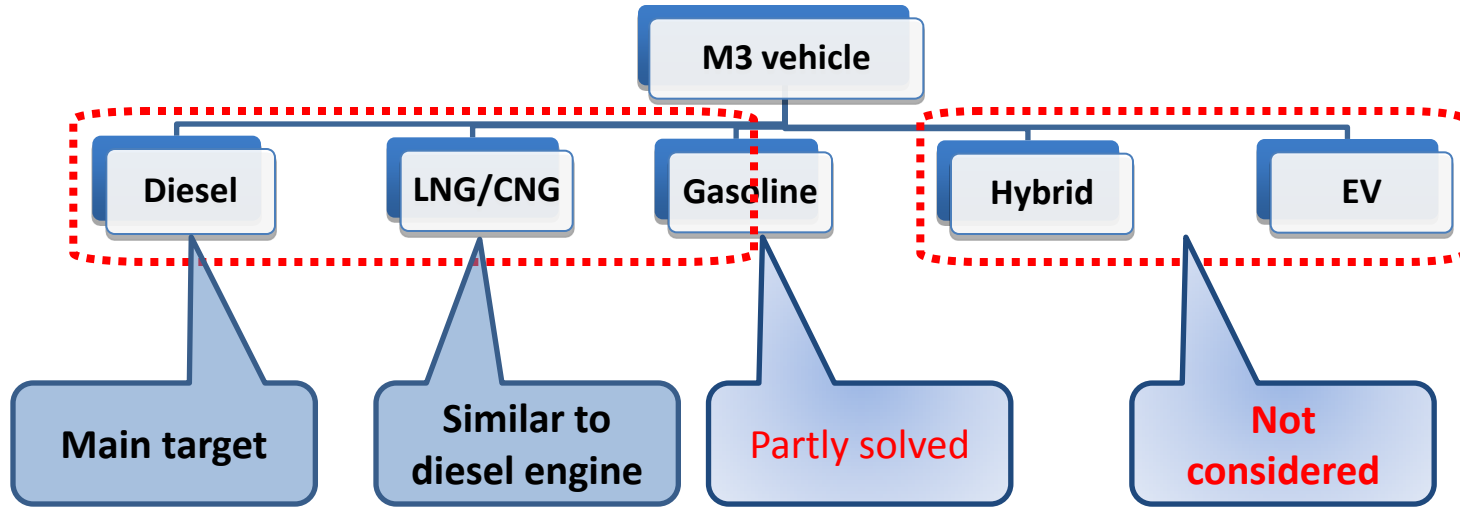
Length	P _n	GVM
6-7m	85-105kW	5200-7800kg
7-8m	88-147kW	5500-11500kg
8-9m	118-191kW	11000-14000kg
9-10m	147-191kW	12500-14000kg



Products parameters of China M3

There will still be problems with the sub-categories level of rated engine power, even we only consider the traditional buses and coaches.

R51-03 for M3 categories



1. We are making limit value for M3 buses and coaches, but not for diesel engine with certain exhaust level only.
2. The test engine speed percentage and sub-categories based on the rated power of diesel engines will always meet problems for other engine types.

Suggestions

- **Add some new vehicle sub-categories.**

- Set different rated engine power sub-categories for gasoline, EV, Hybrid, LNG & CNG.

- **Use some new definition for engine power**

- Do not use the rated engine power for EV, but use the **peak power**.

- **Not only use the engine power but also use complete vehicle parameters for sub-categories**

- If the engine power can not cover all situation of M3 categories, some other stable parameters of complete vehicle can also be considered together.

- **Build up new regulation for new technology**

- Build up new regulation systems for EV separately, with considering pass-by noise, high frequency noise, QRTV, ASEP.....



Thanks for your attention



Web site: www.catarc.org.cn

