Transmitted by the expert from China

Informal document GRB-66-21
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agenda item 4(a))

Noise problems and driving conditions in China based on ECE R51.03

CHINA AUTOMOTIVE TECHNOLOGY & RESEARCH CENTER

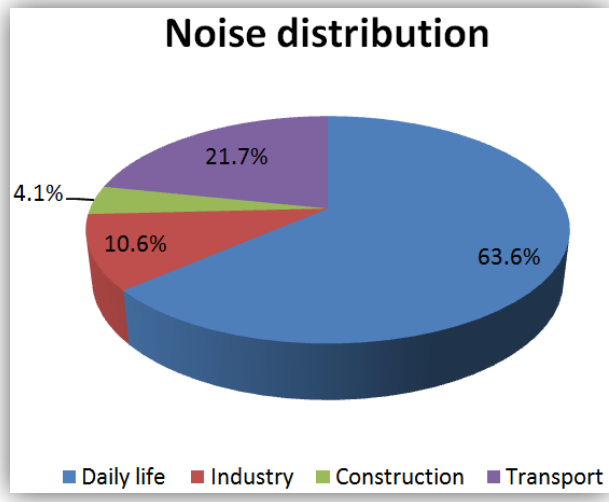
Noise function areas of China

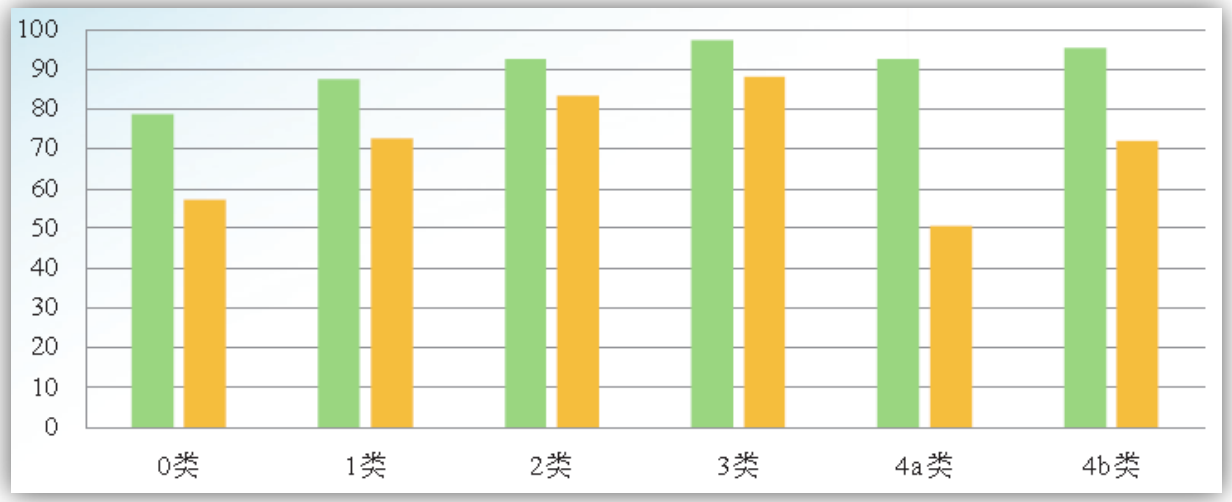
- **GB 3096 《Environment quality standard for noise》**
  - The main parameters considered are L_{day} and L_{night}.
  - L_{max} is also very important for the evaluation of burst noise (limit value+15dB(A)).

Noise area categories	Limit values for different time periods (L_{eq}, dB(A))	
	Day time (6:00-22:00)	Night time (22:00-6:00)
0	50	40
1	55	45
2	60	50
3	65	55
4a	70	55
4b	70	60

*4a category area contains nearly all road transport system (highway, express, arterials, main streets and residential streets), tram and metro (above the ground).

Transport noise problems of China





* Figure from the <China Environmental Noise Prevention and Control Annual Report(2017)>.

The figure left shows that the transport noise take 21.7% contribution to the environment noise of China in the year 2016, and the figure right shows that the noise problems in the 4a areas (near the roads) are extremely serious, especially during the night. Only 50% of 4a areas can fulfill the requirements of GB 3096, and in the big cities this rate is lower than 20% .

Complains about transport noise

1. Most of complains are for metro, high way, express and main streets close to the residential areas.
2. It is very difficult to find the defendants for transport noise.

*Figure from: Ms. XIE HUI from Tianjin environment monitoring center, <Case study on typical noise complains>, Workshops on noise environment inspection and management, April, 2017.

Improvement for transport noise

- **Noise environment regional planning**

  - Noise assessment is necessary, especially for building highway, express, arterials and main streets.

- **Control noise resource**

  - **Type approval for HDV, LDV and motor cycles**.

  - Speed limitation, and horn prohibition.

  - Change the road from white into black (quiet road surface), **quiet tyre**.

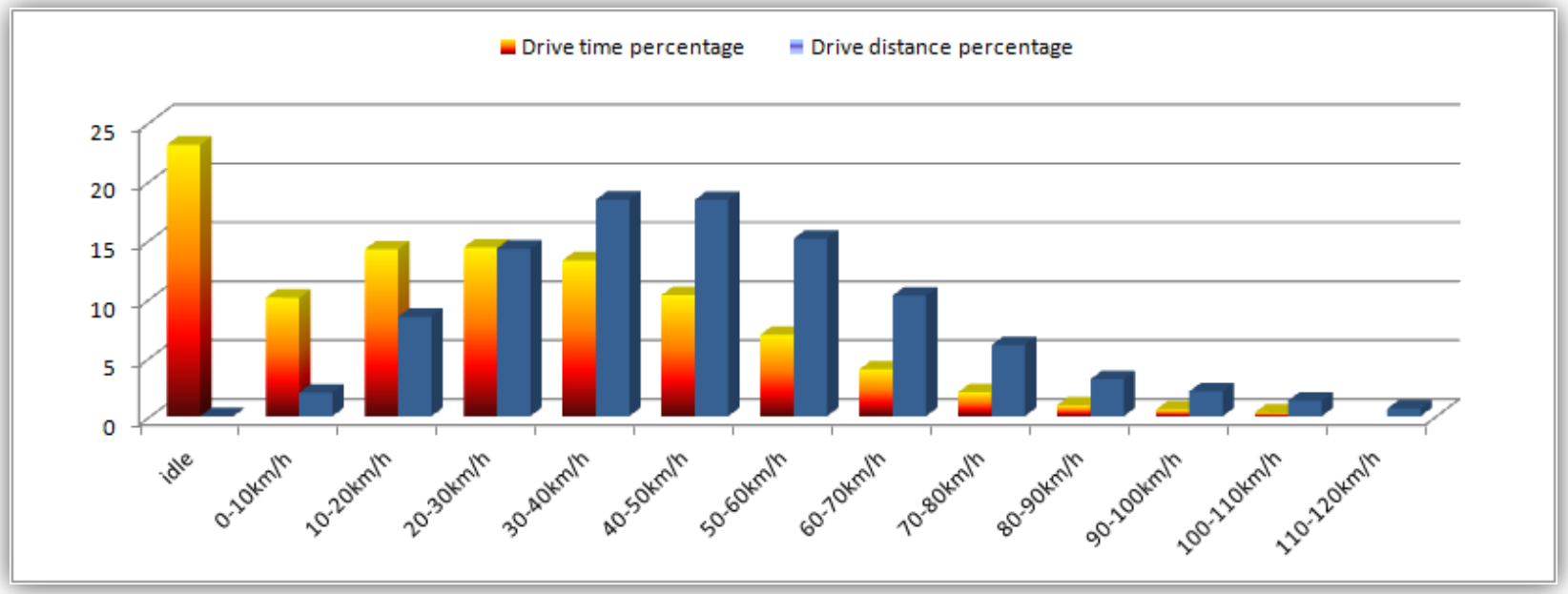
- **Control the path**

  - Sound barriers, green the road and environment.

- **Strength the building**

  - Soundproof windows or walls.

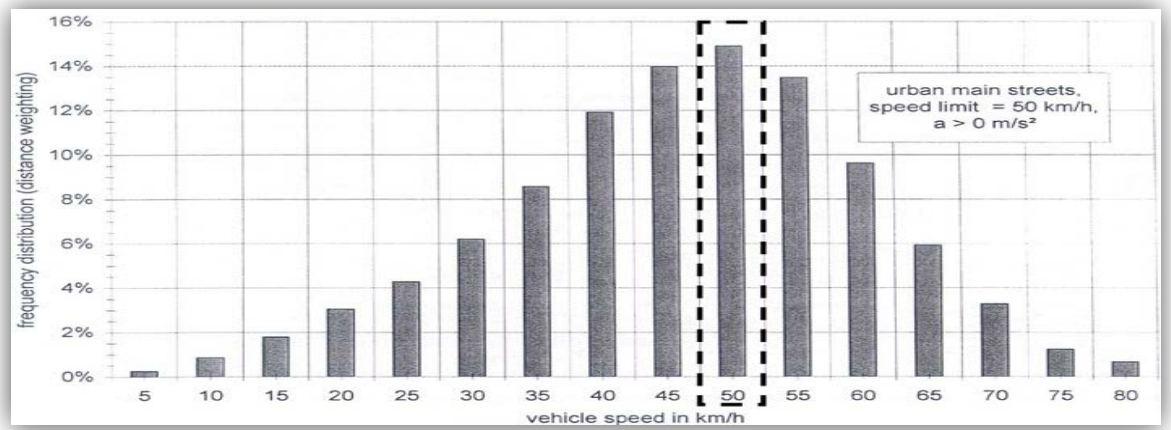
Driving conditions of China

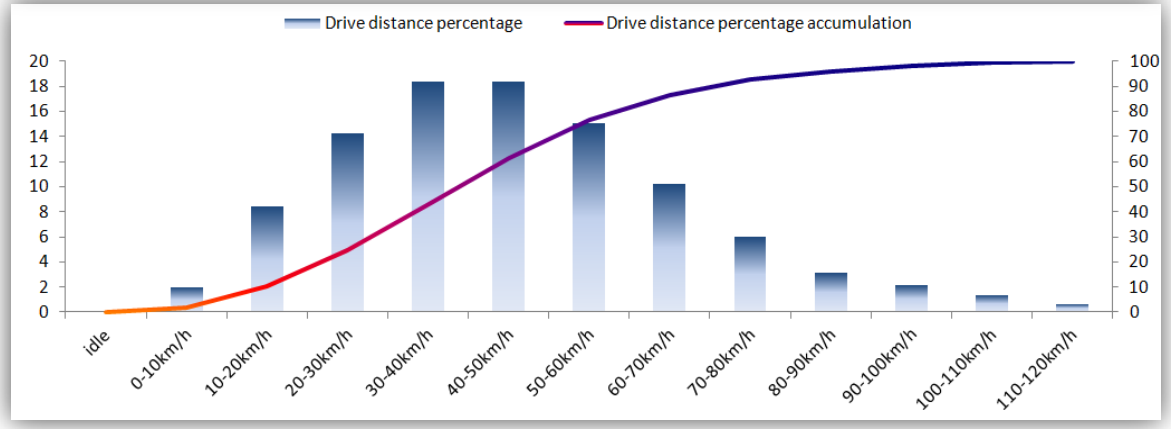


1. **For most time, vehicles are idle and then driven at speed between 10-40km/h in China.**
2. **For most distance, vehicles are driven at speed between 30-50km/h with the center speed nearly 40km/h.**

Remark: This figure is analyzed from part data of M1 category within two months 2017 of **Project of China Automotive Test Cycles** and for the official results please wait for the final report of Project of China Automotive Test Cycles.

Speed comparison between China and ISO

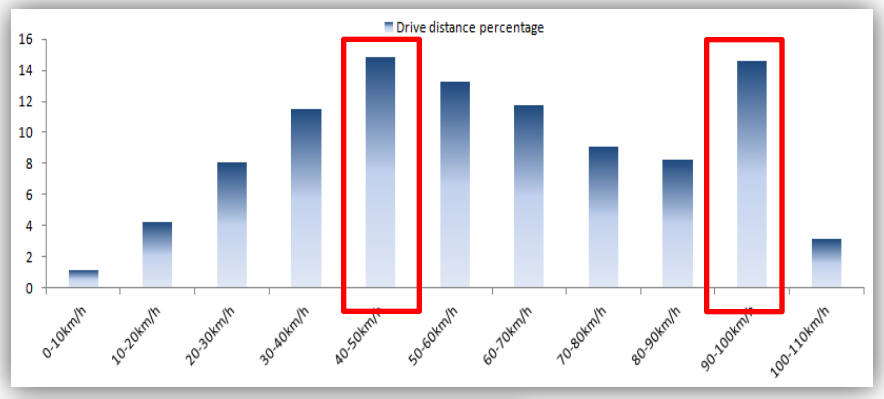


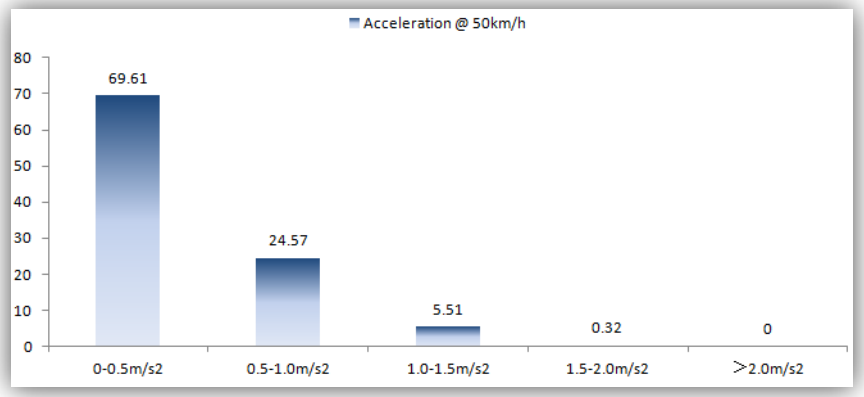


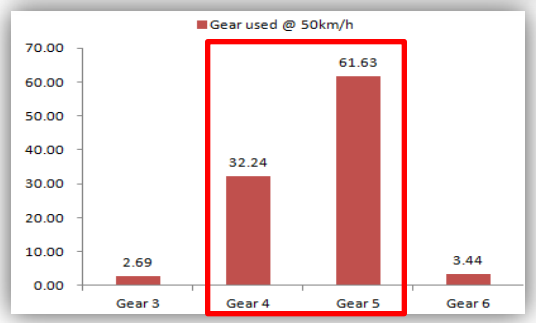
1. The vehicle speed frequency distribution based on distance weighting seems differently between China and ISO, that the speed of China is more dispersive and lower than ISO.
2. The speed frequency distribution is the cornerstone of test method of ISO 362-1 and also ECE R51.03.
3. The speed frequency distribution of ISO is from the year 1998 and for medium city and the China test cycles data is from the year 2017 for 40 cities.

Case study on China test cycles and R51.03

P_n (kW)	S (r/min)	PMR	Gear No.	a_{urban} (m/s2)	a_{ref} (m/s2)	$Gear_{test}$	$a_{wot\ test}$ (m/s2)	$v_{PP'}$(km/h)	n_{BB_ASEP}(r/min)
192	5400	112	AT(6 gears)	1.20	1.85	**3**	1.69	**50**	**3786**







ASEP	$v_{AA'}$ (km/h)	$n_{AA'}$ (r/min)	$v_{BB'}$ (km/h)	$n_{BB'}$ (r/min)
Gear 2	20.6	3786	48.9	3806
Gear 2	21.6	3636	46.1	3636

Research needed

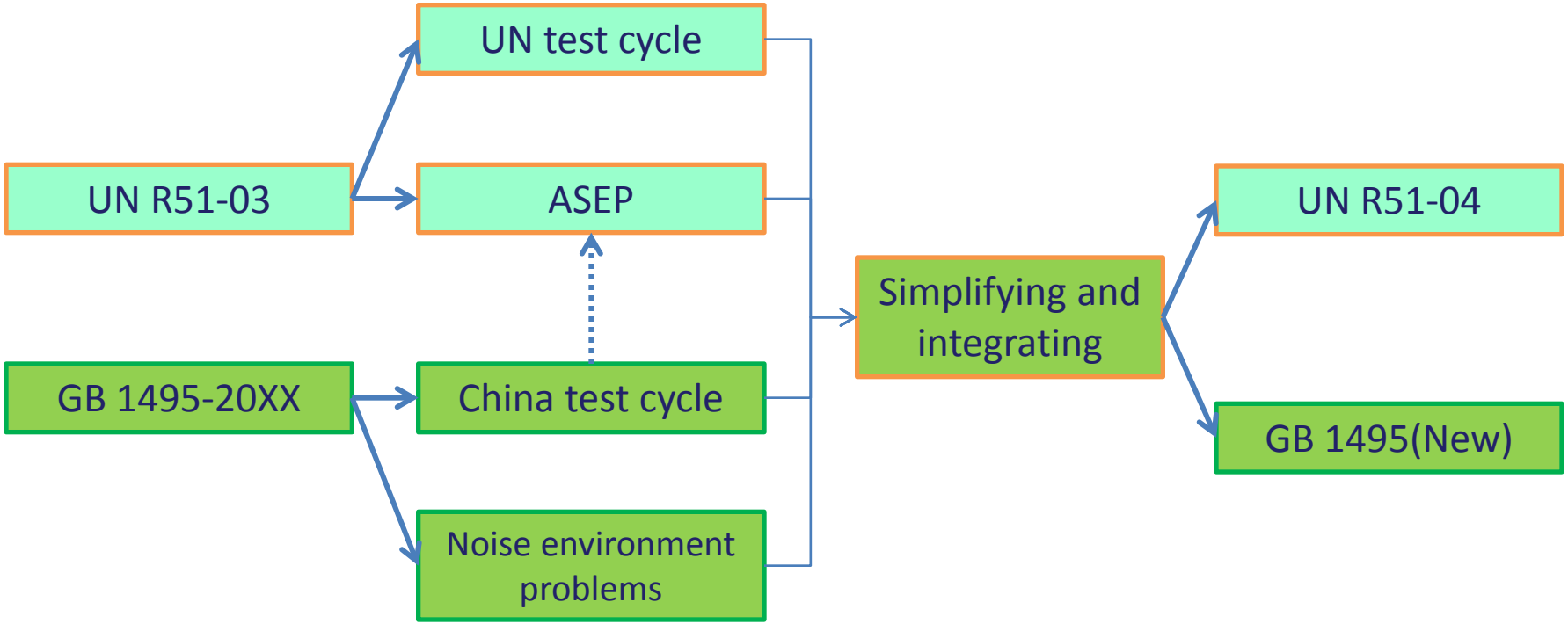
- **Relationship between test cycles and noise problems.**

  - The China test cycles can only find the vehicle behaviors on road and speed, acceleration, distance frequencies, but high frequency does not mean serious noise problems.

- **A test method to cover the driving behaviors and noise problems both**

  - It is important and at the same time difficult in building a test method to cover both the main vehicle behaviors and the actual noise problems on road.

Vision for future on noise



Thanks for your attention

Web site： www.catarc.org.cn