



# Update of EV GB Standards in China

March, 2018

# Background

## Plans in adopting the GTR into their national regulation

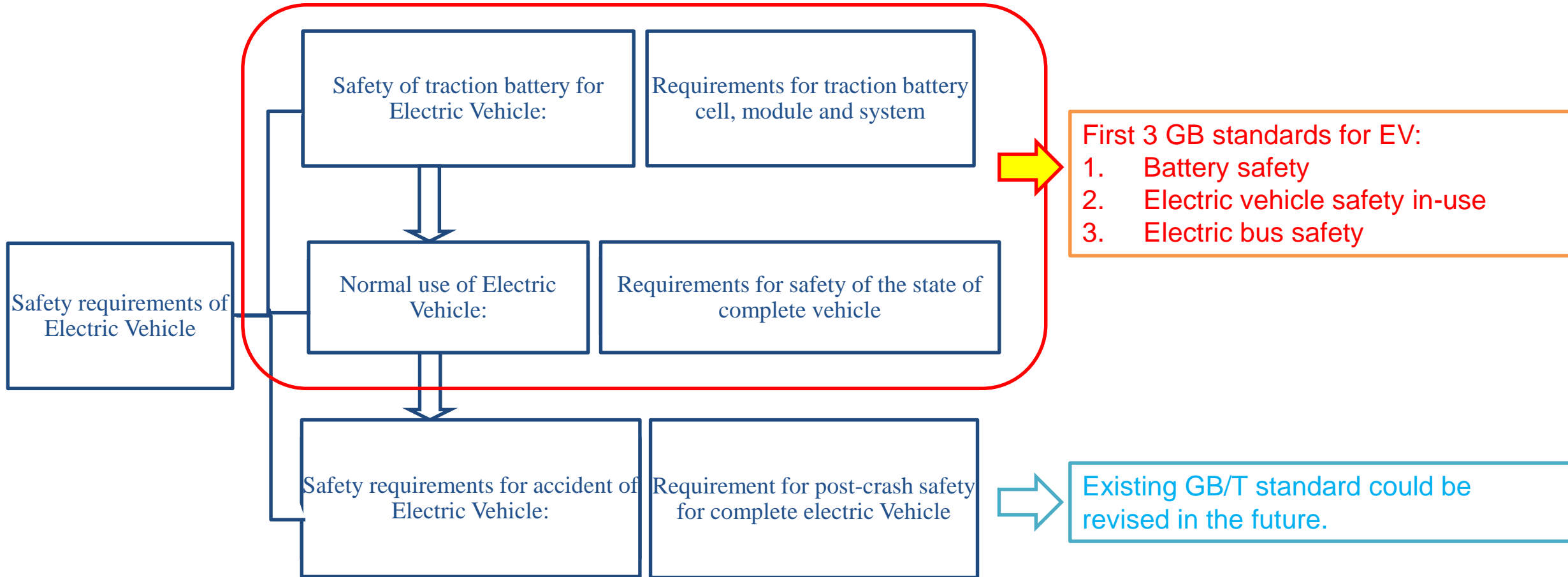
Contracting parties	Timeline
U.S.	The United States start the adopting process of phase 1 of the GTR <b>upon its completion</b> . Partial adoption is likely, based on the outcome of a cost-benefit study.
Canada	Canada will <b>wait for a completion of Phase 2</b> of the GTR before the requirements would be adopted into the national regulation.
EC	EC will propose the revision of R100 at the GRSP <b>after the establishment of Phase 1 of the GTR regardless of finalization of Phase 2</b> .
Japan	Japan has the intention to introduce the GTR into their national requirements after UN R100 is revised accordingly. Transposition of Phase 1 <b>may proceed without having to wait for Phase 2 completion</b> .
Korea	Korea will transpose Phase 1 of the GTR as soon as possible <b>without having to wait for Phase 2</b> .
China	China <b>has already started</b> the adoption work and is introducing the GTR into their 3 national GB standards.

Information source: EVS12-04

GB is mandatory standard in China, GB/T is recommended standard.

# Background

## First 3 GB standards for Electric vehicle safety



# Background

## Corresponding relation between China's safety standards and EVS-GTR

	EVS-GTR	China's standard	Comparison
1	5.1 Requirements of a vehicle with regard to its electrical safety - in-use	GB Electric vehicle safety requirement	The structure is similar and much effort has been done for the harmonization.
2	5.2 Requirements of a vehicle with regard to its electrical safety - post-crash	GB/T 31498 The safety requirement of electric vehicle post crash	Heavy duty vehicles not included for both standards.
3	5.3 Requirements with regard to installation and functionality of REESS	GB Electric vehicle safety requirement & GB Electric vehicle Li-ion battery safety requirement	2 GB standard cover 5.3 in GTR except 5.3.2 Warning in the event of operational failure of vehicle controls that manage REESS safe operation.
4	5.4 Requirements with regard to the safety of REESS - in-use	GB Electric vehicle Li-ion battery safety requirement	GB has requirement for cell level and much effort has been done for the harmonization.
5	5.5 Requirements with regard to the safety of REESS - post-crash	GB Electric vehicle Li-ion battery safety requirement	
6	7 Heavy duty vehicles – Performance requirements	GB Electric vehicle safety requirement & GB Electric Bus Safety	GB Electric Bus Safety added requirements for fire resistance, crash and etc.

# 1. GB Electric vehicle safety requirement

## Input and structure for GB

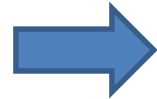
### **EVS-GTR**

**GB/T18384.1-2015**

**GB/T18384.2-2015**

**GB/T18384.3-2015**

- Standards at home and abroad
- Experience from accidents recently
- Consider the special working conditions in China
- Combine the experience from testing
- Overall consideration of technical development



**GB Electric  
vehicle safety  
requirement**

### ◆ Electric shock protection

- High voltage warning label
- Direct contact protection
- Indirect contact protection
- Water protection

### ◆ Functional safety protection

- Drive system on/off
- Warning
- Reverse driving
- Parking
- Interlock when charging

# 1. GB Electric vehicle safety requirement

No.	Item	GB/T 18384	EVS-GTR	GB/T18384+EVS-GTR	Other GB	New
1	High Voltage Marking		★			
2	Barriers and Enclosures		★			
3	Connectors		★			
4	Service Disconnect	★				
5	Charging Inlet	★				
6	Isolation Resistance					★
7	Isolation Resistance Monitoring				★	
8	Potential Equalization		★			
9	Low Energy	★				
10	Charging Inlet	★				
11	Water Protection		★			
12	Drive System Power on/off				★	
13	Driving				★	
14	Change Direction				★	
15	Parking				★	
16	Moving Forbidden in Charging		★			

## 2. GB Electric vehicle Li-ion battery safety requirement-cell

NO	Test items	GB/T 31485-2015 (cell + module)	IEC 62660-3 ( cell )	GB ( cell )	Key points
1	Overcharge	O	O	O	◆1 $I_1$ or the current specified by the manufacturer and not less than $I_3$ ◆Two options for comments collection: 1) $1.2 * U_{max}$ or 120%SOC 2) $1.1 * U_{max}$ or 115%SOC
2	Over-discharge	O	O	O	Delete " no leakage" in safety requirement
3	Short circuit	O	O	O	
4	Heating	O	O	O	The same with GB/T 31485
5	Temperature cycling	O	O	O	
6	Crush	O	O	O	◆Crush speed : $\leq 2\text{mm/s}$ ◆Crush force : 100kN ◆Add : keep 10min
7	Vibration	-	O	-	
8	Mechanical shock	-	O	-	Does not consider transportation and production safety
9	Drop	O	-	-	
10	Low atmospheric pressure	O	-	-	
11	Seawater immersion	O	-	-	( Cancel )
12	Nail	O	-	-	

✦ The test object is lithium ion battery cell, all requirements for modules are removed.

"O" included , "-" Not included

✦ If manufacturer can not provide lithium-ion battery cell that can work alone, lithium-ion battery modules could be used for testing.

## 2. GB Electric vehicle Li-ion battery safety requirement-pack or system

NO	category	Test items	GBT-31467.3	EVS-GTR	GB	Key points
1	Mechanical safety	Vibration	○	○	○	◆ GB PSD consists of "random+ fixed frequency" ◆ GTR: Swept Vibration
2		Mechanical Shock	○	○	○	The same with GB/T 31467.3, (EVS-GTR)
3		Simulation impact	○	-	○	The same with GB/T 31467.3 (EVS-GTR: mechanical impact)
4		Squeeze test	○	○	○	The same with GB/T 31467.3 Amend.1 (EVS-GTR: Mechanical integrity)
5		Drop	○	-	-	cancelled from GB/T, same with EVS-GTR
6		Turn over	○	-	-	
7	Environment safety	Temperature shock	○	○	○	The same with GB/T 31467.3, GB: -40°C ~ 85°C; EVS-GTR: -40°C ~ 60°C
8		Damp heat cycle	○	-	○	The same with GB/T 31467.3, EVS-GTR: no
9		High altitude	○	-	○	
10		Salt spray	○	-	○	◆ Evaluate electrical safety, instead of corrosion reliability ◆ Period: 6 days; exempt pack in luggage compartment ◆ EVS-GTR: no
11	Water immersion	○	-	○	◆ Test object: The DUT which has pass the vibration test ◆ Refer to ISO WD 6469-1 6th, immersion into salt water or IPX7, ◆ EVS-GTR: no	
12	Thermal stability-Thermal propagation	-	○	○	◆ Two options, but not specified PASS or not requirement: 1) Coordinate phase I conclusion of EVS-GTR→ Annex C 2) Verification experiment to record the thermal propagation result→ Annex D	
	Thermal stability-External fire	○	○	○	◆ Refer to EVS-GTR , safety requirement : no explosion	
13	Electric safety & System protection	Over-temperature protection	○	○	○	◆ Coordinate phase I conclusion of EVS-GTR, but low-temperature protection is exempted ( no detailed method of in EVS-GTR)
14		Short-circuit protection	○	○	○	
15		Overcharge protection	○	○	○	
16		Over-discharge protection	○	○	○	
17		Low-temperature protection	-	○	-	
18	Overcurrent protection	-	○	○		

"○" included , "-" Not included



# 3. GB Electric Bus Safety

- ❑ Electric bus should meet GB Electric vehicle safety requirement first, then GB Electric Bus Safety has increased several requirements based on its safety technical characteristics, for example, flame retardant mater for battery packs and water protection.
  
- ❑ New requirements in GB compared to EVS-GTR:
  - Flame retardant properties of interior material of battery pack;
  - Flame retardant requirements for insulation materials used in class B voltage components;
  - Flame retardant materials used in rechargeable energy storage systems;
  - Increasing water protection: water depth increased from 100mm to 300mm;
  - Minimum monitoring unit thermal runaway safety requirements;
  - Vehicle level crash test and exemption conditions.

# Summary and next step

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- China EV safety standards are harmonizing with global regulations.
- Based on GB/T standards and industry experiences, GB are under discussion.
- 3 GB standards are planned to be voted in 2018 and go through WTO notification.
- Open for comments from experts from other countries.

Thanks for your attention !