

Recent Topics for Tyre Regulations and Standards

The 11th Public and Private Joint Forum in Asian Region
7th -8th December, 2021



JAPAN AUTOMOBILE STANDARDS INTERNATIONALIZATION CENTER



The Japan Automobile Tyre Manufacturers Association

MOTOhide TAKASUGI

Vice Chairman

Tyre Standard Verification Sub Committee of JATMA
(Japan Automobile Tyre Manufacturers Association)

Senior Engineer

Tire Quality Assurance Department
The YOKOHAMA RUBBER CO.,LTD

Contents

1. Tyre is one of the Important Vehicle Parts
2. Tyre is a Unique Product with High Level Standardization
3. Latest Situation of UN Regulations for Tyres
4. Update : Elimination of Plunger Energy(PE) and Bead Unseating(BU) from Tyre Regulations
5. What is Expected for Electrified Vehicle(EV) tyres ?
-High Load Capacity (HLC) Tyres -
6. Conclusion

1. Tyre is one of the Important Vehicle Parts

Pneumatic tyre is one of the most important vehicle parts to realize vehicle dynamic behavior.



Supporting the load



Absorbing the vibration



Transmitting the traction

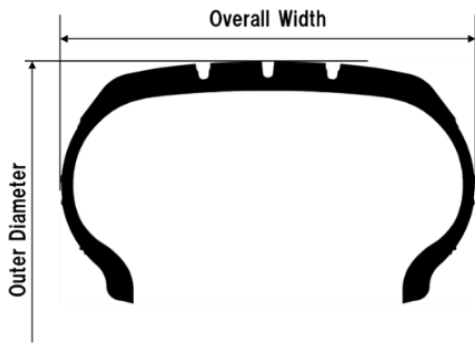


Changing & keeping the direction

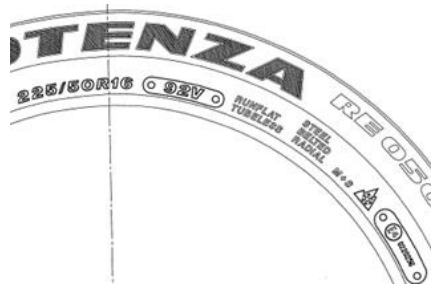


Tyres are made of composite materials

In order to keep vehicle safety, Safety Regulations related to tyre have been developed under the 1958 Agreement.



Dimension



Marking



Load/speed & Endurance test

2. Tyre is a Unique Product with High Level Standardization

- ✓ Tyre is a simple but unique product which have been highly standardized.
(Size designation/Dimension/Load Capacity/Speed Category)
 - Anyone can get adequate tyres mainly by size information only from anywhere around the world

- ✓ Mutual Recognition of Arrangement (MRA) is one of the measure to maximize such tire characteristics, because, for the industry in your country,
 - Certificates or Test Reports of your country will be effective around the world, and
 - For such documents to be effective, it will be important for your safety rules to be in harmony with other country's rules, and
 - To be in harmony with other country's rule, your requirement should harmonize with global technical regulation.

However,

2. Tyre is a Unique Product with High Level Standardization

- ✓ However, for the government,
 - a lot of effort is taken to consolidate and maintain your individual rules to meet global rules.

- ✓ UN Regulations for tyres are well harmonized and its common rules reflect latest technology in each case
 - It means that introduction of UN Regulations will be easy way to introduce latest harmonized Safety Regulations in your country.

- ✓ More importantly, UN regulations for tyres have been accepted in many countries and/or region around the world.

UN Regulations will work effectively in your countries through framework of ASEAN MRA

3. Latest Situation of UN Regulations for Tyres

Outline of main UN Regulations on tyre safety

UN Reg. 30-02	Pneumatic Tyres for Motor Vehicles and Their Trailers
Scope	New pneumatic tyres designed primarily for vehicles of categories M ₁ , N ₁ , O ₁ and O ₂
Requirement	Dimensions, Marking, Load/speed performance test (High speed test / Runflat endurance test), Tread Wear Indicator
Issued date	15/Mar/1981
Latest version	Supplement 23 (Date of entry into force: 30 September 2021)
UN Reg. 54-00	Pneumatic Tyres for Commercial Vehicles and Their Trailers
Scope	New pneumatic tyres designed primarily for vehicles of categories M ₂ , M ₃ , N, O ₃ and O ₄
Requirement	Dimensions, Marking, Load/speed endurance test (High speed test / Endurance test)
Issued date	1/Mar/1983
Latest version	Supplement 24 (Date of entry into force: 30 September 2021)
UN Reg. 75-00	Pneumatic Tyres for L-Category Vehicles
Scope	New pneumatic tyres for vehicles of category L
Requirement	Dimensions, Marking, Load/speed performance test (High speed test), Dynamic growth of tyres
Issued date	1/Apr/1988
Latest version	Supplement 19 (Date of entry into force: 30 September 2021)

4. Update : Elimination of PE/BU from Tyre Regulations

The status of eliminating Plunger Energy and Bead Unseating requirements

Organization	Regulation /Standard	Status
ISO TC31	ISO 10191:2021	<ul style="list-style-type: none"> • Issued in Aug/2021 • PE/BU test methods were eliminated from radial structure tyres
NHTSA	FMVSS 139/109	<ul style="list-style-type: none"> • ANPRM* is issued in Jan/2019 (gathering the comment from stakeholders) • Watching ISO

* Advance Notice of Proposed Rulemaking

✓ This is never a retreat from safety

Committees or Organizations began to recognize that;

- radial tyres have enough strength for PE and BU because of its construction(steel belt/high stiffness)
 - it is not necessary to verify its performance as requirement
- ✓ UN Regulations for tyres do not require PE/BU from its first publication. And recently UN Regulations eliminated overall diameter measurement after drum testing through validation by actual performance.
 - ✓ UN Regulations are always considering **what kind of requirements is essentially necessary for Safety Regulations.**

5. What is Expected for Electrified Vehicle(EV) Tyres?

Main Functions of tyre



Supporting



Absorbing



Transmitting

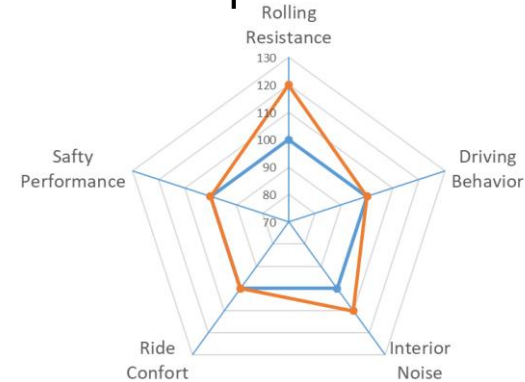


Changing & Keeping



These functions are also common for EV Tyres, and we cannot find out additional special function for EV tyres

Tyre Performance requirements



Focusing demand of EV Manufacturers, some specific requests are expected

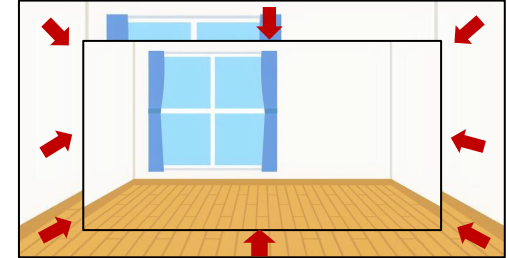
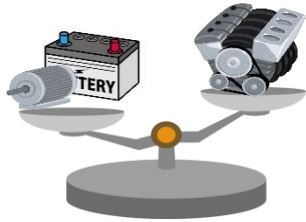
Expected requests by EV manufacturers

- Longer cruising distance ⇒ Lower Rolling Resistance
- Satisfying both Lower Rolling Resistance and Safety performance (esp. Wet/Dry Breaking)
- Reduction of Interior Noise (bigger contribution of tyres)

But these development items are also expected to Internal Combustion Engine Vehicle (IC Engine Vehicle).
And these are in the scope of Fine Tuning and in the competition to produce better products as usual.

5. What is Expected for Electrified Vehicle Tyres?

Specific Demands for EV tyres



EV is heavier than IC Engine Vehicle. According to one simulation, +50kg/tyre is expected

To meet this demand, Larger size tyre shall be installed on EV. Because tyre load capacity is fixed by internal air volume therefore, larger size tyres have higher load capacity.

Larger size tyres will make "smaller passenger space" or it is "impossible to install larger tyres" in case of modifying current vehicles to EV

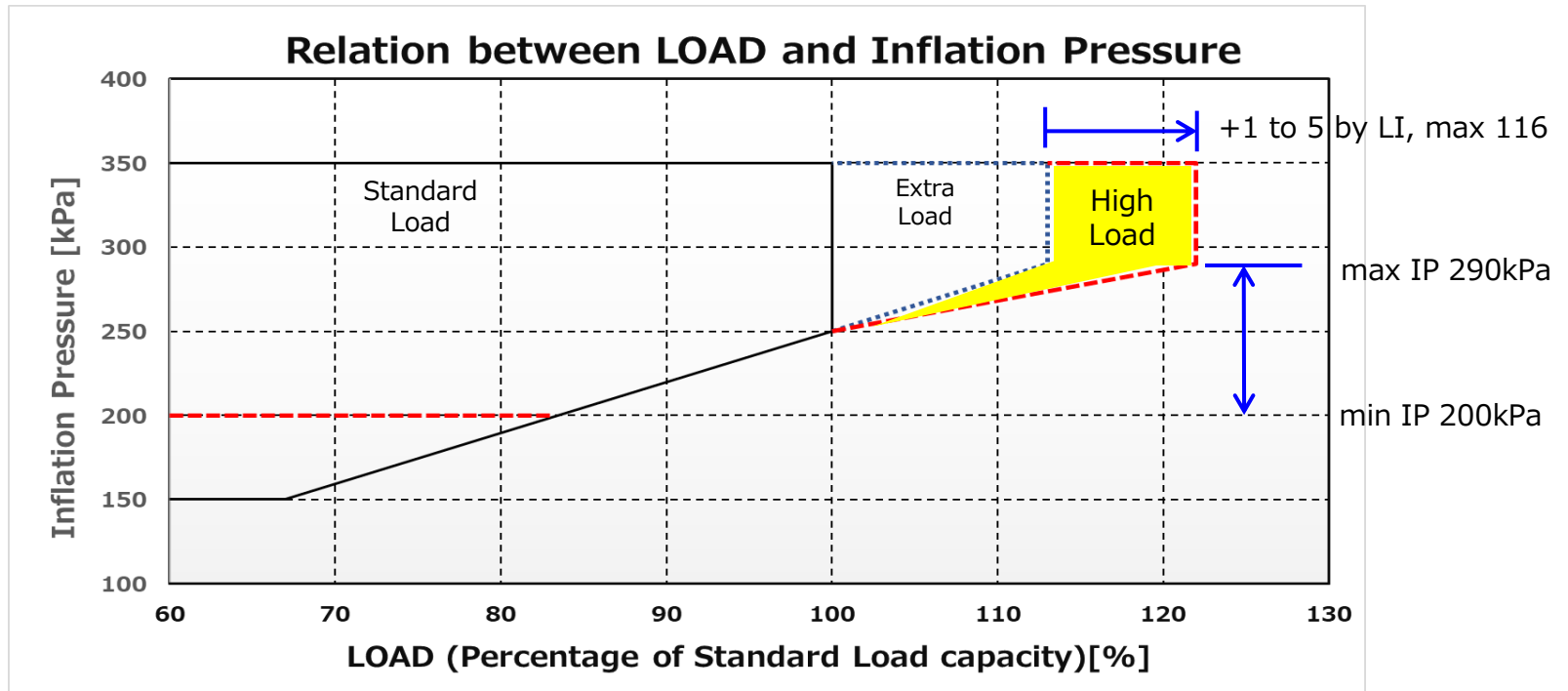


ETRTO decided modification of their Standards Manual and High Load Capacity Tyre debuted in 2021 Edition

5. What is Expected for Electrified Vehicle Tyres?

What is High Load Capacity(HLC) in standard? (ETRTO S/M Case)

- One of the **EXTRA LOAD** tyres
- Adding the load capacity on current EXTRA LOAD tyres
- Keeping the max. Permissible Inflation Pressure (290kPa)



Sample

Load Capacity Type	Size Designation	LI (kg)	Max. Permissible IP
Standard Load	245/40R18	93 (650)	250
Extra Load	245/40R18	97 (730)	290
High Load Capacity	HL 245/40R18	99 (775)	290

Prefix "HL" is still under discussion

5. What is Expected for Electrified Vehicle Tyres?

• Is HLC tyre focused on only Electrical Vehicles ?

No.

- ✓ HLC has merits for not only Electrified Vehicles but also IC Engine Vehicles.
- ✓ HLC tyres are smaller than current tyres with the same load capacity.
- ✓ By replacing current tyres to HLC tyres with the same load capacity, IC Engine Vehicle designers will also get the measure to realize larger passenger space.
- ✓ Additionally, this concept will potentially meet high level autonomous driving vehicles. For example, all equipment for driving operation will not be necessary for complete autonomous driving. The space for these equipment will be replaced to cargo space for a commercial vehicle case. It means more load capacity is required for tyres.

• Was UN Regulations amended to approve HLC tyre?

No.

- ✓ Because HLC tyre is one of the Extra Load tyres, HLC tyres are evaluated and guaranteed by the same method as well as its result. Actually, many tyre manufacturers have the type approval of HLC tyres already.
- ✓ This fact will show the flexibility of UN Regulations

6. Conclusion

- ✓ Tyre is one of the important vehicle parts for vehicle dynamic behavior by four essential functions (supporting, absorbing, transmitting, keeping and changing)
- ✓ Safety Regulations for tyres are issued and managed to ensure these essential functions.
- ✓ MRA will be efficient for global development of tyre industries of each country. Certification of your country will be accepted in the world.
- ✓ PE/BU requirement of RADIAL tyres were eliminated from ISO, and some countries already started discussion of elimination of these requirement from their rules internally.
- ✓ HLC tyre has been standardized to meet the demand from the situation that EV are heavier than IC Engine Vehicles. Additionally this new standard potentially meet the needs of autonomous driving vehicles.
- ✓ UN Regulations meet HLC standard without any amendments.

Thank you for your attention