***June 7, 2018***

TYREGTR-18-15

Agenda item 4.1

**USTMA Perspective on**

**Potential Elimination of Load Range (and Ply Rating) from the GTR-Tyres**

**Load Range (Ply Rating) – Load Index Issue**

**Introduction:**

Based on the current proposed GTR-Tyres (Phase 2a) language, LT/C tyres test prescriptions are based on specific ranges of reference inflation pressures instead of Load Ranges. These established inflation pressure ranges were established to include the existing USA Load Range inflation pressure values as well as relevant ETRTO C-type reference inflation pressures. Additionally, these current test prescriptions define a singular test inflation for each reference inflation pressure range to ensure common test severity. With the addition of this revised language, identifying a specific Load Range and actually marking a specific Load Range (or ply rating) on each tire is no longer needed*.*

**Defining Tires in Regulations**

Regulation Complexity:

The US FMVSS 139 (CMVS 139) differentiates tires by load range, using an alphabetic character typically ranging from C to E for light truck tires. Specifically, test protocols and requirements (inflation pressure or required strength) are based on the tire load range. Additionally, the US regulation currently requires that the load range *‘letter’* be marked on the tire: ***(S5.5 (d) …and for LT tires, the letter designating the tire load range;…)***

In contrast, UNECE Regulation 54 does not acknowledge load range. The numeric

load index, directly associated with the tire maximum load, along with the speed

symbol (the two terms that comprise the service description) generally determine

which test prescription must be followed. The vast majority of tires within the scope of the GTR and sold in North America voluntarily contain service description markings. However, there is virtually no correlation between these two terms Load Range and Load Index.

The load index value which is specified by the principle tire standardizing bodies’

(ETRTO, JATMA, TRA) Standards Manual for each tire size at a given reference

pressure is straightforward. The load index value directly relates to the tire load

capacity. Tables of Load Index values can be found in the referenced Standards

Manuals as well as ISO standards (ISO 4000-1, ISO 4209-1) and UN-ECE Regulation 54. ECE Regulation 54 test specifications are generally based on a percentage of the tire load index (LI).

FMVSS 139 stipulates different test procedures and/or requirements based on the

tire load range. However, the US code does not specify how a tire manufacturer is

to select an appropriate load range for a specific tire. The most widely recognized source of information to establish the relevant load range is found in the US TRA publication, Engineering Design Information (EDI). TRA established an inflation pressure for each load range, dependent on the nominal section width of the tire. The following table, edited from TRA EDI p.2-14 (rev 0, dated 2/14/17) provides illustrations:



Note: SN refers to the tire nominal section width.

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The inflation pressure commonly associated with load range E is 550 kPa (80 psi).

However, this is only true if the nominal section width is less than or equal to 295 mm (or 11.50” for high-flotation sizing). For section widths between 305 and 395 mm, the reference pressure for load range E tires is 450 kPa (65 psi); the pressures normally associated with load range D tires. Tire experts who are familiar with TRA guidelines have no trouble understanding this concept and assigning the correct load range for a given tire. But for those who are not as well versed; this can be a source of significant confusion.

Not only do FMVSS 119 and 139 make no reference to a procedure for assigning Load

Range, it is also silent on the specification of the tire reference inflation pressure (Light Truck tires do not have specified “Maximum Permissible Inflation Pressures” as required for passenger car tires (FMVSS 139 S5.5.6 use of the term “maximum permissible inflation pressure” is misleading/confusing). These two factors make it virtually impossible to consistently assign a Load Range for an ETRTO metric tire, or to tires now entering the North American market from some non-European countries.

The following table provides an illustration:

Two columns have been added to the left side of the previous table (TRA Load Range from EDI p. 2-14) to list the standardized inflation pressures used by ETRTO for ‘C-type’ light truck tires. These values (based on kPa, with conversion to psi shown for reference only) are shown in relation to the TRA standardized Load Range inflations.



It should be clear from this table, that if an ETRTO tire has a reference pressure of

any value other than 350 kPa, or 450 kPa, there is no absolute prescription

to assign an appropriate load range.

Tire manufacturers are faced with this dilemma today for most tire sizes that are

standardized outside of TRA. It is not known what basis or procedures any given tire

manufacturer may use to assign a Load Range, or even if a manufacturer is consistent across different tire types and sizes. Similarly, there is no direction provided to ensure that the tire reference pressure relates to any FMVSS 139 or 119 specified test pressure (FMVSS 139 references the Light Truck Tire Strength Test listed in S7.3 of §571.119. (As mentioned in the Introduction, Tire Industry members have created a table to provide guidance for the relevant test inflation pressure identified within the GTR-Tyres. However, this alone still does not solve the Load Range-Ply Rating issue.)

The Load Range has no absolute correlation to the load index value. The load index

(or maximum load) is a function of the tire size and reference inflation pressure.

There can be, and in fact exists today, significant overlap in load index values across

load ranges. The following table, based on a review of the 2018 TRA Year Book,

provides an illustration:

**TRA Load Index (LI) Range**

**(LT metric tires only – for illustrative purposes)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ***Load Range*** | **C** | **D** | **E** | **F** |
| Minimum LI | 85 | 96 | 104 | 116 |
| Maximum LI | 123 | 130 | 130 | 128 |

 **‘Ply Rating’:**

The term “ply rating” is a historical term that has limited usage today. Within North America, the term is not generally used for highway tires. It is used for off-the-road, industrial, and agricultural tires. It is found in some standards manuals (JATMA for example) for some limited tire categories. China has proposed that ‘Ply Rating’ be used either instead of or in addition to Load Range within the GTR-Tyres.

The TRA Engineering Design Information (p. 3-21) shows a table of Load Range – Ply Rating Equivalencies (the purpose within TRA is to calculate parameters associated with load carrying capacity). It is reproduced in part for reference:

|  |  |
| --- | --- |
| Load Range | Ply Rating |
| A | 2 |
| B | 4 |
| C | 6 |
| D | 8 |
| E | 10 |
| F | 12 |
| G | 14 |
| H | 16 |

*Load Range is the U.S. regulatory term for highway tires*

In practical terms, the ply rating designation provides minimal value. From a

historical perspective, a review of TRA Year Books shows the following definition of

ply rating as published in the 1947-48 Year Book:

*DEFINITION OF TERM “PLY RATING”*

*The term “Ply Rating” is used to identify a given tire with its maximum recommended load when used in a specific type of service. It is an index of tire strength and does not necessarily represent the number of cord plies in the tire.*

The general recollection of several long-time industry members was that the origin of

the ply rating term was based on the usage of cotton cord as a bias tire ply material.

Reference:

* The Tire and Rim Association, Inc. (TRA)
* Japan Automobile Tire Manufacturers Association(JATMA)
* European Tire and Rim Technical Organization

**Summary and Future Action Plan:**

There is no good methodology on how to integrate the Load Range nomenclature

with the international Load Index system. To address this situation, the USTMA and tire industry members of the GTR-Tyres Informal Working Group suggest the following:

1. Seek consensus with Transport Canada, NHTSA, other contracting parties and industry members on this approach.

1. NHTSA and Transport Canada acknowledge and adopt the Load Index system for an update to FMVSS 139 (CMVTSR 139) for the purposes of the endurance, low inflation pressure endurance, high speed, strength and bead unseat tests and protocols. The Load Range requirement would continue to exist for a transition period. When appropriate, USTMA welcomes opportunities to eliminate the requirement for Load Range marking and make the necessary revisions to address regulatory requirements currently based on Load Range.

These efforts will facilitate further international harmonization and therefore global commerce, which is the ultimate goal of all GTRs.