For Comments Only

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Draft *Indian Standard*
AUTOMOTIVE VEHICLES- PNEUMATIC TYRES FOR COMMERICAL VEHICLES -DIAGONAL AND RADIAL PLY – SPECIFICATION
(First Revision of IS 15636)

Last date for receipt of comments is 30-03-2010

0 FOREWORD

(Formal Clause. Will be added later on)

This standard was first issued in 2005. This revision has been undertaken to include the latest sizes of tyres which have been introduced after the publication of the standard.

The tyre types/sizes given in this standard are for guidance only and reference may be made to Indian Tyre Technical Advisory Committee (ITTAC) Manual for any particular size of tyre which is not listed in this standard.

In preparing this standard, considerable assistance has been derived from the following standards:

AIS-044 (Part 1)	Automotive vehicles – Pneumatic tyres for commercial vehicles.
ECE R 54	Uniform provisions concerning the approval of pneumatic tyres for commercial vehicles and their trailers.
ISO 10454: 1993	Truck and bus tyres – Verifying tyre capabilities – Laboratory test methods
FMVSS 571.119	New pneumatic tires for vehicles other than passenger cars

In this standard SI units have been used, the unit of force, in Newton (N), of tyre load, in kilogram (kg) and of pressure, in Pascal (Pa). Their relationships are given below for information:

1 kgf = 9.806 65 N
1 kgf/cm^2 = 98.066 kPa.

The composition of the Committee responsible for formulation of this standard is given in Annex L.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2:1960 ‘Rules for rounding off numerical values (*revised*)’. The number of significant places in the rounded off value should be the same as that of the specified value in this standard.

1 SCOPE

This standard specifies the general, dimensional, and performance requirements of new pneumatic tyres designed primarily, but not only, for vehicles in categories M2, M3, N, T3 and T4. However, it does not apply to tyre types identified by speed category symbols corresponding to speeds below 80 km/h.

2 REFERENCES

The following standards contain provisions, which through reference in this text constitute provisions of the standard. At the time of publication, the edition indicated was valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent edition of the standard indicated below:

IS No.	*Title*
10694(Part 3):1991	Automotive vehicles-Rims-General requirements Part 3 Commercial vehicle rims (*first revision*)

3 TERMS, DEFINITIONS AND NOMENCLATURE

3.1 Tyre - An annular toroidal shaped inflatable envelope made of elastic materials, natural and/or synthetic rubber or a blend thereof, reinforced with a textile cord fabric casing enclosing multi-coil wire beadings. The tyre is so made that it can be used by mounting and inflating on the appropriate rim.

3.1.1 *Type of Pneumatic Tyre,* means a category of pneumatic tyres which do not differ in such essential respects as:

a) The manufacturers name and brand name;
b) Tyre-size designation;
c) Category of use :
    1) Normal: Normal-road-use tyres;
    2) Special: Special-use tyre, for example tyre for mixed use (both on and off the road) and/or
    3) Restricted speed: Snow tyre;
d) Structure (diagonal (bias-ply), (radial));
e) Speed category;
f) Load-capacity indices or maximum load and ply rating; and
g) Nominal cross-section: Dimension when fitted to a specified rim.

3.1.2 The nomenclature used is given in **Fig. 1**.

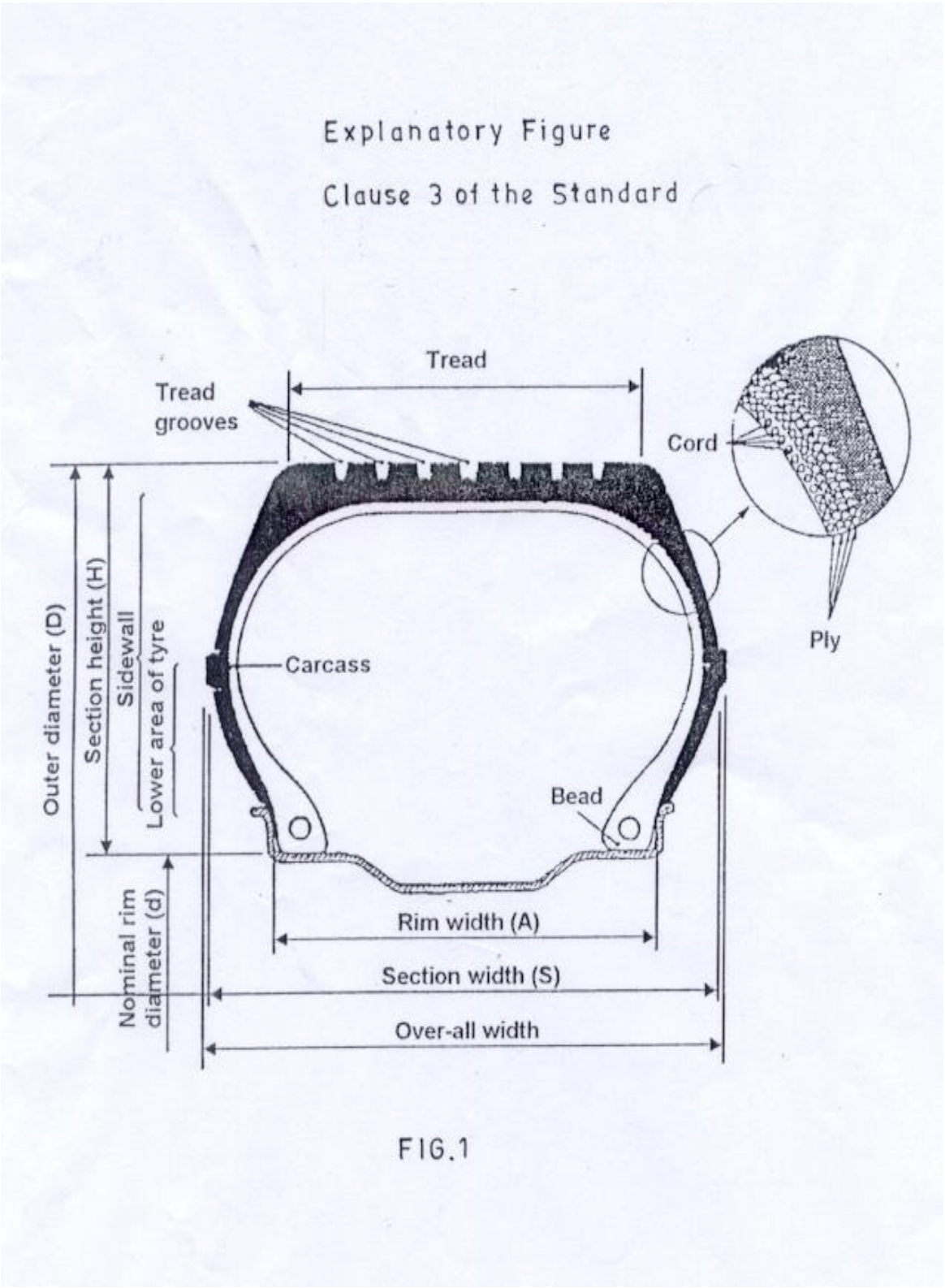


FIG.1

3.2 Snow Tyre - Tyre whose tread pattern and whose structure are primarily designed to ensure in mud and fresh or melting snow a performance better than of an ordinary (road-type) tyre. The tread pattern of a snow tyre generally consists of groove (rib) and /or solid block elements more widely spaced than on an ordinary (road type) tyre.

3.3 Structure - Tyre technical characteristics of the tyre's carcass. A distinction is made between the following structures in particular.

3.3.1 ***Diagonal or Bias-ply*** **–** Structure in which the ply cords extend to the beads and are laid at alternate angles substantially less than 90° to the centreline of the tread.

3.3.2 ***Radia****l* – Structure in which the ply cords extend to the beads and are laid substantially at 90° to the centreline of the tread, the carcass being stabilized by an essentially inextensible circumferential belt.

3.4 Bead - Part of a pneumatic tyre which is of such shape and structure as to fit the rim and to hold the tyre on it (*see* **Fig. 1**).

3.5 Cord - Strands forming the fabric of the plies in the pneumatic tyre.

3.6 Ply - Layer of rubber-coated parallel cords.

3.7 Carcass - Part of a pneumatic tyre other than the tread and the rubber sidewalls which, when inflated, bears the load.

3.8 Tread - Part of a pneumatic tyre which comes into contact with the ground protects the carcass against mechanical damage and contributes to ground adhesion.

3.9 Sidewall - Part of a pneumatic tyre between the tread and the area designed to be covered by the rim flange.

3.10 Lower Sidewall - Area included between the line of maximum section width of the tyre and the area designed to be covered by the rim flange.

3.11 Tread Groove - Space between two adjacent ribs and/or blocks in the tread pattern (*see* **Fig.1**).

3.12 Section Width(S) - Linear distance between the outsides of the sidewalls of an inflated pneumatic tyre, excluding elevations due to labelling (marking), decoration or protective bands or ribs.

3.13 Overall Width – Linear distance between the outsides of the sidewalls of an inflated pneumatic tyre, including labelling (marking), decoration and protective bands or ribs.

3.14 Section Height (H) - Distance equal to half the difference between the outer diameter of the tyre and the nominal rim diameter.

3.15 Nominal Aspect Ratio (Ra) - Hundred times the number obtained by dividing the number expressing the section height (H) by the number expressing the nominal section width (S_1), both dimensions expressed in the same units.

3.16 Outer Diameter (D) - Overall diameter of an inflated new pneumatic tyre.

3.17 Tyre-Size Designation - The description containing the following:

a) Nominal tyre section width code;
b) Nominal aspect ratio (where applicable); and
c) Nominal rim diameter code.

3.18 Nominal Rim Diameter (d**) -**Diameter of the rim on which a tyre is designed to be mounted.

3.19 Rim - Support for a tyre-and-tube assembly, or for a tubeless tyre, on which support the tyre beads are seated [*see* IS 10694 (Part 3)]

3.20 Measuring Rim - Rim on which a tyre must be fitted for dimensional measurements.

3.21 Test Rim - Rim on which a tyre must be fitted for load/speed, endurance, plunger testing.

3.22 Chunking - Breaking away of pieces of rubber from the tread.

3.23 Cord Separation - Parting of the cords from their coating.

3.24 Ply Separation - Parting of adjacent plies.

3.25 Tread Separation - Pulling away of the tread from the carcass.

3.26 Load Index - One or two numbers (higher number is for single application and lower number for dual) which indicate the load the tyre can carry in single or in single and dual operation at the speed corresponding to the associated speed category and when operated in conformity with the requirements governing utilization specified by the manufacturer. The list of these indices and their corresponding load given in Table1.

3.27 Ply Rating - Term used to identify given tyre with its maximum recommended load when used in specified type of service. It is an index of tyre strength and does not necessarily represent the number of cord plies in the tyre.

3.28 Speed Category

3.28.1 Speeds, indicated by a symbol, at which the tyre can carry the load indicated by the associated load-capacity index or maximum rated load. The maximum speed which the tyre can sustain, expressed by speed category symbol given in Table 2.

3.29 Table Load-capacity Variation with Speed - Tables 3 & 4, in Annex B, showing as a function of the load-capacity indices and nominal-speed-category symbols the load variations which a pneumatic tyre can withstand when used at speeds different from that conforming to its nominal speed-category symbol.

3.30 Theoretical Rim - An imaginary rim the width of which would be X times the nominal section width of a tyre. The value of X shall be specified by the tyre manufacturer.

4 TEST REQUIREMENTS

4.1 Tyre Dimensions

4.1.1 Tyre dimensions and profiles shall be compatible with the appropriate rims. The tyre dimensions namely section width and outer diameter shall meets the requirements given in Annex C Tables 5 to 16 and method of measurement given in Annex D.

4.1.1.1 *Section width of tyre* - Tyre size designation shall be as per tables given in Annex C for the tyre sizes listed in Tables 5 to 16, the section width shall be deemed to be that opposite the tyre size designation in those tables.

NOTE - Adjustment to tyre section width/overall width – Within the parameters of specified permissibility of a wider or narrower rim than the recommended rim size, the guidelines for the necessary adjustment are – Sectional width or overall width: 5mm increase or reduction (as applicable) for every 0.50 difference in nominal rim width.

4.1.1.2 *Tyre outer diameter* - Tyre size designation shall be as per tables given in Annex C for the tyre sizes listed in Tables 5 to 16. The outer diameter shall not exceed the minimum and maximum diameter values specified in Annex C.

4.1.2.1.1 For the existing types of tyres whose designation is given in the col 2 of the tables in Annex C to this standard, the outer diameter shall be deemed to be that given opposite the tyre designation in those tables.

4.2 Endurance Test

4.2.1 Each type of pneumatic tyre shall undergo at least one endurance test. The sample shall conform to the requirements given in **4.2.2** and **4.2.3** when tested as per the method given in Annex E.

4.2.2 A tyre which, after undergoing the endurance test, shall not exhibit any tread separation, ply separation, cord separation, chunking or broken cords.

4.2.3 The outer diameter of the tyre, measured 6h after the endurance test, must not differ by more than ± 3.5 percent from the outer diameter as measured before the test.

4.3 Load/ Speed Performance Test

4.3.1 Each type of pneumatic tyre having Load index (Maximum load rating) 121 or less and a speed category 150 km/h and below shall undergo load/speed tests. The sample shall conform to the requirements given in **4.3.2,** when tested as per the method given in Annex F.

4.3.2 A tyre which, after undergoing the load/speed test, shall not exhibit any tread separation, ply separation, cord separation, chunking or broken cords.

4.4 Tread-wear Indicators

4.4.1 The pneumatic tyre shall include not less than six transverse rows of wear indicators, approximately equally spaced and situated in the principal grooves of the tread. The tread-wear indicators shall be such that these cannot be confused with the rubber ridges between the ribs or blocks of the tread.

4.4.2 However, in the case of tyres dimensions appropriate for mounting on rims of a nominal diameter code ≤12, minimum four number of tread-wear indicators shall be accepted.

4.4.3 The tread-wear indicators must provide a means of indicating with a tolerance of $^{+ 0.60}_{- 0.00}$ mm when the tread grooves are no longer more than 1.6 mm deep.

4.4.4 Height of tread-wear indicators is determined by measuring the difference between the depth, from the tread's surface, to the top of the tread-wear indicator and to the bottom of the tread groove close to the slope at the base of the tread-wear indicator.

NOTE: The tyre shall be considered unsafe for service on road when remaining worn skid depth reaches minimum value of 1.6 mm at any part of the tread circumference.

4.5 Tyre Strength Test (Plunger Test)

4.5.1 The tyre shall conform to the requirements given in Tables 18 to 22 when tested as per the method given in Annex G. When both Load Index and PR are marked on the tyre, the test values as given in Table 18 shall be adopted.

5 MARKINGS

Tyre shall be permanently and legibly marked on both the sides of their sidewalls in the case of symmetrical tyre and at least on the outer sidewall in the case of asymmetrical tyre shall bear following markings:

a) Manufacturer's name or trade-name;
b) Tyre size designation as given in **3.17**;
c) An indication of the structure as follows:

   1) On diagonal (bias-ply) tyre: no marking or the character '–' or the letter 'D' placed in front of the rim- diameter marking;
   2) On radial-ply tyres: the letter 'R' placed in front of the rim-diameter marking and, optionally, the word 'RADIAL';

d) Speed – category symbol (or symbols) - An indication of the tyre's nominal speed category in the form of the symbol given in 3.28**;**
e) Load-capacity indices given in Annex A or maximum permissible load in kg and ply rating;
f) Tyre inflation pressure, in kPa or bar or kg/cm^2 or any combination of these units;
g) The word 'TUBELESS' if the tyre is designed for use without an inner tube;
h) Manufacturer's code (May be placed on one side wall);
j) Week and Year code (Code only in the form of '2504' which indicates 25th week of year 2004) or Month and Year code of manufacture (Code only in the form of 'MAR 04' which indicates March month of year 2004) may be placed on one sidewall.

k) In the case of tyres which can be regrooved , symbol 'U' at least 20 mm in diameter, or the word 'REGROOVABLE', moulded on the each sidewall; and
m) Tread wear indicators marking shall be provided at minimum six/four (as applicable) places along the circumference to give indication to the user for location of tread wear indicator.
n) The inscription M+S or M.S or M&S in the case of a snow tyre

5.2 An example of tyre markings given in **Annex H**.

5.3 Markings given in **5.1** shall be moulded into or on the tyres. These shall be clearly legible and situated in the lower area of the tyre on at least one of its sidewalls. The layout for tyre markings given in Annex H.

5.4 Examples of tyre size designations are given in **Annex J**.

6 CRITERIA FOR TYPE APPROVAL /TYPE TEST

6.1 Tyre(s) shall meet the test requirements when tested as per schedule given in Table 22.

6.2 Type Approval Procedure

6.2.1 Application for type approval to be submitted by the manufacturer.

6.2.2 The application for type approval shall contain at least the technical information as specified in the **Annex K**.

NOTE - For type approval of tyre belonging to one family of tyre, brand of the tyre to be selected for type approval shall be left to certifying authority. Worst case selection shall be made at the discretion of the certifying authority based on the family of tyres specified in **6.2.5.2.**

6.2.3 ***Changes in the Technical Specification of Already Type Approved Tyres***

6.2.3.1 Every functional modification in technical specification declared in accordance with **6.2.1** shall be intimated to the Certifying Authority.

6.2.3.2 The Certifying Authority may then consider, whether:
a) Tyre with modification complies with specified requirement or;
b) Any further verification is required.

For considering whether any further verification is required or not, criteria for extension of type approval specified in **6.2.5** shall be used.

6.2.3.3 In case of **6.2.3.2** (b), checks for those parameters which are affected by the modifications, only need to be carried out.

6.2.4 In the event of **6.2.3.2**(a) or in the case of **6.2.3.2**(b) after successful compliance to the requirements, a certificate of compliance shall be validated for the modified version, as applicable**.**

6.2.5 ***Criteria for Extension of Type Approval***

6.2.5.1 In case the changes cause the tyre to be outside the approved family/range of tyres, the verification shall be carried out for establishing compliance of the changed parameters to the requirements specified in this standard.

6.2.5.2 Family/Range of tyres would mean tyres, which do not differ in the aspects listed below, but having different brand names/trade name/trade descriptions or trade-marks:

a) Registered name of company;
b) Country of origin;
c) Location of manufacturing facility;
d) Application category (road or off road or snow);
e) Construction type (standard or reinforced);

f) Structure (Diagonal or radial or bias belted);
g) Tyre size designation;
h) Speed category;
j) Tube or tubeless;
k) Load index (or Load capacity);
m) Ply rating of diagonal ply tyres; and
n) Carcass material- Nylon/Polyester/ Steel (As applicable).

7 CONFORMITY OF PRODUCTION TESTS/ACCEPTANCE TESTS

7.1 Periodic testing and approval of each type of tyre as per the approved family of tyres in **6.2.5.2** shall be carried out. The approval marking shall be made only on the tyres of that approved family and the same shall not get extended to other families of tyres, unless tyres from out of that have undergone the same testing and type approval for that family of tyre. If a Tubeless tyre version is approved its Tube version shall also deemed to be approved.

7.2 The authority which has granted type approval may at any time verify the conformity control methods applied in each production facility. For each production facility, the normal frequency of these verifications shall be at least once every two years.

7.3 The tyres approved under this standard shall be so manufactured as to conform to requirements set forth in the Table 23.

7.4 The production and quality assurance system shall meet all the requirements laid out by the Certifying Authority**.**

8 BIS CERTIFICATION MARKING

Each tyre may also be marked with the Standard Mark.

8.1 The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act*, 1986 and the Rules and Regulations made there under. The details of conditions under which the license for the use of Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

Annex A

(*Clause* 3.26)

Table 1 List of Symbols of Load in kg -Load Indices

Load-Index	Corresponding Maximum Load to be Carried Kg	Load-Index	Corresponding Maximum Load to be Carried kg	Load-Index	Corresponding Maximum Load to be Carried kg
60	250	108	1000	156	4000
61	257	109	1030	157	4125
62	265	110	1060	158	4250
63	272	111	1090	159	4375
64	280	112	1120	160	4500
65	290	113	1150	161	4625
66	300	114	1180	162	4750
67	307	115	1215	163	4875
68	315	116	1250	164	5000
69	325	117	1285	165	5150
70	335	118	1320	166	5300
71	345	119	1360	167	5450
72	355	120	1400	168	5600
73	365	121	1450	169	5800
74	375	122	1500	170	6000
75	387	123	1550	171	6150
76	400	124	1600	172	6300
77	412	125	1650	173	6500
78	425	126	1700	174	6700
79	437	127	1750	175	6900
80	450	128	1800	176	7100
81	462	129	1850	177	7300
82	475	130	1900	178	7500
83	487	131	1950	179	7750
84	500	132	2000	180	8000
85	515	133	2060	181	8250
86	530	134	2120	182	8500
87	545	135	2180	183	8750
88	560	136	2240	184	9000
89	580	137	2300	185	9250
90	600	138	2360	186	9500
91	615	139	2430	187	9750
92	630	140	2500	188	10000
93	650	141	2575	189	10300
94	670	142	2650	190	10600
95	690	143	2725	191	10900
96	710	144	2800	192	11200
97	730	145	2900	193	11500
98	750	146	3000	194	11800
99	775	147	3075	195	12150
100	800	148	3150	196	12500
101	825	149	3250	197	12850
102	850	150	3350	198	13200
103	875	151	3450	199	13600
104	900	152	3550	200	14000
105	925	153	3650		
106	950	154	3750		
107	975	155	3875		

Table 2 Speed Category Symbol and Maximum Speed
(*Clause* 3.28.1)

Sl No. (1)	**Speed-Category Symbol** (2)	**Corresponding Speed** km/h (3)
i)	A1	5
ii)	A2	10
iii)	A3	15
iv)	A4	20
v)	A5	25
vi)	A6	30
vii)	A7	35
viii)	A8	40
ix)	B	50
x)	C	60
xi)	D	65
xii)	E	70
xiii)	F	80
xiv)	G	90
xv)	J	100
xvi)	K	110
xvii)	L	120
xviii)	M	130
xix)	N	140
xx)	P	150
xxi)	Q	160
xxii)	R	170
xxiii)	S	180
xxiv)	T	190
xxv)	U	200
xxvi)	H	210

Annex B
Load Limits at Various Speeds
(*Clause* 3.29)
Table 3 Variation of Load Capacity with Speed and Inflation Pressure Compensation
Commercial Vehicles Tyres – Radial and Diagonal Ply

Sl No.	**Speed** km/h	**Variation of Load Capacity (Percent)**						
		Load Indices ≥ 122[1)]						Inflation Pressure Compensation (%)
		Speed Category Symbol						
(1)	(2)	(3)	(4)	5)	(6)	(7)	(8)	(9)
		F	G	J	K	L	M	
i)	0	+150	+150	+150	+150	+150	+150	+40
ii)	5	+110	+110	+110	+110	+110	+110	+40
iii)	10	+80	+80	+80	+80	+80	+80	+30
iv)	15	+65	+65	+65	+65	+65	+65	+25
v)	20	+50	+50	+50	+50	+50	+50	+21
vi)	25	+35	+35	+35	+35	+35	+35	+17
vii)	30	+25	+25	+25	+25	+25	+25	+13
viii)	35	+19	+19	+19	+19	+19	+19	+11
ix)	40	+15	+15	+15	+15	+15	+15	+10
x)	45	+13	+13	+13	+13	+13	+13	+9
xi)	50	+12	+12	+12	+12	+12	+12	+8
xii)	55	+11	+11	+11	+11	+11	+11	+7
xiii)	60	+10	+10	+10	+10	+10	+10	+6
xiv)	65	+7.5	+8.5	+8.5	+8.5	+8.5	+8.5	+4
xv)	70	+5.0	+7.0	+7.0	+7.0	+7.0	+7.0	+2
xvi)	75	+2.5	+5.5	+5.5	+5.5	+5.5	+5.5	+1
xvii)	80	0	+4.0	+4.0	+4.0	+4.0	+4.0	0
xviii)	85		+2.0	+3.0	+3.0	+3.0	+3.0	0
xix)	90		0	+2.0	+2.0	+2.0	+2.0	0
xx)	95			+1.0	+1.0	+1.0	+1.0	0
xxi)	100			0	0	0	0	0
xxii)	105				0	0	0	0
xxiii)	110				0	0	0	0
xxiv)	115					0	0	0
xxv)	120					0	0	0
xxvi)	125						0	0
xxvii)	130						0	0

[1)] Load capacity indices refer to a single operation.

[2)] It is imperative to consult Rim/Wheel manufacturers for the choice of rims and wheels suitable for the load carrying capacities and the inflation pressure required for applications at speed of 40 km/h and below.

Load Limits at Various Speeds

(*Clause* 3.29)

Table 4 Variation of Load Capacity with Speed and Inflation Pressure Compensation
Commercial Vehicles Tyres – Radial and Diagonal Ply

Sl No.	**Speed** km/h	**Variation of Load Capacity (Percent)**									Inflation pressure compen-sation (%)
		Load Indices ≤ 121 [1)]									
		Speed Category Symbol									
(1)	(2)	L (3)	M (4)	N (5)	P (6)	Q (7)	R (8)	S (9)	T (10)	H (11)	(12)
i)	0	+110	+110	+110	+110	+110	+110	+110	+110	+110	+40
ii)	5	+90	+90	+90	+90	+90	+90	+90	+90	+90	+35
iii)	10	+75	+75	+75	+75	+75	+75	+75	+75	+75	+35
iv)	15	+60	+60	+60	+60	+60	+60	+60	+60	+60	+30
v)	20	+50	+50	+50	+50	+50	+50	+50	+50	+50	+30
vi)	25	+42	+42	+42	+42	+42	+42	+42	+42	+42	+30
vii)	30	+35	+35	+35	+35	+35	+35	+35	+35	+35	+30
viii)	35	+29	+29	+29	+29	+29	+29	+29	+29	+29	+30
ix)	40	+25	+25	+25	+25	+25	+25	+25	+25	+25	+30
x)	45	+22	+22	+22	+22	+22	+22	+22	+22	+22	+28
xi)	50	+20	+20	+20	+20	+20	+20	+20	+20	+20	+25
xii)	55	+17.5	+17.5	+17.5	+17.5	+17.5	+17.5	+17.5	+17.5	+17.5	+22
xiii)	60	+15.0	+15.0	+15.0	+15.0	+15.0	+15.0	+15.0	+15.0	+15.0	+18
xiv)	65	+13.5	+13.5	+13.5	+13.5	+13.5	+13.5	+13.5	+13.5	+13.5	+15
xv)	70	+12.5	+12.5	+12.5	+12.5	+12.5	+12.5	+12.5	+12.5	+12.5	+15
xvi)	75	+11.0	+11.0	+11.0	+11.0	+11.0	+11.0	+11.0	+11.0	+11.0	+14
xvii)	80	+10.0	+10.0	+10.0	+10.0	+10.0	+10.0	+10.0	+10.0	+10.0	+12
xviii)	85	+8.5	+8.5	+8.5	+8.5	+8.5	+8.5	+8.5	+8.5	+8.5	+10
xix)	90	+7.5	+7.5	+7.5	+7.5	+7.5	+7.5	+7.5	+7.5	+7.5	+9
xx)	95	+6.5	+6.5	+6.5	+6.5	+6.5	+6.5	+6.5	+6.5	+6.5	+8
xxi)	100	+5.0	+5.0	+5.0	+5.0	+5.0	+5.0	+5.0	+5.0	+5.0	+6
xxii)	105	+3.75	+3.75	+3.75	+3.75	+3.75	+3.75	+3.75	+3.75	+3.75	+4
xxiii)	110	+2.5	+2.5	+2.5	+2.5	+2.5	+2.5	+2.5	+2.5	+2.5	+2
xxiv)	115	+1.25	+1.25	+1.25	+1.25	+1.25	+1.25	+1.25	+1.25	+1.25	+1
xxv)	120	0	0	0	0	0	0	0	0	0	0
xxvi)	130		0	0	0	0	0	0	0	0	0
xxvii)	140			0	0	0	0	0	0	0	0
xxviii)	150				0	0	0	0	0	0	0
xxix)	160					0	0	0	0	0	0
xxx)	170						0	0	0	0	0
xxxi)	180							0	0	0	0
xxxii)	190								0	0	0
xxxiii)	200									0	0
xxxiii)	210									0	0

It is imperative to consult Rim/Wheel manufacturers for the choice of rims and wheels suitable for

[1)]Load capacity indices refer to a single operation.

[2)] It is imperative to consult Rim/Wheel manufacturers for the choice of rims and wheels suitable for the load carrying capacities and the inflation pressure required for applications at speed of 40 km/h and below.

Annex C

General Data, Load and Inflation Pressures

(*Clause* 4.1.1)

Table 5 Tyres for Trucks, Buses and Trailers for use in Highway Service (Diagonal Ply) Maximum Speed 100 kmph.

(Clauses 4.1.1, 4.1.2.1.2 *and* 4.1.2.2.2)

Sl. No.	Tyre Size Designation	Rim Rec. / Alt	New Tyre – Inflated									
			Section Width (mm)			Overall Diameter (mm)			Ply Rating	Load Index Single/ Dual	Maximum Load kg Single/Dual	Maximum Cold I. P[1] kPa Single/Dual
			Design Section Width	Minimum Section Width	Maximum Overall Width	Design Std/ Premium	Minimum Std/ Premium	Maximum Std/ Premium				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
i)	7.00-20	5.5 / 5.0	199 / 194	193 / 188	209 / 204	904/---	892/---	924/---	10	121/117	1450/1285	620/550
ii)	7.50-20	6.0 / 5.5	215 / 210	209 / 204	226 / 221	935/952	922/939	956/974	10	124/120	1600/1400	620/550
									12	128/124	1800/1600	725/655
iii)	8.25-20	6.5 / 6.0	236 / 231	229 / 224	248 / 243	974/992	960/977	997/1016	12	133/128	2060/1800	690/620
									14	136/131	2240/1950	795/725
									16	137/132	2300/2000	825/760
iv)	9.00-20	7.0 / 6.5	259 / 254	251 / 246	272 / 267	1019/1038	1004/1022	1045/1065	12	138/133	2360/2060	655/585
									14	141/136	2575/2240	760/690
									16	142/138	2650/2360	795/725
v)	10.00-20	7.5 / 7.0	278 / 273	270 / 265	292 / 287	1054/1073	1038/1056	1081/1101	14	143/139	2725/2430	690/620
									16	146/142	3000/2650	795/725
									18	147/143	3075/2725	825/760
vi)	11.00-20	8.0 / 7.5	293 / 288	284 / 279	308 / 303	1085/1104	1068/1086	1114/1134	14	146/142	3000/2650	690/620
									16	149/145	3250/2900	795/725
									18	150/146	3350/3000	825/760
vii)	11.00-24	8.0 / 7.5	293 / 288	284 / 279	308 / 303	1186/---	1169/---	1215/---	14	150/145	3350/2 900	690/620
viii)	12.00-20	8.5 / 8.0	315 / 310	306 / 301	331 / 326	1125/1146	1106/1127	1156/1178	14	148/144	3150/2 800	620/550
									16	152/148	3550/3 150	725/655
									18	154/150	3750/3 350	795/725
ix)	12.00-24	8.5 / 9.0	315 / 320	306 / 311	331 / 336	1226/1247	1211/1225	1262/1284	14	153/148	3650/3 150	620/550
									16	156/152	4000/3 550	725/655
									18	158/154	4250/3 750	795/725
									20	160/155	4500/3 875	860/795

[1] Inflation Pressure

NOTES: **1)** Recommended shown underlined.

2) Rims: Sizes not underlined above are permitted, but one and the same tyre may not be suitable for more than two rim widths or flange profiles. Before deciding a rim size/type, the tyre manufacturer should be consulted regarding suitability of the size/type intended to be used with a Permitted Rim. SDC rims provide ease of tyre mounting/demounting, particularly important for the high PR tyres.

Table 6 Mining and Logging Tyres for use in Intermittent Highway Service (Diagonal Ply)
(*Clauses 4.1.1, 4.1.2.1.2* and *4.1.2.2.2)*

Sl No.	Tyre Size Designation	Rim Rec. / Alt	Width (mm)			Overall Diameter (mm)			Ply Rating	Load Index	Maximum Load kg	Maximum Cold I. P[1] kPa
			Design Section Width	Minimum Section Width	Maximum Overall Width	Design	Minimum	Maximum				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Maximum Speed: 90 km. /hr. * Distance shall not exceed 90 km. in any 1 ½ hr. period of run.												
i)	8.25-20	6.5	236	229	248	992	977	1016	10	124	1600	515
		6.0	231	224	243				12	128	1800	620
ii)	9.00-20	7.0	259	251	272	1038	1022	1065	12	133	2060	585
		6.5	254	246	267				14	136	2240	690
									16	138	2360	725
iii)	10.00-20	7.5	278	270	292	1073	1056	1101	12	135	2180	515
		7.0	273	265	287				14	139	2430	620
									16	142	2650	725
iv)	11.00-20	8.0	293	284	308	1104	1086	1134	12	138	2360	515
		7.5	288	279	303				14	142	2650	620
									16	145	2900	725
									18	146	3000	760
Maximum Speed: 80 km. /hr. * Distance shall not exceed 80 km. in any 1 ½ hr. period of run.												
v)	12.00-24	8.5	315	306	331	1247	1225	1284	18	154	3750	725
		8.0	310	301	326				20	155	3875	790
vi)	14.00-20	10.00	375	364	394	1266	1243	1304	18	159	4375	690

[1] Inflation Pressure

Note - Mining and Logging tyres are not intended for sustained Highway Service. For restricted duration of run stipulated below, the load limits applicable are as tabulated:

LOAD LIMITS FOR MINING AND LOGGING TYRES USED AT REDUCED SPEEDS (This table does not apply to rims and wheel-consult rim and wheel manufacturer)

SPEED RANGE (KM. /HR.)	% INCREASE (+) OR DECREASE (-)	INCREASE (+) OR DECREASE (-) IN I.P.	MAX.TRAVEL TIME *	MINIMUM STOPPING TIME TO PERMIT COOLING
65-90*	NO CHANGE	NO CHANGE	1 hour	½ hour
50-64	+ 9%	NO CHANGE	1 ¼ hours	½ hour
33-49	+ 18 %	NO CHANGE	2 hours	½ hour
18-32	+ 32 %	NO CHANGE	3 hours	½ hour
10-17	+ 60 %	+ 70 kPa	3 hours	½ hour

* 80 km/hr.for sizes 12.00-24 and 14.00-20

Table 7 Tyres for Light Truck
(Diagonal Ply) Maximum Speed 100 kmph.
(Clauses 4.1.1, 4.1.2.1.2 *and* 4.1.2.2.2)

Sl No.	Tyre Size Designation	Rim WB SDC	New Tyre- Inflated									
			Width (mm)			Overall Diameter (mm)			Ply Rating	Load Index Single/Dual	Maximum Load kg Single/Dual	Maximum Cold I. P[1] kPa Single/Dual
			Design Section Width	Minimum Section Width	Maximum Overall Width	Design Std/ Premium	Minimum Std/ Premium	Maximum Std/ Premium				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
i)	6.00-16	4.50E 4.50E	166	161	174	737/748	727/738	754/765	6 8 10	93/89 99/95 103/99	650/580 775/690 875/775	310/310 415/415 515/515
ii)	6.40-15	4.50E	168	163	176	698/706	688/696	714/722	6	90/86	600/530	310/310
iii)	6.50-16	4.50E 4.50E 5K	175 180	170 175	184 189	760/771	749/760	778/789	6 8	97/93 102/98	730/650 850/750	310/310 415/415
iv)	6.70-15	5K 5.50F	180 185	175 180	189 194	715/724	705/714	732/741	6 8	95/91 101/97	690/615 825/730	310/310 415/415
v)	7.00-15	5.50F 5.50F 5K	199 194	193 188	209 204	758/769	747/758	777/788	6 8 10 12	99/95 105/101 110/105 114/109	775/690 925/825 1060/925 1180/1030	310/310 415/415 515/515 620/620
vi)	7.00-16	5.50F 5.50F 6.00G	199 204	193 198	209 214	784/795	773/783	803/814	6 8 10 12 14	101/97 107/102 111/107 115/110 118/113	825/730 975/850 1090/975 1215/1065 1320/1150	310/310 415/415 515/515 620/620 690/690
vii)	7.50-16	5.50F 6.00G 5.50F	211 206	205 200	222 217	813/824	801/811	833/845	8 10 12 14 16	112/107 116/111 120/116 122/118 124/120	1120/975 1250/1090 1400/1250 1500/1320 1600/1400	415/415 515/515 620/620 690/690 760/760
	8.25-16	6.50 6.0	234 229	227 222	241 236	854/863	845/ 854	863/872	16	129/127	1850/1750	760/760
	9.00-16	6.50H 6.00 G	257 252	249 244	270 265	891/903	877/888	915/928	16	134/130	2120/1 900	725/725

[1] Inflation Pressure

NOTES:

1) Recommended shown underlined.

2) Rims: Sizes not underlined above are permitted, but one and the same tyre may not be suitable for more than two rim widths or flange profiles. Before deciding a rim size/type, the tyre manufacturer should be consulted regarding suitability of the size/type intended to be used with a Permitted Rim.
SDC rims provide ease of tyre mounting/demounting, particularly important for the high P.R.tyres.

3) Well Base Wheels: Strength - The load and inflation pressure imposed on a Rim or wheel must not exceed the rim manufacturer's recommendation. Whenever a high ply rating size is decided for original equipment or Replacement of a lower P.R. for O.E., the rim manufacturer must be consulted. To insure that the rim/wheel is of sufficient, strength for the load, inflation and service intended. This applies particularly to 6.00-16, 8PR, 6.50-16 8PR, 7.00-15, 10 PR & 12 PR 7.00-16. 10 PR, 12PR & 14 PR, 7. 50-16. 10 PR, 12 PR, 14PR & 16 PR tyres on W.B.Rims.

Table 8 Ultra Light Truck Tyres (Diagonal Ply)
Maximum Speed 100 kmph.
(*Clause* 4.1.1)

Sl No.	Tyre Size Designation	Rim Rec / Alt	New Tyre- Inflated									
			Width (mm)			Overall Diameter (mm)			PR	Load Index Single/ Dual	Maximum Load kg Single/ Dual	Maximum Cold I. P[1] kPa Single/Dual
			Design Section Width	Minimum Section Width	Maximum Overall Width	Design	Minimum	Maximum				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
i)	4.50-10 ULT	3.50B 3.00B	125	121	131	490	483	502	8	84/-	500/-	500/-
ii)	4.50-12 ULT	3½J 4J	128 133	124 129	136 141	545	537	553	6 8	72/70 77/76	355/335 412/400	300/300 400/400
iii)	5.00-10 ULT	3.50 3.50B 3.00B	134 129	130 125	141 136	516	508	529	8	87/-	545/-	500/-

[1] Inflation Pressure

NOTES: **1)** Recommended shown underlined.

2) Rims: Sizes not underlined above are permitted, but one and the same tyre may not be suitable for more than two rim widths or flange profiles.

Before deciding a rim size/type, the tyre manufacturer should be consulted regarding suitability of the size/type intended to be used with a

Permitted Rim. SDC rims provide case of tyre mounting/demounting, particularly important for the high P R.tyres.

Table 9 Alpha Numeric Light Truck Tyres (Diagonal Ply)
(*Clause* 4.1.1**)**

Sl No.	Tyre Size Designation	Rim Rec.	New Tyre- Inflated									
			Width (mm)			Overall Diameter (mm)			Ply Rating	Load Index Single	Maximum Load kg Single	Maximum Cold I. P[1] kPa Single
			Design Section Width	Minimum Section Width	Maximum Overall Width	Design	Minimum	Maximum				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
i)	F78 – 15 LT	5.50	202	196	212	698	689	714	6	96	710	310
									8	101	825	415

[1] Inflation Pressure

Table 10 Tyres for Trucks, Buses and Trailers in Highway Service: Code Designated Sizes (Radial Ply) Maximum Speed 100 kmph

(*Clause* 4.1.1)

Sl No.	Tyre Size Designation	Rim Rec.	New Tyre-Inflated									
			Width (mm)			Overall Diameter (mm)			Ply Rating	Load Index Single/Dual	Maximum Load Kg Single/Dual	Maximum Cold I. P[1] kPa Single/Dual
			Design Section Width	Minimum Section Width	Maximum Overall Width	Design HW/ HT/ TR[2]	Minimum HW/ HT/ TR[2]	Maximum HW/ HT/ TR[2]				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
i)	9.00 R20	7.00	259	251	272	1019/ 1024/ 1030	1004/ 1009/ 1014	1034/ 1039/ 1046	8	129/127	1850/1750	480/480
									10	134/132	2120/2000	590/590
									12	138/136	2360/2240	690/690
									14	141/139	2575/2430	790/790
									16	144/142	2650/2500	830/830
ii)	10.00R20	7.50	278	270	292	1054/ 1059/ 1065	1038/ 1042/ 1048	1070/ 1076/ 1082	12	140/138	2500/2360	620/620
									14	144/142	2800/2650	720/720
									16	146/143	3000/2725	830/830
iii)	11.00R20	8.00	293	284	308	1085/ 1090/ 1096	1068/ 1073/ 1078	1102/ 1107/ 1114	12	143/141	2725/2575	620/620
									14	146/143	3000/2725	720/720
									16	150/147	3350/3075	830/830
iv)	12.00R20	8.50	315	306	331	1125/ ------/ 1136	1106/ ------/ 1117	1144/ ------/ 1155	14	149/146	3250/3000	660/660
									16	152/149	3550/3250	760/760
									18	154/151	3750/3450	830/830
v)	11.00R22	8.00	293	284	308	1135/ 1141/ 1147	1118/ 1124/ 1129	1152/ 1158/ 1165	12	145/142	2900/2650	620/620
									14	149/146	3250/3000	720/720
									16	152/149	3550/3250	830/830
vi)	12.00R24	8.50	315	306	331	1226/ ------/ 1238	1208/ ------/ 1219	1244/ ------/ 1257	14	153/150	3650/3350	660/660
									16	156/153	4000/3650	760/760
									18	158/155	4250/3875	830/830
vii)	11R22.5 Tubeless	8.25	279	271	293	1054/ 1059/ 1065	1040/ 1044/ 1050	1068/ 1074/ 1080	12	140/138	2500/2360	620/620
									14	144/142	2800/2650	720/720
									16	146/143	3000/2725	830/830

[1] Inflation Pressure

[2] HW– Highway, HT- Heavy Tread, TR-Traction

Table 11 Tyres for Trucks, Buses and Trailers in Highway Service: Millimetric Truck (Radial Ply)
(*Clause* 4.1.1)

Sl. No.	Tyre Size Designation " 80 Series"	Rim Width Code	New Tyre-Inflated							
			Section Width (mm)			Overall Diameter (mm)			Load Index Single/Dual	Maximum Load kg Single/Dual
			Design	Minimum	Maximum	Design	Minimum	Maximum		
(1)	(2)	(3)	(4)	(5)	(6)	(10)	(8)	(9)	(10)	(11)
i)	295/80R22.5	9.00	298	286	307	1044	1030	1058	152/148	3550/3150
ii)	315/80R22.5	9.00	312	300	315	1076	1061	1091	156/150	4000/3350

[1)] Inflation Pressure

Table 12 Tyres for Light Truck Numeric Sizes (Radial Ply)
Maximum Speed 100 kmph.
(*Clause* 4.1.1)

Sl No.	Tyre Size Designation	Rim WB SDC	New Tyre- Inflated									
			Width (mm)		Overall Diameter (mm)				Ply Rating	Load Index Single/Dual	Maximum Load Kg Single/Dual	Maximum Cold I. P[1)] kPa Single/Dual
			Design Section Width	Minimum Section Width	Maximum Overall Width	Design Std/Prem.	Minimum Std/Prem.	Maximum Std/Prem.				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
i)	7.00R15LT	5.50F 5.50F 5K	202 197	192 187	216 211	752/760	741/749	763/771	6 8 10 12	99/95 105/101 110/105 114/109	775/690 925/825 1060/925 1180/1030	345/345 450/450 550/550 655/655
ii)	7.00R16LT	5.50F 5.50F 6.00G	202 207	192 197	216 221	778/785	767/774	789/796	6 8 10 12	101/97 107/102 111/107 115/110	825/730 975/850 1090/975 1215/1060	345/345 450/450 550/550 655/655
iii)	7.50R16LT	5.50F 6.00 5.50F	211 206	200 195	226 221	808/ 815	796/803	820/827	6 8 10 12 14	105/101 112/107 116/111 120/116 122/118	935/825 1120/975 1250/1090 1400/1250 1500/1320	345/345 450/450 550/550 655/655 725/725
iv)	8.25R16LT	6.50H 6.00G	234 229	222 217	250 245	841/849	828/836	854/862	10 12 14 16	122/120 125/123 127/125 129/127	1500/1400 1650/1550 1750/1650 1850/1750	550/550 655/655 725/725 795/795

[1)] Inflation Pressure

NOTES: **1)** Recommended shown underlined.

2) Rims: Sizes not underlined above are permitted, but one and the same tyre may not be suitable for more than two rim widths or flange profiles.
Before deciding a rim size/type, the tyre manufacturer should be consulted regarding suitability of the size/type intended to be used with a Permitted
Rim. Semi Drop Center (SDC) rims provide ease of tyre mounting/demounting, particularly important for the high P.R. tyres.

Table 13 Millimetric Light Truck Tyres (80 Series) (Diagonal Ply)
Maximum Speed 100 kmph.
(*Clause* 4.1.1)

Sl No.	Tyre Size Designation	Rim Rec.	New Tyre- Inflated									
			Width (mm)			Overall Diameter (mm)			PR	Load Index Single/Dual	Maximum Load Kg Single/Dual	Maximum Cold I. P[1] kPa Single/Dual
			Design Section Width	Minimum Section Width	Maximum Overall Width	Design	Minimum	Maximum				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
i)	155/80D12LT	4½J	157	151	165	553	546	560	6	82/80	475/450	345/345
									8	88/86	560/530	450/450
ii)	165/80D12LT	4.50E	165	158	173	569	561	577	8	89/86	580/530	450/450
iii)	165/80D14LT	4½J	167	160	175	624	612	632	8	96/94	710/670	450/450

[1] Inflation Pressure

Table 14 Metric Size Designated Light Truck Tyres
(Diagonal Ply)
Maximum Speed 100 kmph.
(*Clause* 4.1.1)

Sl. No.	Tyre Size Designation	Rim Rec.	New Tyre- Inflated									
			Width (mm)			Overall Diameter (mm)			Ply Rating	Load Index Single/Dual	Maximum Load kg Single/Dual	Maximum Cold I. P[1] kPa Single/Dual
			Design Section Width	Minimum Section Width	Maximum Overall Width	Design	Minimum	Maximum				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
i)	165D13LT	4½J	167	160	175	596	588	609	6 8	91/89 94/92	615/580 530/500	375/375 450/450
ii)	165D14LT	4½J 5J	167 172	160 165	172 177	622	614	630	6 8	93/91 97/95	650/615 730/690	375/375 450/450

[1] Inflation Pressure

Table 15 Millimetric Light Truck Tyres
(Radial Ply)
(*Clause* 4.1.1)

Sl No.	Tyre Size Designation	Rim Rec. / Alt	New Tyre- Inflated						Load Index Single/Dual	Maximum Load kg Single/Dual	Maximum Cold I. P[1] kPa Single/Dual
			Width (mm)			Overall Diameter (mm)					
			Design Section Width	Minimum Section Width	Maximum Overall Width	Design	Minimum	Maximum			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	70 Series										
i)	215/70 R15LT	6½J / 7J	221 / 226	214 / 219	228 / 233	683	674	692	107/105	975/925	450/450
	75 Series										
ii)	205/75 R16LT	5½J / 6J	203 / 208	197 / 202	209 / 214	714	705	723	113/111	1150/1090	600/600
iii)	215/75 R15LT	6J / 6½J	216 / 221	210 / 215	222 / 227	703	693	713	115/113	1215/1150	600/600
iv)	215/75 R16LT	6J / 5½J	215 / 210	206 / 201	221 / 216	728	718	738	113/111 116/114	1150/1090 1250/1180	475/475 525/525
v)	225/75 R15 LT	6J / 6½J	223 / 228	216 / 221	230 / 235	719	709	729	108/104	1000/900	450/450
vi)	235/75 R15LT	6½J	235	226	242	733	722	744	110/107 116/113	1060/975 1250/1150	450/450 550/550
	80 Series										
vii)	145/80 R12LT	4J / 3½J	145 / 140	139 / 134	149 / 144	537	530	544	86/84	530/500	450/450
viii)	195/80 R15LT	5½J / 6J	196 / 201	190 / 195	202 / 207	693	684	702	107/105	975/925	450/450
ix)	205/80 R16LT	5½J / 6J	203 / 208	195 / 200	209 / 214	734	724	744	106/104 110/108	950/900 1060/1000	350/350 450/450
x)	215/80 R14LT	6J / 6½J	216 / 221	210 / 215	222 / 227	700	690	710	112/110	1120/ 1060	450/450
	85 Series										
xii)	185/85 R16LT	5J / 5½J	184 / 189	178 / 183	190 / 195	720	711	729	105/103	925/875	450/450

1) Inflation Pressure

Table 16 Metric Size Designated Light Truck Tyres
(Radial Ply)

(*Clause* 4.1.1)

Sl. No.	Tyre Size Designation	Rim	New Tyre- Inflated									
			Width (mm)			Overall Diameter (mm)			Ply Rating	Load Index	Maximum Load kg	Maximum Cold I. P[1] kPa
		Rec. / Alt	Design Section Width	Minimum Section Width	Maximum Overall Width	Design	Minimum	Maximum		Single/Dual	Single/Dual	Single/Dual
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
i)	145R12 LT	4J	145	141	149	543	535	550	6	80/78	450/425	350/350
		3½J	140	136	144				8	86/84	530/500	450/450
ii)	155R13 LT	4½J	157	152	165	582	574	590	6	85/83	515/487	350/350
		5J	162	157	170				8	90/89	600/580	450/450
iii)	165R14LT	4½J	167	160	172	622	614	630	6	93/91	650/615	375/375
		5J	172	165	177				8	97/95	730/690	450/450
iv)	175R14LT	5J	178	173	187	638	630	646	6	96/94	710/670	375/375
		5½J	183	178	192				8	99/98	775/750	450/450
v)	185R14 LT	5½J	188	182	197	653	643	662	6	99/97	775/730	375/375
		6J	193	187	202				8	102/100	850/800	450/450
									10	107/105	975/925	575/575
vi)	195R14LT	5½J	198	190	204	666	657	675	6	102/100	850/800	375/375
		6J	203	195	209				8	106/104	950/900	450/450
vii)	205R16LT	5½J	203	197	209	734	724	744	8	110/108	1060/1000	450/450
		6J	208	202	214							
viii)	215R14 LT	6J	216	210	227	704	694	715	8	112/110	1120/1060	450/450
		6½J	221	215	232							

[1] Inflation Pressure

NOTES – **1)** Recommended shown underlined**2** Rims: Sizes not underlined above are permitted, but one and the same tyre may not be suitable for more than two rim widths or flange profiles. Before deciding a rim size/type, the tyre manufacturer should be consulted regarding suitability of the size/type intended to be used with a Permitted Rim. SDC rims provide case of tyre mounting/demounting, particularly important for the high P.R.tyres.

Annex D
(*Clause* 4.1)

METHOD OF MEASURING PNEUMATIC TYRES

D-1 The tyre shall be mounted on the measuring rim and inflated to a pressure specified by the manufacturer.

D-2 The tyre fitted on its rim shall be conditioned to the ambient temperature of the laboratory for at least 24 h.

D-3 The pressure shall be readjusted to the value specified in **D-1**.

D-4 The overall width shall be callipered at six equally-spaced points, account being taken of the thickness of the protective ribs or bands. The highest measurement so obtained is taken as the overall width.

D-5 Determine the outer diameter by measuring the maximum circumference and dividing the figure so obtained by π (3.1416). The tyre overall diameter shall be calculated by using the following formula:

$$D_o = \frac{C}{\pi}$$

Where
D_o = Tyre overall diameter, in mm; and
C = Circumference of tyre tread in mm.

Annex E
(*Clause* 4.2)

PROCEDURE FOR ENDURANCE TEST

E-1 PREPARATION OF TYRE FOR TEST

E-1.1 Mount a new tyre on the test rim specified by the manufacturer in pursuant to Annex K

E-1.2 Use a new inner tube or combination of inner tube, valve and flap (as required) when testing tyres with inner tubes.

E-1.3 Inflate the tyre to the pressure corresponding to the pressure specified by the manufacturer.

E-1.4 Condition the tyre-and-wheel assembly at test-room temperature for not less than 3 h.

E-1.5 Readjust the tyre pressure to that specified in E-**1.3**.

E-2 TEST PROCEDURE

E-2.1 Mount the tyre-and wheel assembly on the test axle and press it against the outer face of a smooth power-driven test drum 1.7 m ± 1 percent or 2.0 m ± 1 percent in diameter having a surface at least as wide as the tyre tread.

E-2.2 Apply to the test axle a series of test loads expressed in percent of the load indicated, in Annex A to this standard, opposite the load index or maximum load engraved on the sidewall of the tyre, in accordance with the test programme below. Where the tyre has load-capacity indices for both single and twinned utilization, the reference load for single utilization shall be taken as the basis for the test loads.

E-2.2.1 In the case of a tyre with a load capacity index 121 or less and a speed category Q and above, test procedures are as specified in **E-3.**

E-2.2.2 For all other tyre types, the endurance test procedure shall be as per the requirements given in Table 17.

E-2.2.3 The tyre pressure must not be corrected throughout the test and the test load must be kept constant throughout each of the three test stages.

E-2.3 During the test the temperature in the test-room must be maintained at between 20°C and 40°C or at a higher temperature if the manufacturer so agrees.

E-2.4 The endurance-test shall be carried out without interruption.

E-3 Load/speed test programme for tyre with a load capacity index 121 or less, or the additional marking 'LT' included in the tyre size designation and a speed category Q and above.

E-3.1 Load placed on the wheel as a percentage of the load corresponding to the load index:

a) 90 percent when tested on a test drum 1.70 m ± 1 percent in diameter;

b) 92 percent when tested on a test drum 2.0 m ± 1 percent in diameter.

E-3.2 Initial Test Speed, speed corresponding to the speed category symbol less 20km/h:

a) Time to reach the initial test speed for 10 min.

b) Duration of the first step for 10 min.

E-3.3 Second Test Speed, speed corresponding to the speed category symbol less 10 km/h;

Duration of the second step for 10 min.

E-3.4 Final test speed: speed corresponding to the speed category symbol:

Duration of the final step for 30 min.

E-3.5 Total test duration for 1 h.

Table 17 Endurance Test Programme
(*Clause* 4.2)

Sl No.	**Load Index**	**Tyre Speed Category**	**Test-drum speed**		**Load placed on the wheel as a percentage of the load corresponding to the load index**		
			Radial-ply rpm	Diagonal (bias-ply) rpm	7 h	16 h	24 h
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
i)	122 or more	F	100	100	66 percent	84 percent	101 percent
		G	125	100			
		J	150	125			
		K	175	150			
		L	200	-			
		M	225	-			
ii)	121 or less	F	100	100			
		G	125	125			
		J	150	150			
		K	175	175			
		L	200	175	70 percent	88 percent	106 percent
					4h.	6 h.	24h
		M	250	200	75 percent	97 percent	114 percent
		N	275	-	75 percent	97 percent	114 percent
		P	300	-	75 percent	97 percent	114 percent

NOTES – 1) 'Special-use' tyres should be tested at a speed equal to 85percent of the speed prescribed for equivalent normal tyres.

2) Tyres with load index 121 or more, speed categories N or P and the additional marking 'LT' or 'C' included in the tyre size designation shall be tested with the same programme as specified in the above table for tyres with load index 121 or less.

Annex F

(*Clause* 4.3)

PROCEDURE FOR LOAD/SPEED PERFORMANCE TEST

F-1 PREPARATION OF TYRE FOR TEST

F-1.1 A new tyre shall be fitted to the rim specified by the manufacturer.

F-1.2 Use a new inner tube or combination of inner tube, valve and flap (as required) when testing tyres with inner tubes.

F-1.3 Inflate the tyre to the pressure corresponding to the pressure specified by the manufacturer.

F-1.4 Condition the tyre-and-wheel assembly at test-room temperature for not less than 3 h.

F-1.5 Readjust the tyre pressure to that specified in **F-1.3**.

F-2 TEST PROCEDURE

F-2.1 Load placed on the wheel as a percentage of the load corresponding to the load index:
F-2.2 90 percent when tested on a test drum 1.70 m ± 1 percent in diameter;

F-2.3 92 percent when tested on a test drum 2.0 m ± 1 percent in diameter.

F-2.4 Initial test speed: speed corresponding to the speed category symbol less 20km/h;

a) Time to reach the initial test speed for 10 min.

b) Duration of the first step for 10 min.

F-2.5 Second test speed, speed corresponding to the speed category symbols less by10 km/hr.
Duration of the second step for 20 min.

F-2.6 Final test speed: speed corresponding to the speed category symbol (Rated speed).

a) Duration of the final step for 20 min.

b) Total test duration for 1 h

Annex G
(Clause 4.5)

TYRE STRENGTH TEST (PLUNGER TEST)

G-1 APPARATUS

The equipment consists of a cylindrical steel plunger, having a hemispherical end of a diameter specified in the Tables 20 & 21 as applicable for type of tyre and a device to force the plunger rod into a tyre at the rate of 50 ± 1.5mm /min.

G-1.1 Preparation of Tyre for the Test

The tyre with a tube shall be mounted and inflated on a test rim of the recommended size and shall be conditioned at approximately the temperature of the room in which the test is to be conducted for at least 3 h after which the pressure shall be adjusted, if necessary, to the test inflation pressure.

G-1.2 Test procedure

The plunger rod shall be forced into the tread of the tyre/wheel assembly mounted as described in **G-1.1** perpendicularly over a tread element at the centerline of the tread, or as near as possible to avoiding penetration into a tread groove. The rate of travel of the plunger; shall be 50 ± 1.5mm / min until the tyre breaks or the plunger is stopped by the rim (bottoming of the plunger against the rim), in which case the tyre shall be deemed to have passed the test regardless of energy value. Measurement of force and penetration at break (or bottoming against the rim) shall be made at 5 points nearly equally spaced around the tyre circumference. The arithmetic mean energy absorbed shall be calculated from the energy values obtained at the break, using the formula given in **G-1.2.1.**

G-1.2.1 Formula for calculating the breaking energy:

$$W = \frac{F \times P}{2} \times 10^{-3}$$

Where

W = Energy at break (or bottoming), in J (Joule)

F = Force at break (or bottoming), in N; and

P = Penetration at break (or bottoming), in mm.

G-1.3 As an option, for purpose of conformity, if the plunger energy measurements meet or exceed the minimum value specified, it is not necessary to continue penetration of the plunger to break the tyre.

Table 18 Tyre Strength -Light Truck and Truck and Bus tyres
(For which the Load Index is shown)
(*Clause* 4.5)

Sl No. (1)	**Air Pressure Corresponding to the Maximum Load Capability** kPa (2)	**Load Index (Single Wheel) 121 Maximum**		**Load Index (Single Wheel) 122 or More** Joules(kgf.cm) (5)
		Nominal Rim Diameter under 13 Joules(kgf.cm) (3)	Nominal Rim Diameter 13 or more Joules(kgf.cm) (4)	
i)	250 or less	136(1385)	294 (3000)	-
ii)	251 to 350	203(2072)	362 (3690)	-
iii)	351 to 450	271(2765)	514 (5240)	-
iv)	451 to 550	-	576 (5875)	972 (9910)
v)	551 to 650	-	644 (6565)	1412 (14400)
vi)	651 to 750	-	712 (7260)	1695 (17285)
vii)	751 to 850	-	-	2090 (21310)
viii)	851 or more	-	-	2203 (22465)

Table 19 Tyre Strength – Ultra Light Truck, Light Truck and Truck and Bus tyres
(For which the Load Index is not shown)
(*Clause* 4.5)

Sl No. (1)	**Ply Rating** (2)	**Ultra Light Truck Tyre , Light Truck Tyre**			**Truck and Bus**	
		Nominal Rim Diameter under 13 Joules (kgf cm) (3)	Nominal Rim Diameter 13 to 14 Joules (kgf cm) (4)	Nominal Rim Diameter 14.5 or more Joules (kgf cm) (5)	Tubeless Joules(kgf cm) (6)	With Tube Joules (kgf cm) (7)
i)	4	136 (1385)	192 (1960)	294 (3000)	--	-
ii)	6	203 (2072)	271 (2765)	362 (3690)	576(5875)	768(7830)
iii)	8	271 (2765)	384 (3915)	514(5240)	734(7485)	893(9105)
iv)	10	-	-	576 (5875)	972(9910)	1412 (14400)
v)	12	-	-	644 (6565)	1412(14400)	1785 (18200)
vi)	14	-	-	712(7260)	1695(17285)	2282 (23270)
vii)	16	-	-	768(7830)	2090(21310)	2599 (26500)
viii)	18	-	-	-	2203(22465)	2825 (28805)
ix)	20	-	-	-	-	3051(31100)
x)	22	-	-	-	-	3220(32835)
xi)	24	-	-	-	-	3390(34560)

NOTE: 1. Inflate to the pressure corresponding to the maximum load, or maximum dual load where there is both single **and** dual load marked on the tyre.

Table 20 Diameter of Plunger
(For the Tyres of Which the Load Index is Shown)
(*Clause* 4.5.1)

Sl No. (1)	Load Index for light truck, truck and bus tyres (Single Wheel) (2)	Diameter of Plunger mm (3)
i)	121 or less	19 ± 0.2
ii)	122 to 134	32 ± 0.3
iii)	135 or more	38 ± 0.3

Table 21 Diameter of Plunger (for the tyre of which the load capability index is not shown)
(*Clause* **4.5**)

Sl No.	**Light Truck Tyre**		**Truck and Bus Tyres**	
(1)	12 Ply Rating or under (2)	14 Ply Rating or above (3)	12 Ply Rating or under (4)	14 Ply Rating or above (5)
i)	19 ± 0.2mm		32 ± 0.3mm	38 ± 0.3mm

Table 22 Type Test Schedule
(*Clause* 6.1)

Sl No. (1)	**Tests** (2)	**TYRE 1** (3)	**TYRE 2** (4)	**TYRE 3** (5)
i)	Tyre marking	√	—	—
ii)	Tyre dimensions	√	—	—
iii)	Tread wear indicator	√	—	—
iv)	Tyre strength test	√	—	—
v)	Endurance test	—	√	—
vi)	Load/speed performance test	—	—	√

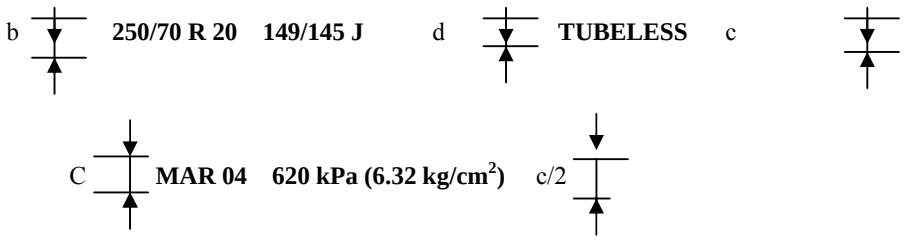
Table 23 Conformity of Production Tests
(*Clause* 7.3)

Sl No. (1)	**Tests** (2)	**TYRE 1** (3)	**TYRE 2** (4)	**TYRE 3** (5)
i)	Tyre marking	√	—	—
ii)	Tyre dimensions	√	—	—
iii)	Tread wear indicator	√	—	—
iv)	Tyre strength test	√	—	—
v)	Endurance test	—	√	—
vi)	Load/speed performance test	—	—	√

Annex H
(*Clause* 5.2*)*

ARRANGEMENT OF TYRE MARKINGS

H-1 TYRE MARKINGS



	Minimum Heights of Markings mm	
	Tyres of Rim Diameter < 20" or <508 mm or of Section Width ≤ 235 mm or ≤ 9"	Tyres of Rim Diameter ≥ 20" or ≥508 mm or of Section Width >235mm or >9"
b	6	9
c	4	
d	6	

H-2 MARKINGS DEFINING A PNEUMATIC TYRE

a) Nominal section width of 250;

b) Nominal aspect ratio of 70;

c) Radial-ply structure (R);

d) Nominal rim diameter of 508 mm, for which the symbol is 20;

e) Load capacities of 3 250 kg when single and 2 900 kg when twinned (dual), corresponding respectively to the load indices 149 and 145 shown in Annex A;

f) Speed category J (reference speed 100 km/h);

g) Capable of being fitted without an inner tube ('TUBELESS');

j) Manufactured during the month MARCH of year 2004; and

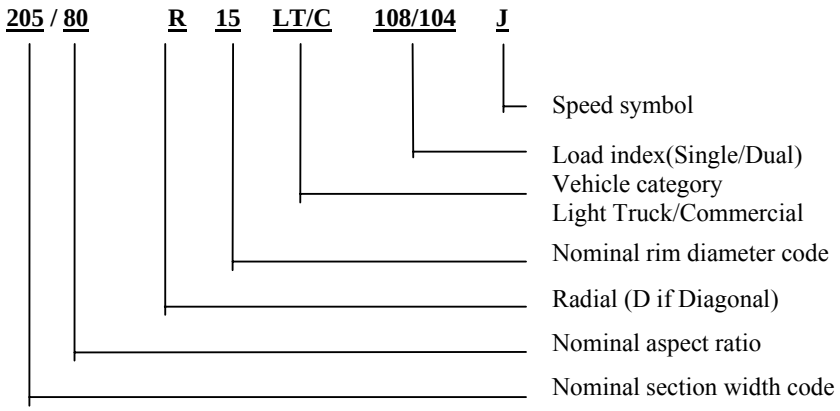
k) Max pressure of 620 kPa or 6.2 bars or 6.32 kg/cm^2.

NOTE - Arrangement of tyre markings relates only to the tyre designation. Other markings location will be left to the discretion of the tyre manufacturer

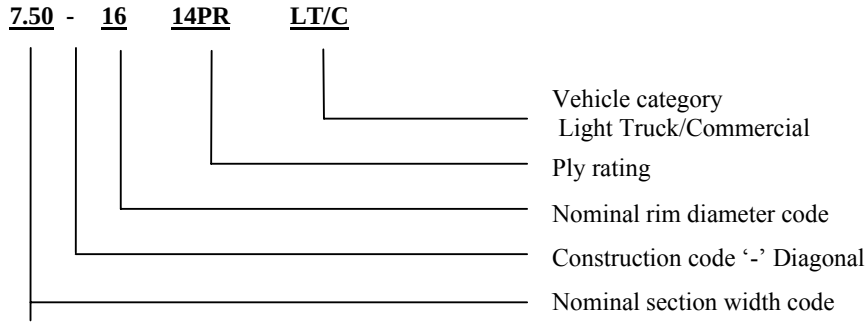
Annex J
(*Clause* 5.4)

EXAMPLES OF TYRE SIZE DESIGNATIONS

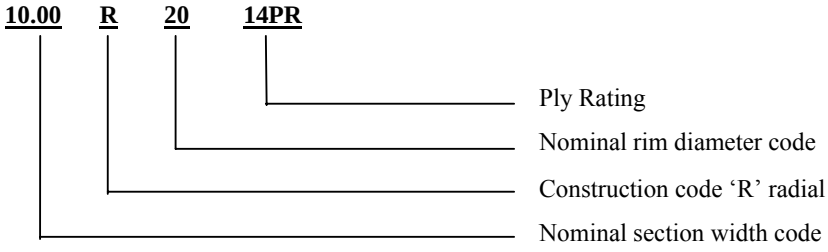
Millimetric Series (Radial)



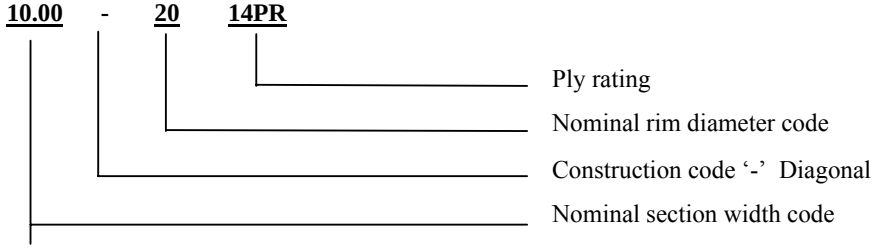
Numeric (Bias)



Numeric (Radial)



Numeric (Bias)



Annex K

(*Clause* 6.2.2)

INFORMATION TO BE SUBMITTED FOR TYPE APPROVAL OF TYRES

1	Manufacturer's name and address
2	Telephone No.
3	FAX. No.
4	E-mail address
5	Contact person
6	Tyre-size designation
7	Trade-name or mark
8	Category of use (normal/special/snow)
9	Structure: diagonal (bias ply/bias belted) / radial
10	Speed category
11	Load-capacity index of the tyre/Maximum load carrying capacity (kg)
12	Whether the tyre is to be used with or without an inner tube.
13	Whether the tyre is normal or reinforced
14	Ply-rating number of tyres for (for code designated tyres)
15	Overall section width (mm)
16	Overall diameter (mm)
17	Rim on which tyre can be mounted
18	Measuring rim and test rim
19	Inflation pressure (bar)
19.1	Inflation pressure corresponding to maximum load carrying capacity
19.2	Test and measurement pressures
20	Factor X referred to in cl.3.30 incase of theoretical (imaginary) rim, if applicable
21	Maximum speed permitted by the tyre manufacturer and the load carrying capacity allowed for that maximum speed. Applicable only for tyres identified by means of letter code 'V' within the size designation and suitable for speeds over 240 km/h or for tyres identified by means of letter code 'Z' within the size designation and suitable for speeds over 270 km/h,
22	Intended for use on (type of vehicle)
23	Numbers and height of tread wear indicator
24	Type of tread pattern (Lug or rib)
25	Drawing or Photograph in triplicate identifying tyre tread pattern side wall marking and relevant dimensions of inflated tyre mounted on the measuring rim.

ANNEX L
(*Foreword)*
COMMITTEE COMPOSITION

Automotive Tyres, Tubes and Rims Sectional Committee, TED 7

Organization	*Representative(s)*
Central Institute of Road Transport, Pune	SHRI D.P.SASTE (***Chairman***) SHRI SELVAKUMAR (*Alternate*)
All India Motor Transport Congress, New Delhi	SHRI CHARAN SINGH SHRI M.MURALI (*Alternate*)
Automotive Tyre manufacturers Association (ATMA), New Delhi	SHRI T.C.KAMATH SHRI R.BUDHRAJA (*Alternate*)
Ashok Leyland Ltd, Chennai	SHRI R. C. BALAKRISHANAN SHRI C SUNDARSANAN (*Alternate*)
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Organization	*Representative(s)*
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Indian Rubber Manufacturers Research Association, Thane	DR. S.K.CHAKRABORTY SHRI P.K.DAS (*Alternate)*
Indian Tyre Technical Advisory Committee), New Delhi	SHRI M.P.KANJOLIA SHRI T. CHAKRAVARTY (*Alternate*)
Kum Rajshree Parmar Memorial Foundation, Pune	SHRI C.M.PARMAR
Maruti Udyog Ltd, Gurgaon	SHRI DEEPAK KUMAR SHRI D. N. DAVE (*Alternate*)
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Ordnance Factory Board, Kolkata	SHRI K.N.ARYA SHRI D.K.BANGOTRA (*Alternate*)
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Member Secretary

SHRI R.R.SINGH
Scientist 'D' (TED), BIS

Please Contact at Phone: 23230131/4348 Telefax: 23236311, e-Mail: ted@bis.org.in

DRAFTS IN WIDE CIRCULATION

DOCUMENT DESPATCH ADVICE

Ref.	Date
TED 7/T -53	08-01-2010

AUTOMOTIVE TYRES, TUBES AND RIMS SECTIONAL COMMITTEE, TED 7

ADDRESSED TO:

1. **All Interested Members of Transport Engineering Division Council, TEDC**
2. **All Members of Automotive Tyres, Tubes and Rims Sectional Committee, TED 7**
3. **All Others Interested.**

Dear Sir(s),

Please find enclosed the following draft Indian Standards:

DOC: TED 7(759)W AUTOMOTIVE VEHICLES - PNEUMATIC TYRES FOR COMMERICAL VEHICLES - DIAGONAL AND RADIAL PLY – SPECIFICATION (First Revision of IS 15636)

Kindly examine this draft Indian standard and forward your views stating any difficulties which you are likely to experience in your business or profession, if this is finally adopted as National Standards.

Last date for comments**:** **30 -03-2010**

Comments, if any, may please be made in the enclosed format and mailed to the undersigned at the above address.

This document is also available on BIS website www.bis.org.in

Thanking you,

Yours faithfully,

(T.V. Singh)
Sc `E' & Head (Transport Engg.)

Encl.: As above

FORMAT FOR SENDING COMMENTS ON

BIS DOCUMENTS

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NAME OF THE COMMENTATOR/ORGANIZATION

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(1)	(2)	(3)

दूरभाष: 23230131शाखा 4348 टेलीफैक्स: 23236311 ई-मेल: ted@bis.org.in

व्यापक परिचालन में मसौदा

प्रलेख प्रषेण सूचना

टीईडी 7/टी–53 | -01-2010

स्वचल टायर, ट्यूब और रिम विषय समिति, टीईडी 7

क) परिवहन इंजीनियरिंग विभाग परिषद (पइंविप) के रूचि रखने वाले सदस्य

ख) स्वचल टायर, टयूब और रिम विषय समिति, टीईडी 7 के सभी सदस्य

ग) अन्य रूचि रखने वाले निकाय

महोदय,

निम्नलिखित प्रलेख संलग्न है :

प्रलेख संख्या	विषय
टीईडी 7(759) W	**स्वचल वाहन — व्यावसायिक वाहनों के लिय वातिल टायर — आड़ी और रेडियल प्लाई — विशिष्टि (आई एस 15636 का पहला पुनरीक्षण)**

कृप्या उपरोक्त मानक मसौदे का अवलोकन कर अपनी टिप्पणियॉ यह बताते हुए भेजें, कि यदि अंततः यह मानक राष्टीय मानक के रूप में स्वीकृत हो जाए, तो इस पर अमल करने में आपके व्यवसाय अथवा कारोबार में क्या कठिनाइयां आ सकती हैं 1

टिप्पणिया भेजने की अन्तिम तिथि **30–03–2010**

टिप्प्णी यदि कोई हो तो संलग्न प्रारूप में लिख कर दें, तथा ऊपरलिखित पते पर अधोहस्ताक्षरी को डाक द्वारा प्रेषित करें ।

प्रलेख भा.मा. ब्यूरो की बेवसाईट www.bis.org.in पर भी उपलब्ध हैं।

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भवदीय,

(टी वी सिंह)

संलग्न: ऊपरलिखित

वैज्ञानिक 'ई' एवं प्रमुख (परिवहन इंजि)