इंटरनेट मानक

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Mazdoor Kisan Shakti Sangathan
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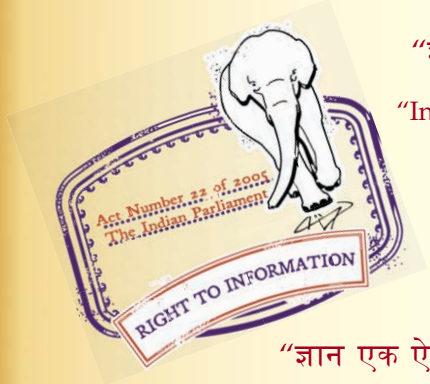
"पुराने को छोड नये के तरफ"
Jawaharlal Nehru
"Step Out From the Old to the New"

IS 15627 (2005): Automotive vehicles - Pneumatic tyres for two and three-wheeled motor vehicles [TED 7: Automotive Tyres, Tubes and Rims]



"ज्ञान से एक नये भारत का निर्माण"
Satyanarayan Gangaram Pitroda
"Invent a New India Using Knowledge"

"ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है"
Bhartṛhari—Nītiśatakam
"Knowledge is such a treasure which cannot be stolen"

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IS 15627 : 2005

[Superseding IS 10914 (Part 1) : 1991, IS 10914 (Part 4) : 1992, IS 10914 (Part 5) : 1995, IS 11157 : 1984 and IS 12151 : 1987]

भारतीय मानक

स्वचल वाहन — दुपहिया और तिपहिया मोटर वाहनों के लिए वातिल टायर — विशिष्टि

Indian Standard

AUTOMOTIVE VEHICLES — PNEUMATIC TYRES FOR TWO AND THREE-WHEELED MOTOR VEHICLES — SPECIFICATION

ICS 83.160.10

BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

December 2005

Price Group 9

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Automotive Tyres, Tubes and Rims Sectional Committee had been approved by the Transport Engineering Division Council.

The standards on pneumatic tyres of automotive vehicles which were earlier issued in five parts have now been revised and issued in three standards. The other standards in the series are:

IS No.	*Title*
15633 : 2005	Automotive vehicles — Pneumatic tyres for passenger car vehicles — Diagonal and radial ply — Specification
15636 : 2005	Automotive vehicles — Pneumatic tyres for commercial vehicles — Diagonal and radial ply — Specification

The requirements of terms, definitions, nomenclature and methods of test, which was earlier covered by separate Indian Standards, have been included in the above parts of the standards.

This standard supersedes the following Indian Standards:

IS No.	*Title*
10914 (Part 1) : 1991	Automotive vehicles — Pneumatic tyres: Part 1 Terms definitions and nomenclature (*first revision*)
10914 (Part 4) : 1992	Automotive vehicles — Pneumatic tyres: Part 4 Scooters and scooter derivates — Diagonal ply (*second revision*)
10914 (Part 5) : 1995	Automotive vehicles — Pneumatic tyres: Part 5 Method of test for diagonal ply and radial ply tyres (*first revision*)
11157 : 1984	Specification for pneumatic tyres for mopeds — Diagonal ply
12151 : 1987	Motorcycles tyres, diagonal ply — Specification

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

AIS-044 (Part 3)	Automotive vehicles — Pneumatic tyres for two and three-wheeled motor vehicles — Specification
ECE R 75	Uniform provisions concerning the approval of pneumatic tyres for motorcycles and mopeds

Following Indian Standards may be referred for valve and valve accessories of automotive vehicles:

IS No.	*Title*
9081 : 2001	Automotive vehicles — Valves and valve accessories for pneumatic tyres — Specification (*third revision*)
10939 : 2000	Designation system for tyre tube valves for automotive vehicles (*first revision*)

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 retained in the rounded off value should be the same as that of the specified value in this standard.

AMENDMENT NO. 1 MAY 2011
TO
IS 15627 : 2005 AUTOMOTIVE VEHICLES — PNEUMATIC TYRES FOR TWO AND THREE-WHEELED MOTOR VEHICLES — SPECIFICATION

(*Page* 1, *clause* **1**) — Substitute the following for the existing matter:

'**1 SCOPE**
This standard specifies the general, dimensional and performance requirements of new diagonal and radial ply pneumatic tyres designed primarily, but not only for two and three wheeled motor vehicles. However, it does not apply to tyres designed for competitions.'

(*Page* 3, *clause* **4.1.1**) — Substitute the following for the existing matter:

'**4.1.1** Tyre dimensions, namely, section width and outer diameter and profiles shall be compatible with the appropriate rim(s). The method of measurement of tyre dimensions is given in Annex D.'

(*Page* 4, *clause* **4.1.1.1**) — Substitute the following for the existing matter:

'**4.1.1.1** *Section width of tyre* — For the existing types of tyres whose designation is given in the col 2 of the tables in Annex C, the actual measured section width shall be within the minimum section width and maximum overall width values specified in Annex C.

NOTE — In case, the rims, other than those have the measuring rim width code as specified in the tables are used, design section width and maximum overall width shall be adjusted as follows:

Every 0.50 difference of rim width code	±5 mm
Rim width code difference between 1.10 and 1.20, 1.50 and 1.60, 1.75 and 1.85	±1 mm
Rim width code difference between 1.20 and 1.40, 1.40 and 1.60	±2 mm
Rim width code difference between 2.50 and 2.75, 1.60 and 1.85, 1.85 and 2.15 2.75 and 3.00, 1.50 and 1.75	±3 mm
Rim width code difference between 2.15 and 2.50	±4 mm
Rim width code difference between 2.75 and 3.50	±8 mm

(*Page* 4, *clause* **4.1.1.2**) — Substitute the following for the existing matter:

'**4.1.1.2** *Tyre outer diameter* — For the existing types of tyres whose designation is given in the col 2 of the tables in Annex C, the actual measured outer diameter shall be within the minimum and maximum diameter values specified in Annex C.

4.1.1.3 For the tyre sizes listed in Annex C, but ply rating/load index and load-inflation details are not listed, the section width and outer diameter shall be determined as follows:

a) The actual measured section width shall be within the minimum section width and maximum overall width specified in Annex C.
b) The actual measured outer diameter shall be within the minimum and maximum diameter specified in Annex C.

4.1.2 For code designated tyres which are not listed in Annex C, the section width and outer diameter shall be verified against the specification declared by the manufacturer.

4.1.3 For ISO designated tyres which are not listed in Annex C, the section width and outer diameter shall be calculated using the following formulae:

Price Group 7

4.1.3.1 *Section width of tyre*

a) The section width shall be calculated by using following formula:

$$S = S_1 + K(A - A_1)$$

where

S = section width measured on measuring rim, in mm;
S_1 = nominal section width, as set out on the tyre sidewall in the tyre size designation, in mm;
A = width of the measuring rim, as shown by the manufacturer in the technical specification, in mm; and
A_1 = theoretical rim width, in mm. A_1 shall be taken to equal S_1 multiplied by the factor X as specified by the manufacturer, and K shall be taken to equal 0.4.

b) The actual measured overall width of the tyre may be less than the section width determined as detailed in **4.1.3.1**.

c) The actual measured overall width may also exceed the section width determined as detailed in **4.1.3.1** up to +10 percent for the rim diameter code greater than or equal to 13 and up to +8 percent for tyres having the rim diameter code not more than 12.

4.1.3.2 *Outer diameter of the tyre*

a) The outer diameter of a tyre is calculated by the following formula:

$$D = d + 2H$$

where

D = outer diameter expressed in mm;
d = conventional number denoting the nominal rim diameter expressed in mm (*see* **3.29**);
H = nominal section height in mm and is equal to:

$$H = 0.01 \times R_a \times S_1$$

R_a = nosminal aspect ratio as shown on the sidewall of the tyre in the tyre-size designation in conformity with the requirements of **3.29**; and
S_1 = nominal section width in mm as shown on the sidewall of the tyre in the tyre-size sdesignation in conformity with the requirements of **3.29**.

b) The outer tyre diameter shall not be outside the minimum and maximum diameter values obtained from the following formula:

$$D_{Min} = d + (2H \times a)$$

$$D_{Max} = d + (2H \times b)$$

where d and H are as given in **4.1.3.2**(a) and 'a' and 'b' are as given below:

Rim diameter	*a*	*B*
For the rim diameter code ≥13	0.96	1.07
For the rim diameter code ≤ 12	0.93	1.10

c) The values in millimeters of the symbol '*d*' when indicated by a code are as follows:

Symbol 'd'	*Value to be used for calculation*
4	102
5	127
6	152
7	178
8	203
9	229
10	254
11	279
12	305
13	330
14	356
15	381
16	406
17	432
18	457
19	483
20	508
21	533
22	559
23	584

(*Page* 5, *clause* **4.4**) — Add the following at the end:

'If a Tubeless tyre version of a tyre is approved its tube version shall also be deemed to be approved.'

(*Page* 5, *clause* **4.6.1**, *line* 1) — Substitute 'minimum four' *for* 'not less than six'.

(*Page* 5, *clause* **4.6.2**) — Delete the clause and renumber the clauses **4.6.3** and **4.6.4** as **4.6.2** and **4.6.3** respectively'.

[*Page* 5, *clause* **5.1**(j)] — Add the following at the end:

'may be placed on one sidewall'.

[*Page* 5, *clause* **5.1**(k)] — Delete the words 'six' and '(as applicable)'.

[(*Page* 6, *clause* **5.1**(q)] — Substitute the following for the existing:

'Maximum cold inflation pressure in kPa.'

(*Page* 6, *clause* **6.2.5.3**) — Add the following new clauses at the end of the clause:

'6.3 Type Approval Procedure for Tyres not Listed in Annex C

6.3.1 Tyre section width and Tyre overall diameter shall be verified as per **4.1.1.3**, **4.1.2** and **4.1.3** against the specification declared by the manufacturer.

6.3.2 For carrying out other tests, the load, speed symbol and inflation pressure (as applicable) specified by the manufacturer and marked on the tyre shall be used.'

(*Page* 6, *clause* **7.1**, *first line*) — Delete the words 'and approval'.

(*Page* 6, *clause* **7.2**) — Delete and renumber clauses **7.3** as **7.2** and **7.4** as **7.3**.

(*Page* 9, *Table* 5) — Substitute the following for the existing table:

Table 5 Motorcycle Tyres — Size Rim Diameter Code ≤12 Code Designated Sizes, Diagonal Ply
(*Clauses* 4.1.1.1, 4.1.1.2, 4.1.1.3 *and* C-1)

Sl No.	Tyre Size Designation	Rim Width Code		New Tyre — Inflated						Ply Rating	Load Index	Maximum Load Capacity	Maximum Cold I.P. [1]
				Overall Diameter			Minimum Section Width	Design Section Width	Maximum Overall Width				
		Recommended	Permitted	D_{Min}	Design	D_{Max}							
				mm	mm	mm	mm	mm	mm			kg	kPa
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
i)	2.75-10	Div.1.75	1.50, 1.85, 2.1	395	399	412	68	71	75	4	37	128	250
ii)	3.00-10	Div.2.10	1.85, 2.15, 2.50	408	413	427	77	80	84	4	42	150	250
iii)	3.00-12	Div.2.50	1.85, 2.15, 2.50	459	464	475	81	84	90	4	47	175	250
iv)	3.50-8	Div.2.50C	2.10, 2.15	380	386	402	88	92	97	4	46	170	250
v)	3.50-10	Div.2.50	2.10, 2.15	431	437	453	88	92	97	4	51	195	250
vi)	3.50-12	Div.2.50C	2.15, 2.50	483	488	501	88	92	98	4	56	224	250

[1] Inflation pressure.

(*Page* 10, *Table* 6) — Substitute the following two tables for the existing table:

Table 6(a) Moped Tyres — Code Designated Sizes, Diagonal Ply With Rim Diameter Code ≤12 *Clauses* 4.1.1.1, 4.1.1.2, 4.1.1.3 *and* C-1)

Sl No.	Tyre Size Designation	Rim Width Code		New Tyre — Inflated						Load Index	Maximum Load Capacity	Maximum Cold I.P.[1]
				Overall Diameter			Minimum Section Width	Design Section Width	Maximum Overall Width			
		Recommended	Permitted	D_{Min}	Design	D_{Max}						
				mm	mm	mm	mm	mm	mm		kg	kPa
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
i)	2½ - 12	1.60	1.50, Div.1.50, Div.1.60, Div. 1.75, 1.85	436	440	449	62	65	68	Std. 28	100	230
ii)	3 -12	MT2.15; 2.15	MT1.85, MT2.50, 2.50, 2.50C	459	464	475	77	80	84	Std. 35	121	230

[1] Inflation pressure.

Table 6(b) Moped Tyres — Code Designated Sizes, Diagonal Ply With Rim Diameter Code >12
(*Clauses* 4.1.1.1, 4.1.1.2, 4.1.1.3 *and* C-1)

Sl No.	Tyre Size Designation	Rim Width Code		New Tyre — Inflated						Load Index	Maximum Load Capacity	Maximum Cold I.P. [1]
		Recommended	Permitted	Overall Diameter			Design Section Width	Minimum Section Width	Maximum Overall Width			
				D_{min}	Design	D_{max}						
				mm	mm	mm	mm	mm	mm		kg	kPa
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
i)	1¾ - 19	1.20	—	586	589	596	50	48	53	Std.20 Reinf.33	80 115	250 275
ii)	2 - 19	1.35	—	592	595	603	55	53	58	Std.24 Reinf.36	90 125	250 275
iii)	2 - 22	1.35	—	667	670	678	55	53	58	Std.26 Reinf.37	95 128	250 275
iv)	2¼ - 16	1.50	—	528	532	541	62	60	65	Std.26 Reinf.37	95 128	250 275
v)	2½- 16	1.60	—	544	548	558	68	65	71	Std.31 Reinf.42	109 150	250 275
vi)	2¼ - 19	1.50	—	605	609	618	62	60	65	Std.30 Reinf.41	106 145	250 275
vii)	2½ - 19	1.60	—	621	625	635	68	65	71	Std.35 Reinf.45	121 165	250 275

NOTE — Std: Standard type of tyre.
Reinf : Reinforced type of tyre.

[1] Inflation pressure.

(*Page* 11, *Table* 7) — Substitute the following for the existing table:

Table 7 Motorcycle Tyres — Size Rim Diameter Code ≥12 Code Designated Sizes, Diagonal Ply
(*Clauses* 4.1.1.1, 4.1.1.2, 4.1.1.3 *and* C-1)

Sl No.	Tyre Size Designation	Rim Width Code		New Tyre — Inflated						Ply Rating	Load Index	Maximum Load Capacity	Maximum Cold I.P.[1)]
				Overall Diameter			Minimum Section Width	Design Section Width	Maximum Overall Width				
		Recommended	Permitted	D_{Min}	Design	D_{Max}							
				mm	mm	mm	mm	mm	mm			kg	kPa
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
i)	2.25-16	1.60	1.20, 1.35, 1.40, 1.50	526	530	541	59	61	65	4 6	31 36	109 125	225 280
ii)	2.25-17	1.60	1.20, 1.35, 1.40, 1.50	552	556	567	59	61	65	4 6	33 38	115 132	225 280
iii)	2.25-18	1.60	1.40, 1.50	577	581	592	59	61	65	4 6	35 40	121 140	225 280
iv)	2.25-19	1.60	1.20, 1.35, 1.50	603	607	616	59	61	65	4 6	37 42	128 150	225 280
v)	2.50-16	1.60	1.35, 1.40, 1.50	538	542	554	62	65	70	4 6	36 41	125 145	225 280
vi)	2.50-17	1.60	1.35, 1.40, 1.50	564	568	580	62	65	70	4 6	38 43	132 155	225 280
vii)	2.50-18	1.60	1.35, 1.40, 1.50	589	593	605	62	65	70	4 6	40 45	140 165	225 280
viii)	2.75-14	1.85	1.40, 1.50, 1.60	507	512	523	72	75	80	4 6	37/35 43/41	128/121 155/145	225 280
ix)	2.75-16	1.85	1.40, 1.50, 1.60	557	562	573	72	75	80	4 6	42/40 48/46	150/140 180/170	225 280
x)	2.75-17	1.85	1.40, 1.50, 1.60	583	588	599	72	75	80	4 6	43/41 49/47	155/145 185/175	225 280
xi)	2.75-18	1.85	1.40, 1.50, 1.60	608	613	624	72	75	80	4 6	44/42 50/48	160/150 190/180	225 280
xii)	3.00-14	1.85	1.60, 2.15	521	526	538	77	80	86	4 6	40 45	140 165	225 280
xiii)	3.00-17	1.85	1.60, 2.15	597	602	614	77	80	86	4 6	46 50	170 190	225 280
xiv)	3.00-18	1.85	1.60, 2.15	623	627	639	77	80	86	4 6	47 52	175 200	225 280
xv)	3.00-19	1.85	1.60, 2.15	648	653	665	77	80	86	4 6	49 54	185 212	225 280
xvi)	3.25-16	2.15	1.85, 2.50	583	588	601	85	89	95	4 6	48 55	180 218	225 280
xvii)	3.25-18	2.15	1.85, 2.50	634	639	652	85	89	95	4 6	52 59	200 243	225 280
xviii)	3.25-19	2.15	1.85, 2.50	660	665	678	85	89	95	4 6	54 60	212 250	225 280
xix)	3.50-18	2.15	1.85, 2.50	643	649	662	89	93	100	4 6	56 62	224 265	225 280
xx)	3.50-19	2.15	1.85, 2.50	669	675	688	89	93	100	4 6	57 63	230 272	225 280

[1)] Inflation pressure.

(*Page* 12, *Table* 8) — Substitute the following for the existing table:

Table 8 Motorcycle Tyres — ISO Designated, Diagonal Ply With Rim Diameter Code ≥12
(*Clauses* 4.1.1.1, 4.1.1.2, 4.1.1.3 *and* C-1)

Sl No.	Tyre Size Designation	Rim Width Code		New Tyre — Inflated						Load Index	Maximum Load Capacity	Maximum Cold I.P.[1)]
				Overall Diameter			Minimum Section Width	Design Section Width	Maximum Overall Width			
		Recommended	Permitted	D_{Min}	Design	D_{Max}						
				mm	mm	mm	mm	mm	mm		Kg	kPa
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
	'70 Series'											
i)	120/70-12	MT3.50DC	MT2.75, MT3.00, MT3.75, 2.75	468	473	483	117	122	131	Std. 51	195	230
										Reinf. 58	236	280
ii)	130/70-12	MT3.50DC	MT3.00, MT3.75, MT4.00	478	487	498	124	129	138	Std. 56	224	230
										Reinf. 62	265	280
	'90 Series'											
i)	90/90-10	2.15	1.85, MT1.85, 2.50, MT2.15, 2.50, 2.50C, Div.2.50C	411	416	425	86	90	96	Std. 50	190	250
ii)	90/90-12	2.15	—	462	467	478	86	90	96	Std. 48	180	250
										Std. 54	212	250
iii)	100/90-10	MT2.50	—	429	434	445	97	101	108	Std. 56	224	250
										Reinf. 61	257	300
iv)	100/90-12	2.50	—	480	485	498	97	101	108	Std. 53	206	250
										Std. 59	243	250
										Reinf. 64	280	300
	'100 Series'											
i)	90/100-10	2.15	1.85, MT1.85, 2.50, MT2.15, 2.50, 2.50C, Div.2.50C	425	434	444	86	90	96	Std. 53	206	250

NOTE — Std: Standard type of tyre.
Reinf : Reinforced type of tyre.

[1)] Inflation pressure.

(*Page* 12, *Table* 9) — Substitute the following for the existing table:

Table 9 Motorcycle Tyres — ISO Designated, Diagonal & Radial Ply With Rim Diameter Code >12
(*Clauses* 4.1.1.1, 4.1.1.2, 4.1.1.3 *and* C-1)

Sl No.	Tyre Size Designation	Rim Width Code		New Tyre — Inflated						Load Index	Maximum Load Capacity	Maximum Cold I.P.[1)]
				Overall Diameter			Minimum Section Width	Design Section Width	Maximum Overall Width			
		Recommended	Permitted	D_{Min}	Design	D_{Max}						
				mm	mm	mm	mm	mm	mm		kg	kPa
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
	'60 Series'											
i)	140/60-17	MT3.75	MT3.50, MT4.00, MT4.25, MT4.50	595	600	609	133	139	149	Std. 63	272	230
ii)	140/60R17		MT4.00, MT4.25, MT4.50						145			
iii)	150/60R17	MT4.25	MT4.00, MT4.50	607	612	621	145	151	157	Std. 66	300	230
	'70 Series'											
i)	110/70-17	MT3.00	2.50, MT2.50, 2.75, MT2.75, MT3.50	581	586	593	106	110	118	Std. 54	212	230
ii)	110/70R17		MT3.50						114			
iii)	130/70-17	MT3.50	MT3.00, MT3.75, MT4.00	609	614	623	124	129	138	Std. 62	265	230
iv)	130/70R17		MT3.75, MT4.00						134			
v)	140/70-17	MT3.75	MT3.50, MT4.00, MT4.25, MT4.50	622	628	639	133	139	149	Std. 66	300	230
vi)	140/70-18	MT3.75	MT3.50, MT4.00, MT4.25, MT4.50	647	653	664	133	139	149	Std. 67	307	230
vii)	150/70-15	MT 4.25	MT 4.00, MT 4.50, MT 3.50, MT 3.75	585	591	603	145	151	162	Std. 67	307	230
viii)	170/70-15	MT4.50	MT4.00, MT4.25, MT5.00, MT5.50	612	619	632	161	168	180	Std. 73	365	230
	'80 Series'											
i)	90/80-17	2.15	1.85, 2.50	572	576	586	86	90	96	Std. 46	170	225
ii)	100/80-17	2.50, MT2.50	2.15:2.75, MT2.15, MT2.75	587	592	601	97	101	108	Std. 52	200	230
iii)	100/80-18	2.50, MT2.50	2.15:2.75, MT2.15, MT2.75	610	617	627	97	101	108	Std. 53	206	225
iv)	110/80-17	2.50, MT2.50	2.15, 2.75, 3.00, MT2.15, MT2.75, MT3.00	603	608	617	105	109	117	Std. 57	230	230
v)	120/80-16	2.75	2.15, 2.50, 3.00	592	598	611	114	119	127	Std. 60	250	225
vi)	120/80-17	2.75, MT2.75	2.50, 3.00, MT2.50, MT3.00	618	624	635	114	119	127	Std. 61	257	230
										Reinf.67	307	280
vii)	120/80R17		3.00, MT3.00						124			
viii)	120/80-18	2.75, MT2.75	2.50, 3.00, MT2.50, MT3.00	643	649	660	114	119	127	Std. 62	265	230
ix)	120/80-19	2.75, MT2.75	2.50, 3.00, MT2.50, MT3.00	669	675	686	114	119	127	Std. 63	272	230
x)	130/80-17	3.00, MT3.00	2.50, 2.75, MT2.50, MT2.75, MT3.50	634	640	651	124	129	138	Std. 65	290	230
xi)	130/80-18	3.00, MT3.00	2.50, 2.75, MT2.50, MT2.75, MT3.50	659	665	676	124	129	138	Std. 66	300	230
										Reinf. 72	355	280
	'90 Series'											
i)	80/90-17	1.85, MT1.85	1.60, MT1.60, 2.15, MT2.15	572	576	583	76	80	86	Std. 44	160	230
										Reinf. 50	190	280
ii)	80/90-18	1.85, MT1.85	1.60, MT1.60, 2.15, MT2.15	597	601	608	76	80	86	Std. 45	165	230
										Reinf. 51	195	280

Table 9 (*Concluded*)

Sl No.	Tyre Size Designation	Rim Width Code		New Tyre — Inflated						Load Index	Maximum Load Capacity	Maximum Cold I.P.[1]
				Overall Diameter			Minimum Section Width	Design Section Width	Maximum Overall Width			
		Recommended	Permitted	D_{Min}	Design	D_{Max}						
				mm	mm	mm	mm	mm	mm		kg	kPa
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
iii)	90/90-17	2.15	1.85, 2.50	589	594	605	86	90	96	Std. 49	185	225
iv)	90/90-18	2.15	1.85, 2.50	614	619	630	86	90	96	Std. 51	195	225
v)	90/90-19	2.15, MT2.15	1.85, 2.50, MT1.85, MT2.50	640	645	654	86	90	96	Std. 52	200	230
vi)	100/90-17	2.50	2.15, 2.75	607	612	625	97	101	108	Std. 55	218	225
vii)	100/90-18	2.50	2.15, 2.75	632	637	650	97	101	108	Std. 56	224	225
viii)	110/90-17	2.50, MT2.50	2.15, 2.75, 3.00, MT2.15, MT2.75, MT3.00	624	630	641	105	109	117	Std. 60	250	230
ix)	110/90-18	2.50, MT2.50	2.15, 2.75, 3.00, MT2.15, MT2.75, MT3.00	649	655	669	105	109	117	Std. 61	257	225
x)	110/90-19	2.50, MT2.50	2.15, 2.75, 3.00, MT2.15, MT2.75, MT3.00	675	681	692	105	109	117	Std. 62	265	230
xi)	130/90-15	3.00	2.15, 2.50, 2.75, 3.50	608	615	631	124	129	138	Std. 66	300	225
xii)	140/90-15	MT3.50	2.75, MT2.75, 3.00, MT3.00, MT3.75	625	633	648	136	142	152	Std. 70	335	230
										Reinf. 76	400	280
'100 Series'												
i)	60/100-17	1.40	1.20, 1.50, MT1.50, 1.60, MT1.60	548	552	557	56	60	64	Std. 33	115	230
ii)	70/100-17	1.60, MT1.60	1.40, 1.50, MT1.50, 1.85, MT1.85	568	572	582	65	69	74	Std. 40	140	230
iii)	80/100-17	1.85, MT1.85	1.60, MT1.60, 2.15, MT2.15	587	592	603	76	80	86	Std. 46	170	230
										Reinf. 53	206	280
iv)	80/100-18	1.85, MT1.85	1.60, MT1.60, 2.15, MT2.15	612	617	626	76	80	86	Std. 47	175	230

NOTE — Std: Standard type of tyre.
Reinf : Reinforced type of tyre.

[1] Inflation pressure.

(*Page* 13, *Table* 10) — Substitute the following for the existing table:

Table 10 Tyres for Three Wheelers Code Designated, Diagonal Ply
(*Clauses* 4.1.1.1, 4.1.1.2, 4.1.1.3 *and* C-1)

Sl No.	Tyre Size Designation	Rim Width Code		New Tyre — Inflated						Ply Rating	Load Index	Maximum Load Capacity	Maximum Cold I.P.[1)]
				Overall Diameter			Minimum Section Width	Design Section Width	Maximum Overall Width				
		Recommended	Permitted	D_{Min}	Design	D_{Max}							
				mm	mm	mm	mm	mm	mm			kg	kPa
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
i)	3.50-10	Div 2.50	2.10, 2.15	431	437	453	88	92	97	6	74	375	425
ii)	4.00-8	Div 3.00	2.50 2.15	409	415	434	109	114	120	4 6	70 76	335 400	345 425
iii)	4.00-10	Div 3.00	2.50, 2.75	460	466	485	106	110	116	4 6	73 79	365 437	345 425
iv)	4.50-10	3.50 DC	3.00	483	490	511	120	125	131	6 8	82 85	475 515	425 500
v)	5.00-10	3.50 DC	—	508	516	540	129	134	141	8	89	580	500

[1)] Inflation pressure.

(*Page* 13, *Table* 11) — Substitute the following for the existing table:

Table 11 Recommended Inflation Pressure for Measuring Tyre Dimensions
(*Clause* D-1)

Sl No.	Tyre Version	Speed Category Symbol	Pressure kPa
(1)	(2)	(3)	(4)
i)	**Mopeds**		
	Standard Rim Diameter Code ≤ 12	B	230
	Standard Rim Diameter Code ≥ 12	B	250
	Reinforced Rim Diameter Code ≥ 12	B	275
ii)	**Motorcycles**		
	Standard and/or 4 PR Rim Diameter Code ≤ 12 Code designated	J	250
	Standard and/or 4 PR Rim Diameter Code ≥ 12 Code designated	L, P	225
	Reinforced and/or 6 PR Rim Diameter Code ≥ 12 Code designated	L, P	280
	Standard Rim Diameter Code ≤ 12 ISO Designated	J, L	230 or 250
	Reinforced Rim Diameter Code ≤ 12 ISO Designated	J, L	280 or 300
	Standard Rim Diameter Code ≥ 12 ISO Designated	P	225 or 230
	Reinforced Rim Diameter Code ≥ 12 ISO Designated	P	280
iii)	**Scooters**		
	Standard and/or 4 PR Rim Diameter Code ≤ 12 Code designated	J	250
	Standard Rim Diameter Code ≤ 12 ISO Designated	J, L	230 or 250
	Reinforced Rim Diameter Code ≤ 12 ISO Designated	J, L	280 or 300
iv)	**Three Wheeler/Scooter Derivatives**		
	4PR	E	345
	6PR		425
	8PR		500

(*Page* 14, *Table* 12) — Substitute the following for the existing table:

Table 12 Recommended Inflation Pressure for Testing Load/Speed Performance
(*Clauses* 4.2 *and* E-1.2)

Sl No.	Tyre Version	Speed Category Symbol	Pressure kPa
(1)	(2)	(3)	(4)
i)	**Mopeds**		
	Standard Rim Diameter Code ≤ 12	B	225
	Standard Rim Diameter Code ≥ 12	B	225
	Reinforced Rim Diameter Code ≥ 12	B	300
ii)	**Motorcycles**		
	Standard and/or 4 PR Rim Diameter Code ≤ 12 Code designated	J	250
	Standard and/or 4 PR Rim Diameter Code ≥ 12 Code designated	L, P	250
	Reinforced and/or 6 PR Rim Diameter Code ≥ 12 Code designated	L, P	330
	Standard Rim Diameter Code ≤ 12 ISO Designated	J, L	250
	Reinforced Rim Diameter Code ≤ 12 ISO Designated	J, L	330
	Standard Rim Diameter Code ≥ 12 ISO Designated	P	250
	Reinforced Rim Diameter Code ≥ 12 ISO Designated	P	330
iii)	**Scooters**		
	Standard and/or 4 PR Rim Diameter Code ≤ 12 Code designated	J	250
	Standard Rim Diameter Code ≤ 12 ISO Designated	J, L	250
	Reinforced Rim Diameter Code ≤ 12 ISO Designated	J, L	330
iv)	**Three Wheeler/Scooter Derivatives**		
	4PR	E	370
	6PR		450
	8PR		520

(*Page* 15, *Annex* F, *clause* **F-1**) — Add the following at the end of the clause:

'This testing procedure is applicable only for normal highway service tyres mentioned in Table 13.'

(*Page* 21, *Annex* K, *item No.* 13) — Substitute the following for the existing:

'Whether the tyre is standard or reinforced.'

(*Page* 21, *Annex* K, *item No.* 14) — Substitute the following for the existing:

'Ply-rating number of tyres for (for code designated tyres, if applicable),'

(TED 7)

Reprography Unit, BIS, New Delhi, India

Indian Standard

AUTOMOTIVE VEHICLES — PNEUMATIC TYRES FOR TWO AND THREE-WHEELED MOTOR VEHICLES — SPECIFICATION

1 SCOPE

This standard prescribes the general, dimensional and performance requirements of new pneumatic tyres for two and three-wheeled motor vehicles.

2 REFERENCES

The following standards contain provisions, which through reference in this text constitute provisions of the standard. At the time of publication, the editions indicated were 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 editions of the standards indicated below:

IS No.	*Title*
10694	General requirements for rims for automotive vehicles:
(Part 4) : 1983	Scooters and scooter derivative
(Part 5) : 1987	Moped, motorcycle and motorcycle derivative rims

3 TERMS, DEFINITIONS AND NOMENCLATURE

3.1 Bead — Part of the pneumatic tyre, the shape and structure of which enables it to fit the rim and hold the tyre on that rim (*see* Fig.1).

3.2 Carcass — Part of the pneumatic tyre other than the tread and the rubber sidewalls which, when inflated, bears the load (*see* Fig. 1).

3.3 Chunking — Breaking away of pieces of rubber from the tyre tread.

3.4 Cords — Strands forming the fabric of the plies in the pneumatic tyre (*see* Fig. 1).

3.5 Cord Separation — Parting of the cords from their rubber coating.

3.6 Load Index — A figure associated with the maximum permissible load which a tyre can carry at the speed corresponding to its speed symbol according to the operating conditions specified by the manufacturer. Annex A contains a list of indices and the corresponding loads (*see* Table 1).

3.7 Maximum Load Rating — Maximum mass which a tyre is rated to carry, subject to the following:

a) For speed lower or equal to 130 km/h the maximum load rating shall not exceed the percentage of the value associated with the relevant load capacity index of the tyre as indicated in Table 2 (*see* **3.21**) with reference to the speed category symbol of the tyre and the speed capability of the vehicle to which the tyre is fitted.

b) For speed above 130 km/h but not exceeding 210 km/h the maximum load rating shall not exceed the value of the mass associated with the load capacity index of the tyre.

c) In the case of tyres designed for a speed exceeding 210 km/h but not exceeding 270 km/h, the maximum load rating shall not exceed the percentage of the mass associated with the load capacity index for the tyre set out in Table 3 with reference to the speed category symbol of the tyre and the maximum design speed of the vehicle to which the tyre is to be fitted (*see* Table 3).

d) For speeds in excess of 270 km/h the maximum load rating shall not exceed the mass specified by the tyre manufacturer with reference to the speed capability of the tyre. For intermediate speeds between 270 km/h and the maximum speed permitted by the tyre manufacturer a linear interpolation of the load rating applies.

3.8 Measuring Rim — Rim on which a tyre shall be fitted for dimensional measurement purposes.

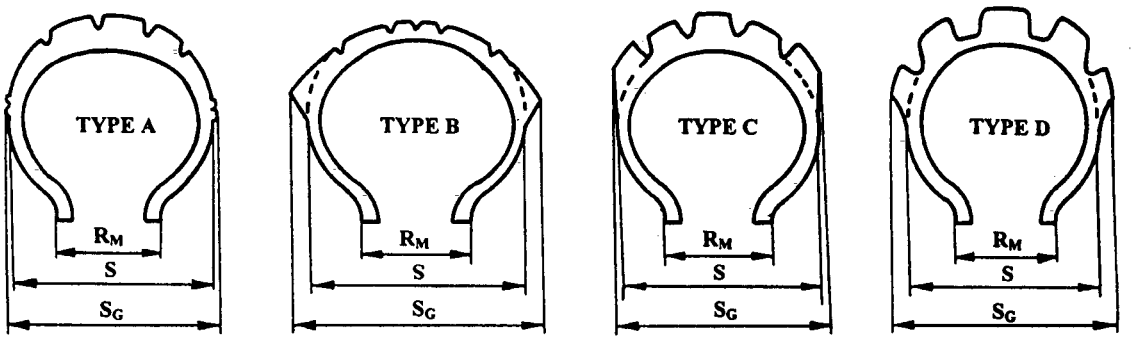
3.9 Nominal Aspect Ratio (R_a) — Hundred times the ratio of the nominal section height to the nominal section width of the tyre on its theoretical rim.

3.10 Nominal Rim Diameter — Diameter of the rim on which a tyre is designed to be mounted (*see* Fig. 1).

3.11 Principal Groove — Wide grooves located in the central zone of the tread.

3.12 Outer Diameter (*D*) — Overall diameter of an inflated new tyre (*see* Fig. 1).

3.13 Overall Width — Linear distance between the outer edges of the sidewalls of an inflated tyre,



S : TYRE SECTION WIDTH S_G : TYRE OVERALL WIDTH R_M : MEASURING RIM WIDTH

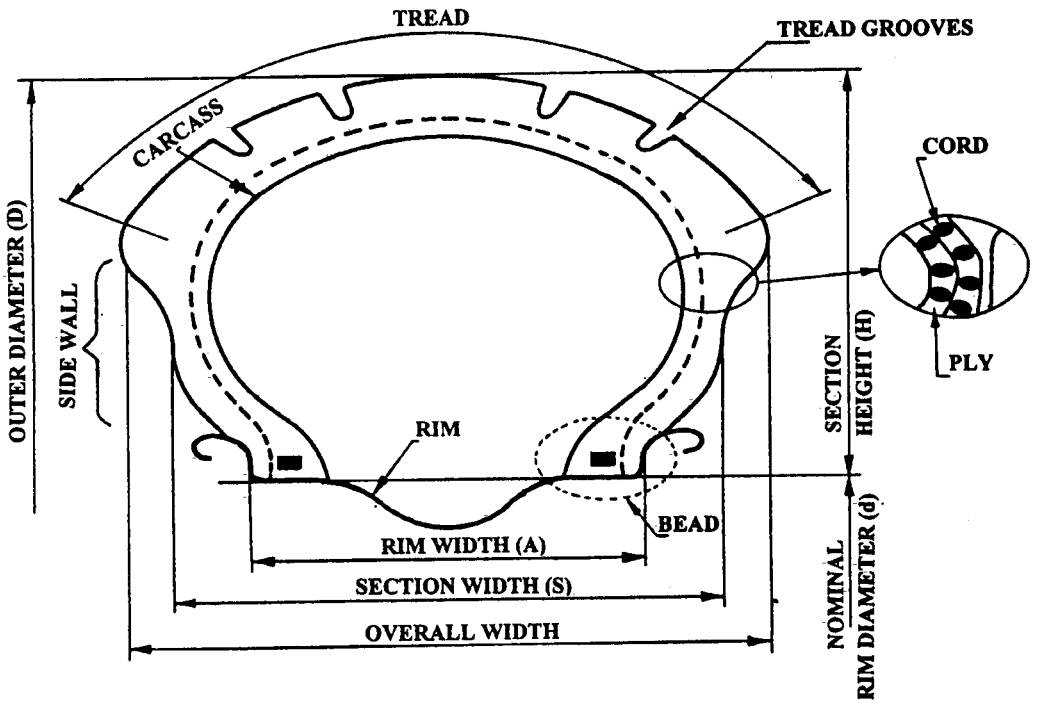


FIG. 1 NOMENCLATURE OF TYRE

including markings, embellishments and protective bands or ribs (*see* Fig. 1); the overall width of tyres, the tread width of which is greater than the section width is the width of the tread.

3.14 Ply — Layer of rubber coated parallel cords (*see* Fig. 1).

3.14.1 *Ply Rating* — Tyre with its maximum recommended load when used in a specific type of service. It is an index of tyre strength and does not necessarily represent the number of cord plies in the tyre.

3.15 Ply Separation — Parting of adjacent plies.

3.16 Rim — Support for either a tyre and inner tube or a tubeless tyre on which the beads of the tyre are seated.

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

3.18 Section Width (*S*) — Linear distance between the outer edges of the sidewalls of an inflated tyre excluding the protrusions due to markings, embellishments or protective bands or ribs.

3.19 Sidewall — Part of a pneumatic tyre lying between the tread and the part intended to be covered by the wheel rim (*see* Fig. 1).

3.20 Speed Category — Maximum designated speed of the tyre, expressed by the speed category symbol as shown in Table 4. Tyres suitable for maximum speeds in excess of 240 km/h are identified by the letter 'V'

or 'Z' placed within the tyre size designation in front of the indications of tyre structure.

3.21 Table of Load Variations as a Function of Speed — Table 2, which shows, by reference to indices of load capacity and of capacity at nominal speed, load variations of a tyre if used at speeds other than those corresponding to that indicated by the nominal speed category (*see* Table 2).

3.22 Test Rim — Rim to which a tyre shall be fitted for testing.

3.23 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.

3.24 Tread — Part of the tyre which comes into contact with the ground, protects the carcass against mechanical damage and contributes to ground adhesion (*see* Fig. 1).

3.25 Tread Groove — Space between two adjacent ribs or blocks in the tread pattern (*see* Fig. 1).

3.26 Tread Separation — Pulling away of the tread from the carcass.

3.27 Type of Tyre — Tyres intended for normal road use which basically do not differ from one another in respect of:

a) Make or trade-name;
b) Tyre size designation;
c) Structure [diagonal or bias ply (cross-ply), belted-bias, radial];
d) Speed category symbol;
e) Load capacity index/maximum load carrying capacity and if applicable ply rating; and
f) Cross-section profile dimension when fitted to a specified rim.

3.28 Tyre Structure — Technical characteristics of a tyre carcass. The following structures of a pneumatic tyre are distinguished in particular:

a) *Diagonal or bias ply (cross-ply)* — Pneumatic tyre structure the ply cords of which extend to the beads and are laid in such a way as to form alternating angles which are perceptibly less than 90° to the tread centre line.
b) *Bias belted* — Pneumatic tyre structure of the cross-ply type in which the carcass is restrained by a belt consisting of two or more layers of basically inextensible cord materials forming alternating angles close to those of the carcass.
c) *Radial* — Pneumatic tyre structure the ply cords of which extend to the beads and are laid substantially at 90° to the tread centre line, while the carcass is stabilized by a basically inextensible circumferential belt.
d) *Reinforced* — Pneumatic tyre structure in which the carcass is more resistant than that of a corresponding standard tyre.

3.29 Tyre Size Designation — The description containing the following:

a) Nominal section width (S_1) expressed in the form of a code, except for certain types of tyre for which the tyre size designation is set out in the col 2 of the tables in Annex C;
b) Nominal aspect ratio (R_a), except for certain types of tyre for which the tyre size designation is given in the col 2 of the tables in Annex C; and
c) A conventional number (d) denoting the nominal rim diameter and corresponding to that diameter expressed either in the form of a code (a figure of less than 100) or in millimetres (a figure of more than 100).

3.30 General — Expressions such as moped tyres, motorcycle tyres, three-wheeler tyres, etc, used in this standard are with the following general meaning:

a) Moped tyre means those intended to be used on two or three-wheelers with maximum design speed not exceeding 50 km/h,
b) Motorcycle tyres means tyres intended to be used on other two-wheelers, and
c) Three-wheeler tyres means tyres intended for use on three-wheelers.

These are for the purpose of convenience of tabulation and do not refer to actual classification of vehicles on which the tyre is intended to be used.

Suitability of a particular tyre for a vehicle depends only on the speed capability of the tyre, its load rating with respect to the maximum design speed of the vehicle, and its maximum permissible axle loads as prescribed in applicable standard.

4 TEST REQUIREMENTS

4.1 Tyre Dimensions

4.1.1 Tyre dimensions shall conform to requirements specified in **4.1.1.1** and **4.1.1.2.** Method of measurement is given in Annex D.

NOTE — In case, the rims, other than those have the measuring rim width code as specified in the tables, are used, section width and maximum overall width shall be adjusted as follows:

a) Every 0.50 difference of rim width code : 5 mm
b) Rim width code difference between 1.10 and 1.20, 1.50 and 1.60, 1.75 and 1.85 : 1 mm

c) Rim width code difference between 1.20 and 1.40, 1.40 and 1.60, 1.60 and 1.85, 1.85 and 2.15, 2.50 and 2.75 : 2 mm

d) Rim width code difference between 1.50 and 1.75, 1.50 and 1.85, 2.75 and 3.00 : 3 mm

e) Rim width code difference between 2.10 and 2.50, 2.15 and 2.50 : 4 mm

4.1.1.1 *Section width of tyre*

a) For the tyre size designation specified in Annex C, the overall width of a tyre shall conform to dimensions specified in Tables 5 to 10. Method of measurement is given in Annex D.

b) Tyre shall be fitted to the measuring rim and inflated to the pressure specified by the manufacturer. In the absence of such specification from the tyre manufacturer, the values given in Table 11 may be used for the categories listed.

c) Nominal section width (S_1), the maximum overall width of the tyre shall be as per the details given in Annex C.

d) Overall width of a tyre shall not exceed the value specified in the relevant table in Annex C.

e) For tyre designations not listed in Annex C, the section width shall be calculated by using following formula:

$$S = S_1 + K(A - A_1)$$

where

S = section width measured on measuring rim, in mm;

S_1 = nominal section width as set out on the tyre sidewall in the tyre size designation, in mm;

A = width of the measuring rim stated by the manufacturer in the technical specification, in mm; and

A_1 = theoretical rim width, in mm.

The value S_1 multiplied by the X factor quoted by the tyre manufacturer and $K = 0.4$.

f) The overall width of a tyre may be less than the section width S as determined in accordance with **4.1.1.1**(e). It may exceed that value up to + 10 percent for the rim diameter code greater than or equal to 13 and up to + 8 percent for tyres having the rim diameter code not more than 12.

4.1.1.2 *Tyre outer diameter*

a) *For tyre designations listed in Annex C*

The outer diameter of the tyre shall not exceed the minimum and maximum diameter values specified in Annex C.

b) *For tyre designations not listed in Annex C*

For tyres, which are not covered in Annex C, the outer diameter of a tyre shall be calculated by using the following formula:

$$D = d + 2H$$

where

S = section width measured on measuring rim, in mm;

D = outer diameter, in mm;

d = nominal rim diameter, in mm;

H = nominal tyre height = $S_1 \times 0.01\ R_a$;

S_1 = nominal section width; and

R_a = nominal aspect ratio as set out in the description on the tyre sidewall.

c) The outer tyre diameter shall not exceed the minimum and maximum diameter values shall be calculated by using the following formula:

1) $D_{Min} = d + (2H \times a)$

2) $D_{Max} = d + (2H \times b)$

where

H and d given in **4.1.1.2**(b) and 'a' and 'b' given as below:

Rim diameter	*a*	*b*
For the rim diameter code ≥ 13	0.96	1.07
For the rim diameter code ≤ 12	0.93	1.10

d) The tyre dimensions (outer diameter and section width) shall be measured as specified in Annex D.

4.2 Load/Speed Performance Test

4.2.1 The load/speed performance test shall be carried out on a tyre in accordance with the method specified in Annex E. The tyre shall be inflated to the pressure specified by its manufacturer. In the absence of such specification from the tyre manufacturer, the values given in Table 12 may be used for the categories listed.

4.2.2 In case of 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, the above load/speed test is carried out on one tyre at the load and speed conditions marked within parentheses on the tyre [*see* **5**(m)]. Another load/speed test shall be carried out on a second tyre of the same type at the load and speed conditions, if any specified as maximum by the tyre manufacturer.

4.2.3 After successfully undergoing the load/speed test a tyre shall not exhibit any tread ply or cord separation or any chunking or cord breakage.

4.2.4 The outer diameter of the tyre measured at least 6 h after the load/speed performance test shall not differ from the outer diameter measured before the test by more than ± 3.5 percent.

4.2.5 The tyre overall width measured at the end of the load/speed performance test shall not exceed the value specified in **4.1.1.1**(d) or **4.1.1.1**(f) as applicable.

4.3 Dynamic Growth of Tyres

4.3.1 This test is applicable only to tyres of the speed category symbol above 'P' (150 km/h).The tyres, which have passed the load/speed performance test as specified in **4.2**, shall undergo a dynamic growth test in accordance with Annex F. Tyre inflation pressure (test inflation pressure) shall be adjusted to the values indicated in Table 13.

4.3.2 The tyre shall meet the requirements specified in **F-4**.

4.4 Tyre Strength Test (Plunger Test)

The sample shall conform to the requirements specified in Tables 14, 15 and 16 (as applicable) when tested as per the method given in Annex G.

4.5 Endurance Test

This test is applicable only for tyres listed in Table 17.

The sample shall conform to the requirements specified in **H-5** when tested as per the method given in Annex H.

4.6 Tread Wear Indicators

4.6.1 The pneumatic tyre shall include not less than six transverse rows of wear indicators, approximately equally spaced and situated in the principle 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.

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

4.6.3 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 0.8 mm deep.

4.6.4 The 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 0.8 mm at any part of the tread circumference.

5 MARKINGS

5.1 Tyre shall be permanently and legibly marked at least on one sidewalls of the tyre with following markings:

a) Make or trade-mark.

b) Tyre size designation as given in **3.29**.

c) Load index and/or maximum load carrying capacity and ply rating (if applicable). In case of ISO designated tyres the marking of load index is mandatory.

NOTE — Examples of tyre sizes designations for code designated and ISO designated tyres in Annex J (*see* Tables 18 and 19).

d) The indications of the tyre structure are as follows:

1) In the case of diagonal or bias ply (cross-ply) tyres, no marking or the character '—' or the letter 'D' preceding the rim diameter code;

2) In the case of belted-bias tyres, the letter 'B' preceding the rim-diameter code and, optionally, the words ' BELTED-BIAS'; and

3) In the case of radial-ply tyres, the letter 'R' preceding the rim-diameter code and, optionally, the word 'RADIAL'.

e) Speed categories of the tyre, expressed by the symbol given in **3.20**.

f) Load capacity index are given in Annex A or maximum load carrying capacity and ply rating (if applicable) at the designated speed.

g) Word 'TUBELESS' where the tyre is intended for use without an inner tube.

h) Symbol 'REINFORCED' or 'REINF' in the case of a reinforced tyre.

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).

k) Tread wear indicators at minimum six/four (as applicable) places along the circumference.

m) Tyres suitable for speeds above 240 km/h shall be marked with the appropriate letter code 'V' or 'Z', as applicable [*see* **3.7**(c)] within the tyre size designation and in front of the indication of the structure [*see* **5**(d)].

n) Tyres suitable for speeds above 240 km/h (or 270 km/h respectively) shall bear, within parentheses, the marking of the load capacity index [*see* **5**(f)] applicable at a speed of 210 km/h (or 240 km/h respectively) and a

reference speed category symbol [*see* 5(e)] as follows:

'V' in case of tyres identified with the letter code 'V' within the size designation.

'W' in case of tyres identified with the letter code 'Z' within the size designation.

p) An arrow marking to indicate the direction in which the tyre should rotate in service in the case of directional type tyres.

q) Maximum permissible tyre pressure, in kPa or bar or kg/cm^2 or any combination of these units.

5.2 An example of tyre markings is given in Annex J.

NOTE — The markings given in **5** shall be moulded into or on the tyres. Marking shall be clearly legible.

6 CRITERIA FOR TYPE APPROVAL/TYPE TEST

6.1 Tyre(s) shall meet the test requirements when tested as per schedule given in Table 20.

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 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 **6.2.2** shall be intimated to the Certifying Authority.

6.2.3.2 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) *Fabric material* — Nylon/Polyester/Polymide (one type).

6.2.5.3 Tyre type approved for the requirements specified for three wheeler tyre shall be considered by the Certifying Authority for type approval for a use on two wheeler on submission of specific application.

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 standard 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 has undergone the same testing and type approval for that family of tyre.

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 Table 21.

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

8 BIS CERTIFICATION MARKING

The product 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 thereunder. The details of conditions under which the licence for the use of Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

ANNEX A

(*Clauses* 3.6 *and* 3.7)

LOAD INDEX AND MAXIMUM LOAD RATING OF TYRES

Table 1 List of Load Indices and Corresponding

(*Clause* 3.6)

LI	Maximum Load	LI	Maximum Load	LI	Maximum Load	LI	Maximum Load
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
0	45	31	109	61	257	91	615
1	46.2	32	112	62	265	92	630
2	47.5	33	115	63	272	93	650
3	48.7	34	118	64	280	94	670
4	50	35	121	65	290	95	690
5	51.5	36	125	66	300	96	710
6	53	37	128	67	307	97	730
7	54.5	38	132	68	315	98	750
8	56	39	136	69	325	99	775
9	58	40	140	70	335	100	800
10	60	41	145	71	345	101	825
11	61.5	42	150	72	355	102	850
12	63	43	155	73	365	103	875
13	65	44	160	74	375	104	900
14	67	45	165	75	387	105	925
15	69	46	170	76	400	106	950
16	71	47	175	77	412	107	975
17	73	48	180	78	425	108	1 000
18	75	49	185	79	437	109	1 030
19	77.5	50	190	80	450	110	1 060
20	80	51	195	81	462	111	1 090
21	82.5	52	200	82	475	112	1 120
22	85	53	206	83	487	113	1 150
23	87.5	54	212	84	500	114	1 180
24	90	55	218	85	515	115	1 215
25	92.5	56	224	86	530	116	1 250
26	95	57	230	87	545	117	1 285
27	97.5	58	236	88	560	118	1 320
28	100	59	243	89	580	119	1 360
29	103	60	250	90	600	120	1 400
30	106						

LI : Load index.

Maximum load : corresponding maximum load (kg).

Table 2 Variation of Load Capacity as a Function of Speed

[*Clauses* 3.7(a) *and* 3.21]

Vehicle Maximum Designed Speed km/h		Variation in Load Carrying Capacity (Percent)										
		Rim diameter code ≤ 12				Moped	Rim diameter code ≥ 13					
		Speed symbol					Speed symbol					
Exceeding	Up to	E	J	K	L	B	J	K	L	M	N	P and above
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
—	30	+12	+30	+30	+30	+30	+30	+30	+30	+30	+30	+30
30	50	+12	+30	+30	+30	0	+30	+30	+30	+30	+30	+30
50	60	+6	+23	+23	+23		+23	+23	+23	+23	+23	+23
60	70	0	+16	+16	+16		+16	+16	+16	+16	+16	+16
70	80		+10	+10	+10		+10	+10	+10	+10	+10	+14
80	90		+5	+5	+7.5		+5	+5	+7.5	+7.5	+7.5	+12
90	100		0	0	+5		0	0	+5	+5	+5	+10
100	110			0	+2.5			0	+2.5	+2.5	+2.5	+8
110	120				0				0	0	0	+6
120	130									0	0	+4
130	140										0	0

Table 3 Load Rating for Tyres Designated for Speeds 210 to 270 km/h

[*Clause* 3.7(c)]

Sl No.	Maximum Speed km/h[1)]	Maximum Load Rating (Percent)	
		Speed category V symbol	Speed category W symbol[1)]
(1)	(2)	(3)	(4)
i)	210	100	100
ii)	220	95	100
iii)	230	90	100
iv)	240	85	100
v)	250	80[2)]	95
vi)	260	75[3)]	85
vii)	270	70[3)]	75

[1)] Applicable also to tyres identified by means of letter code 'Z' within the size designation.

[2)] Applicable only to tyres identified by means of letter code 'V' within the size designation and upto the maximum speed specified by the tyre manufacturer.

[3)] For intermediate speeds linear interpolation of maximum load rating is allowed.

ANNEX B

Table 4 Speed Category Symbol

(*Clause* 3.20)

Speed Category Symbol	Maximum Speed km/h	Speed Category Symbol	Maximum Speed km/h
(1)	(2)	(3)	(4)
A1	5	J	100
A2	10	K	110
A3	15	L	120
A4	20	M	130
A5	25	N	140
A6	30	P	150
A7	35	Q	160
A8	40	R	170
B	50	S	180
C	60	T	190
D	65	U	200
E	70	H	210
F	80	V	240
G	90	W	270

ANNEX C

(*Clauses* 3.29 *and* 4.1.1.1)

TYRE SIZE DESIGNATION AND DIMENSIONS

C-1 The details of tyres of certain designations are listed in various Tables in 5 to 10.

C-2 In these tables the following are the unit of measurement unless otherwise mentioned.

	Parameter	*Unit*
a)	Dimensions	mm
b)	Load	kg
c)	Pressure	kPa

C-3 Width of permitted rim code specified in Tables 5 to 10 is for reference and are allowed to be used instead of the recommended. The use rims other than those listed in the 'Permitted' column is as mutually agreed between the tyre and vehicle manufacturer.

Table 5 Motorcycle Tyres Size Rim Diameter Code ≤ 12

(*Clauses* 4.1.1.1 *and* C-1)

Sl No.	Tyre Size Designation	Rim Width Code		Overall Diameter			Nominal Section Width (S_1)	Maximum Overall Width	Ply Rating	Maximum Load Capacity kg	Maximum Cold I.P[1] kPa
		Recommended	Permitted	D_{Min}	D	D_{Max}					
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
i)	2.75-10	1.75 Div	1.50, 1.85,2.1	395	399	412	71	75	4	128	250
ii)	3.00-10	2.10 Div	1.85, 2.15, 2.50	408	413	427	80	84	4	150	250
iii)	3.00-12	2.50 Div	1.85, 2.15	459	464	475	84	90	4	175	250
iv)	3.50-8	Div 2.50 C	2.10, 2.15	380	386	402	92	97	4	170	250
v)	3.50-10	2.50 Div	2.10, 2.15	431	437	453	92	97	4	195	250
vi)	3.50-12	Div 2.50 C	2.15	483	488	501	92	98	4	224	250

[1] Inflation pressure.

Table 6 Moped Tyres Normal Profile (with Rim Diameter Code More than 12)

(*Clauses* 4.1.1.1 *and* C-1)

Sl No.	Tyre Size Designation	Rim Width Code		Overall Diameter			Nominal Section Width	Maximum Overall Width	Maximum Load Capacity	Maximum I.P[1)]
		Recommended	Permitted	D_{Min}	D	D_{Max}	(S_1)		kg	kPa
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
i)	1¾-19	1.20	—	586	589	596	50	53	Std - 80 Rein - 115	Std - 250 Rein - 275
ii)	2-19	1.35	—	592	595	603	55	58	Std - 90 Rein - 125	Std - 250 Rein - 275
iii)	2-22	1.35	—	667	670	678	55	58	Std - 95 Rein - 128	Std - 250 Rein - 275
iv)	2¼-16	1.50	—	528	532	541	62	65	Std - 95 Rein - 128	Std - 250 Rein - 275
v)	2½-16	1.50	—	605	609	618	62	65	Std - 109 Rein - 150	Std - 250 Rein - 275
vi)	2½-19	1.60	—	544	548	558	68	71	Std - 106 Rein - 145	Std - 250 Rein - 275
vii)	2½-19	1.60	—	621	625	635	68	71	Std - 121 Rein - 165	Std - 250 Rein - 275

NOTE — Std: Standard type of tyre.
Rein: Reinforced type of tyre.

[1)] Inflation pressure.

Table 7 Motorcycle Tyres Normal Profile (with Rim Diameter Code > 12)

(*Clauses* 4.1.1.1 *and* C-1)

Sl No.	Tyre Size Designation	Rim Width Code		Overall Diameter			Nominal Section Width	Maximum Overall Width	Ply Rating	Maximum Load Capacity	Maximum I.P[1)]
		Recommended	Permitted	D_{Min}	D	D_{Max}	(S_1)			kg	kPa
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
i)	2.25-16	1.60	1.20,1.35, 1.40,1.50	526	530	541	61	65	4	109	225
									6	125	280
ii)	2.25-17	1.60	1.20,1.35, 1.40,1.50	552	556	567	61	65	4	115	225
									6	132	280
iii)	2.25-18	1.60	1.40, 1.50	577	581	592	61	65	4	121	225
									6	140	280
iv)	2.25-19	1.60	1.20,1.35,1.50	603	607	616	61	65	4	128	225
									6	150	280
v)	2.50-16	1.60	1.35,1.40,1.50	538	542	554	65	70	4	125	225
									6	145	280
vi)	2.50-17	1.60	1.35,1.40,1.50	564	568	580	65	70	4	132	225
									6	155	280
vii)	2.50-18	1.60	1.35,1.40,1.50	589	593	605	65	70	4	140	225
									6	165	280
viii)	2.75-14	1.85	1.40, 1.50,1.60	507	512	523	75	80	4	128	225
									6	155	280
ix)	2.75-16	1.85	1.40,1.50, 1.60	557	562	573	75	80	4	150	225
									6	180	280
x)	2.75-17	1.85	1.40,1.50, 1.60	583	588	599	75	80	4	155	225
									6	185	280
xi)	2.75-18	1.85	1.40,1.50, 1.60	608	613	624	75	80	4	160	225
									6	190	280
xii)	3.00-14	1.85	1.60, 2.15	521	526	538	80	86	4	140	225
									6	165	280
xiii)	3.00-17	1.85	1.60, 2.15	597	602	614	80	86	4	170	225
									6	190	280
xiv)	3.00-18	1.85	1.60, 2.15	623	627	639	80	86	4	175	225
									6	200	280
xv)	3.00-19	1.85	1.60, 2.15	648	653	665	80	86	4	185	225
									6	212	280
xvi)	3.25-16	2.15	1.85, 2.50	583	588	601	89	95	4	180	225
									6	218	280
xvii)	3.25-18	2.15	1.85, 2.50	634	639	652	89	95	4	200	225
									6	243	280
xviii)	3.25-19	2.15	1.85, 2.50	660	665	678	89	95	4	212	225
									6	250	280
xix)	3.50-18	2.15	1.85, 2.50	643	649	662	93	100	4	224	225
									6	265	280
xx)	3.50-19	2.15	1.85, 2.50	669	675	688	93	100	4	230	225
									6	272	280

[1)] Inflation pressure.

Table 8 Motor Cycle Tyres — ISO Designated Tyres (with Rim Diameter Code ≤ 12)

(*Clauses* 4.1.1.1 *and* C-1)

Sl No.	Tyre Size Designation	Rim Width Code		Overall Diameter			Nominal Section Width	Maximum Overall Width	Load Index	Maximum Load Capacity	Maximum I.P[1]
		Recommended	Permitted	D_{Min}	D	D_{Max}	(S_1)			kg	kPa
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
i)	100/90-10	2.50MT	—	429	434	445	101	106	56	224	250
ii)	100/90-12	2.50	—	480	485	498	101	108	59	243	250
iii)	90/90-12	2.15	—	462	467	478	90	96	54	212	250

[1] Inflation pressure.

Table 9 Motor Cycle Tyres — ISO Designated Tyres (with Rim Diameter Code >12)

(*Clauses* 4.1.1.1 *and* C-1)

Sl No.	Tyre Size Designation	Rim Width Code		Overall Diameter			Nominal Section Width	Maximum Overall Width	Load Index	Maximum Load Capacity	Maximum I.P[1]
		Recommended	Permitted	D_{Min}	D	D_{Max}	(S_1)			kg	kPa
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
i)	130/90-15	3.00	2.15, 2.50, 2.75, 3.50	608	615	631	129	138	66	300	225
ii)	120/80-16	2.75	2.15, 2.50, 3.00	592	598	611	119	127	60	250	225
iii)	90/80-17	2.15	1.85, 2.50	572	576	586	90	96	46	170	225
iv)	90/90-17	2.15	1.85, 2.50	589	594	605	90	96	49	185	225
v)	100/90-17	2.50	2.15, 2.75	607	612	625	101	108	55	218	225
vi)	90/90-18	2.15	1.85, 2.50	614	619	630	90	96	51	195	225
vii)	100/90-18	2.50	2.15, 2.75	632	637	650	101	108	56	224	225
viii)	110/90-18	2.50	2.15, 2.75, 3.00	649	655	669	109	117	61	257	225

[1] Inflation pressure.

Table 10 Tyres for Three Wheelers

(*Clauses* 4.1.1.1 *and* C-1)

Sl No.	Tyre Size Designation	Rim Width Code		Overall Diameter			Nominal Section Width (S_1)	Maximum Overall Width	Ply Rating	Maximum Load Capacity kg	Maximum I.P[1] kPa
		Recommended	Permitted	D_{Min}	D	D_{Max}					
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
i)	3.50-10	2.50 Div	2.10, 2.15, 2.15	431	437	453	92	97	6	375	425
ii)	4.00-8	3.00 Div	2.50, 2.15	409	415	434	114	120	4 6	335 400	345 425
iii)	4.00-0	3.00 Div	2.50, 2.75	460	466	485	110	116	4 6	365 437	345 425
iv)	4.50-10	3.50 WB	3.00	483	490	511	125	131	6 8	475 520	425 500
v)	5.00-10	3.50 WB	—	508	516	540	134	141	8	580	500

[1] Inflation pressure.

ANNEX D

(*Clauses* 4.1.1 *and* 4.1.1.1)

METHOD OF MEASURING TYRE DIMENSIONS

D-1 Tyre shall be fitted to the measuring rim and inflated to the pressure specified by the manufacturer. In the absence of such specification from the tyre manufacturer, the values given in Table 11 may be used for the categories listed.

D-2 Tyre mounted on its rim shall be left at ambient laboratory temperature for at least 24 h.

D-3 Pressure shall be reset at the value as per **D-1**.

D-4 Overall width shall be measured by means of a caliper gauge at six equally spaced points account being taken of the thickness of the ribs or bands. The highest measurement obtained shall be considered on the overall width.

D-5 Outer diameter shall be determined as follows:

The maximum circumference is measured and the value obtained is divided by π (3.141 6).

Table 11 Recommended Inflation Pressure for Measuring Tyre Dimensions

(*Clauses* 4.1.1.1 *and* D-1)

Sl No.	Tyre Version		Speed Category Symbol	Pressure	
				bar	kPa
(1)	(2)		(3)	(4)	(5)
i)	**Mopeds**				
	Standard		B	2.50	250
	Reinforced		B	2.75	275
ii)	**Motorcycles**				
	Standard		J	2.50	250
			F, G, K, L, M, N, P, Q, R, S	2.25	225
			T, U, H, V, W	2.80	280
	Reinforced		F to P	2.80	280
			Q, R, S, T, U, H	3.30	330
	Scooter	4PR	J	2.50	250
	Scooter derivatives and motorcycle derivatives	4PR	E	3.45	345
		6PR		4.25	425
		8PR		5.00	500
		4PR	F to M	3.50	350
		6PR		4.00	400
		8PR		4.50	450

ANNEX E

(*Clauses* 4.2)

PROCEDURE FOR TESTING LOAD/SPEED PERFORMANCE

E-1 PREPARATION OF TYRE FOR THE TEST

E-1.1 A new tyre shall be fitted to the test rim identified by the manufacturer [*see* IS 10694 (Part 4) and IS 10694 (Part 5)].

E-1.2 The tyre shall be inflated to the pressure specified by its manufacturer. In the absence of such specification from the tyre manufacturer, the values given in Table 12 may be used for the categories listed.

E-1.3 The wheel/tyre combination shall be stored at the temperature of the test chamber for at least 3h.

E-1.4 Tyre pressure shall be brought to that specified in **E-1.2**.

E-2 TEST SEQUENCE

E-2.1 The tyre/wheel combination shall be fitted to a test spindle and pressed against the outer surface of a smooth flywheel having a diameter of 1.7 m ± 1 percent or 2.0 m ± 1 percent.

E-2.2 A load, which is equal to 65 percent of the following, shall be applied to the test spindle. In the case of moped tyres (speed category symbol B) the test load shall be 67 percent on a test drum which is 2.0 m in diameter, instead of 65 percent.

E-2.2.1 Maximum load rating corresponding to the load capacity index for tyres bearing speed symbols up to and including 'H' (210 km/h).

E-2.2.2 Maximum load rating associated with a maximum speed of 240 km/h for tyres bearing speed symbol 'V' (*see* **3.20**).

E-2.2.3 Maximum load rating associated with a maximum speed of 270 km/h for tyres with speed symbol 'W' (*see* **3.20**).

E-2.2.4 Load rating associated with the maximum speed specified by the tyre manufacturer for tyres suitable for speeds above 240 km/h (or 270 km/h as applicable) (*see* **3.7.3**).

E-2.3 Throughout the test the tyre pressure shall not be reset and the test load shall be held constant.

E-2.4 During the test the temperature in the test room shall be kept at between 20°C and 40°C or at a higher temperature if so accepted by the manufacturer.

E-2.5 The test shall proceed uninterrupted. in accordance with the following:

a) Time for transition from speed 0 to initial test speed shall be carried out in 20 min.

b) Initial test speed shall be equal to the maximum speed intended for the type of tyre reduced by 30 km/h if the test is carried out

Table 12 Recommended Inflation Pressure for Testing Load/Speed Performance

(*Clauses* 4.2 *and* E-1.2)

Sl No.	Tyre Version		Speed Category Symbol	Pressure	
				bar	kPa
(1)	(2)		(3)	(4)	(5)
i)	Mopeds — standard		B	2.25	225
ii)	Mopeds — reinforced		B	3.00	300
iii)	Motorcycles — standard (Including 4PR)		F, G, J, K, L, M, N, P	2.50	250
			Q, R, S	3.00	300
			T, U, H, V [1)]	3.50	350
iv)	Motorcycles — reinforced (including 6PR)		F G, J, K, L, M, N, P	3.30	330
			Q, R, S, T, U, H	3.90	390
v)	Scooter	4 PR	J	2.50	250
vi)	Scooter derivatives and Motorcycle derivatives	4PR	F, G, J, K, L, M	3.70	370
		6PR		4.50	450
		8PR		5.20	520

[1)] For speeds above 240 km/h the test pressure is 3.20 bar (320 kPa). Other types of tyre shall be inflated to the pressure quoted by their manufacturer.

on a 2 m diameter drum or by 40 km/h if the test is carried out on a 1.7 m diameter drum.

c) Successive speed increments shall be 10 km/h and duration of test at each speed range shall be of 10 min.

d) Total duration of test shall be 1h.

e) Maximum test speed shall be the maximum speed intended for the type of tyre if the test is carried out on a 2 m-diameter drum and maximum speed intended for the type of tyre reduced by 10 km/h if the test is carried out on a 1.7 m diameter drum.

f) In the case of moped tyres (speed-category symbol B). the test speed shall be 50 km/h. the time taken to accelerate from 0 to 50 km/h being 10 min, a steady state speed then being held for 30 min and the total duration of the test being 40 min.

E-2.6 However, if a second test is performed to assess the top performances of tyres suitable for speeds above 240 km/h identified by means of letter code 'V' within the size designation (or 270 km/h for tyres identified by means of letter code 'Z' within the size designation) the procedure shall be as follows:

a) Maximum speed shall be the maximum speed specified by the tyre manufacturer.

b) 20 min, to build up from zero to the initial test speed.

c) 20 min, at the initial test speed.

d) 10 min, to build up to the maximum test speed.

e) 5 min, at the maximum test speed.

ANNEX F

(*Clause* 4.3.1)

METHOD FOR DETERMINING THE DYNAMIC GROWTH OF TYRES

F-1 This test method shall apply to motorcycle tyres of the speed capability symbol greater than P (150 km/h). It is intended to determine the maximum growth of the tyre which is due to the effect of the centrifugal force at the maximum permissible speed.

F-2 DESCRIPTION OF TEST PROCEDURE

F-2.1 The test axle and the rim shall be checked in order to ensure that radial eccentricity is less than ± 0.5 mm and that lateral displacement is less than ± 0.5 mm, when measured at the outer periphery of the bead seat of the wheel.

F-2.2 Contour-Outline Device

Any device (projection grid camera. spotlights and others) enabling the outer contour of the cross section of the tyre to be outlined distinctly or to establish an enveloping curve at right angles to the equator of the tyre at the point of maximum tread deformation. This device shall reduce any deformation to a minimum and ensure a constant (known) ratio (K) between the contour plotted and the actual dimensions of the tyre. This device will enable the tyre contour to be determined in relation to the wheel axis.

F-3 EXECUTION OF TEST

F-3.1 During the test the temperature in the test room shall be held between 20°C and 40°C or at a higher temperature, if so accepted by the tyre manufacturer.

F-3.2 Tyres to be tested shall have undergone the load/ speed performance test in accordance with Annex E without any faults having emerged.

F-3.3 Tyre to be tested shall be fitted to a wheel, the rim of which shall conform to the IS 10694 (Part 5).

F-3.4 Tyre inflation pressure (test inflation pressure) shall be adjusted to the values indicated in Table 13.

Table 13 Inflation Pressure for Diagonal or Bias Ply and Belted-Bias Tyres

(*Clause* F-3.4)

Sl No.	Speed Category Symbol	Tyre Version	Tyre Inflation Pressure bar
(1)	(2)	(3)	(4)
i)	Q/R/S	Standard	2.50 {250 kPa}
ii)	T and above	Standard	2.90 {290 kPa}

F-3.5 The wheel/tyre combination shall be stored at the temperature of the test room for at least 3h.

F-3.6 Following that period of storage the inflation pressure shall be corrected to the value laid down in **F-3.4**.

F-3.7 The wheel/tyre combination shall be mounted on the test axle and checked to ensure that it turns freely. Tyre may be rotated by a motor acting on the tyre axis or else via pressure against a test drum.

F-3.8 The entire assembly shall be accelerated without

interruption in order to achieve the maximum speed capability of the tyre within 5 min.

F-3.9 The contour-outline device shall be installed care being taken to ensure that it is at right angles to the direction of rotation of the tread of the tyre being tested.

F-3.10 A check shall be made that the peripheral speed of the tread surface is equal to the maximum speed capability of the tyre within ± 2 percent. The equipment shall be kept at a constant speed for 5 min at least and then the cross-section of the tyre shall be traced in the area of maximum deformation or a check shall be made that the tyre does not exceed the enveloping curve.

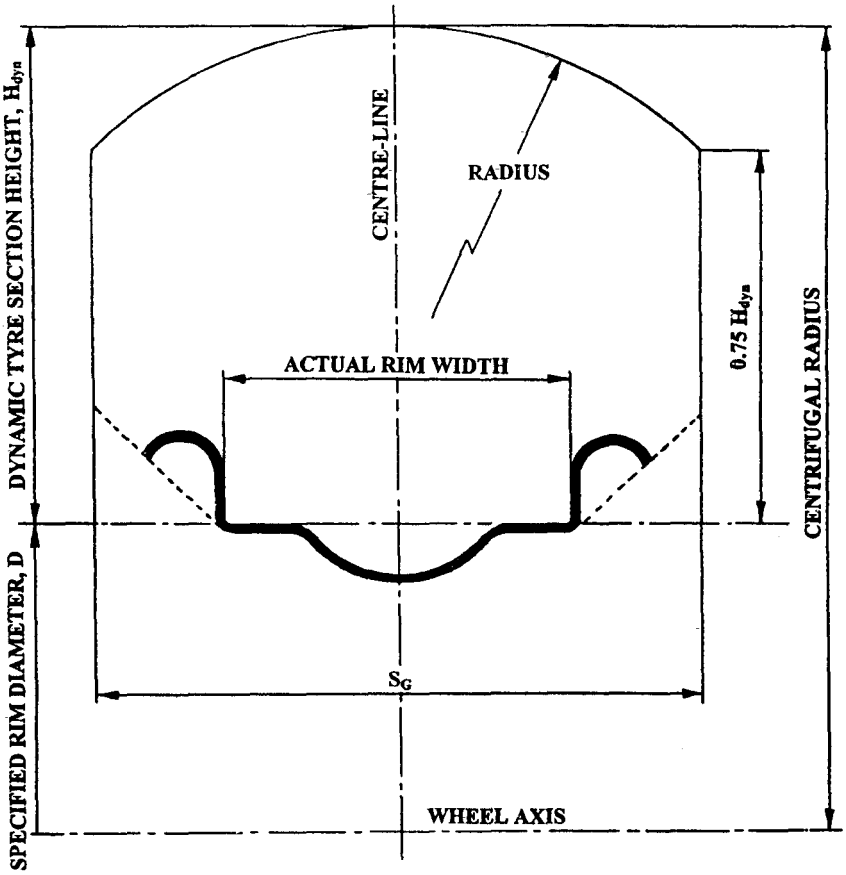
F-4 ASSESSMENT OF RESULTS

F-4.1 The limiting curve (enveloping curve) specified for the mounted tyre/wheel assembly shall be as in the example shown in Fig. 2.

F-4.1.1 The main dimensions of the enveloping curve shall be adjusted. if applicable taking into account the constant ratio K (*see* **F-2.2**).

F-4.2 The contour of the tyre portrayed at the maximum speed shall not exceed the enveloping curve, with reference to the tyre axes.

F-4.3 No other test is carried out on the tyre.



S_G = maximum overall width in service
(This changes 1 mm per 0.1 Rim width code change from the measuring rim)

H_{dyn} = centrifugal radius — D/2

S_G = maximum overall width in service
(This changes 1 mm per 0.1 Rim width code change from the measuring rim)

The limit values for the envelope outline are laid down as follows:

Tyre speed category	Q/R/S	T/U/H	Over 210 km/h
H_{dyn} (mm)	H × 1.10	H × 1.13	H × 1.16
were H is nominal tyre height given in **4.1.1.2**(b)			

FIG. 2 ENVELOPING CURVE FOR DYNAMIC GROWTH TEST

ANNEX G

(*Clause* 4.4)

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 Tables 14, 15 or 16, as applicable for type of tyre and a device to force the plunger rod into a tyre at the rate specified in **G-3**.

G-2 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 specified in **D-1**.

G-3 TEST PROCEDURE

The plunger rod shall be forced into the tread of the tyre/wheel assembly mounted as described in **G-2**, perpendicularly over a tread element at the centre line 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 ± 1.5 mm/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 round the tyre circumference.

The arithmetic mean energy absorbed shall be calculated from the five energy values obtained at the break using the formula given in **G-4**.

G-4 CALCULATION

The braking energy shall be calculated as:

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

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-5 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.

G-6 REQUIREMENTS

G-6.1 Nylon cord tyre should conform to the requirements specified in Tables 14, 15 and 16, as applicable, when tested as per procedure given above.

G-6.2 For rayon tyres, the minimum static breaking energy values will be 60 percent of those for nylon tyre.

G-6.3 Tyre designation, load index and speed category symbol not covered by Table 14, the test inflation pressure, plunger diameter and static breaking energy shall be as declared by the tyre manufacturer.

Table 14 Requirements for Plunger Test for Diagonal Ply Tyres

(*Clauses* G-1, G-6.1 *and* G-6.3)

Sl No.	Tyres	Ply Rating	Plunger Diameter mm	Static Breaking Energy J
(1)	(2)	(3)	(4)	(5)
i)	Tyres with rim diameter code more than 12 (Motorcycle and scooter derivatives)	2 PR	8 ± 0.2	17
		4 PR	8 ± 0.2	34
		6 PR	8 ± 0.2	45
ii)	Tyres with rim diameter code not more than 12 (Scooter and scooter derivatives)	4 PR	19 ± 0.2	136
		6 PR	19 ± 0.2	203
		8 PR	19 ± 0.2	271
iii)	Moped tyres (diagonal)	—	8 ± 0.2	34.6

Table 15 Requirements for Plunger Test for Radial Ply Millimetric Designated Tyres

(*Clauses* G-1, G-6.1 *and* G-6.3)

Sl No.	Tyres	Ply Rating	Plunger Diameter mm	Static Breaking Energy J
(1)	(2)	(3)	(4)	(5)
i)	Nominal Section width up to 62	2PR	8 ± 0.2	15
		4 PR	8 ± 0.2	29
		6 PR	8 ± 0.2	39
ii)	Radial ply tyres, Code designated — Nominal section width above 62	2PR	8 ± 0.2	17
		4 PR	8 ± 0.2	34
		6 PR	8 ± 0.2	45
		8 PR	8 ± 0.2	56

Table 16 Requirements for Plunger Test for Radial and Diagonal Ply for Millimetric (ISO Designated) Tyres

(*Clauses* G-1, G-6.1 *and* G-6.3)

Sl No.	Section Width	Inflation Pressure[1)] kPa	Plunger Diameter mm	Static Breaking Energy J
(1)	(2)	(3)	(4)	(5)
i)	Nominal section width up to 62	Up to 225	8 ± 0.2	15
		225 and above	8 ± 0.2	29
ii)	Nominal section width more than 62	Up to 225	8 ± 0.2	17
		225 and above	8 ± 0.2	34

[1)] Inflation pressure corresponding to maximum load carrying capacity.

ANNEX H

(*Clause* 4.5)

PROCEDURE FOR ENDURANCE TEST

H-1 This test is applicable only for tyres listed in Table 17.

H-2 TEST APPARATUS

The test wheel shall be a flat smooth faced wheel having a diameter of 1.7m ± 1 percent or 2.0 m ± 1 percent. The surface width of the wheel shall be more than the loaded tyre tread width. The air surrounding the tyre during the test shall at a temperature of 20°C to 40°C.

H-3 PREPARATION OF TYRE FOR THE TEST

Mount the tyre after ensuring that it exhibits no visual evidence of tread, side-wall, ply, cord or bead separation, broken cord or cracking, on a test rim of the recommended size and inflate to the pressure specified in **E-1.2**. Condition the inflated tyre-rim assembly in an ambient atmosphere with temperature 20°C to 40°C for a minimum period of 3 h. Readjust if necessary, the tyre pressure to the original inflation pressure immediately before the test.

H-4 TEST PROCEDURE

Mount the conditioned tyre-rim assembly on a test machine axle and press the tyre against the face of the test drum at initial (Stage I) test load followed by the test loads Stage II and Stage III as those specified in Table 17. At the end of each run, a record shall be kept of the tyre inflation pressure. Additionally, the first reading of inflation pressure shall be taken 3 h after the start of the test. A normal tyre pressure rise from initial test inflation pressure is permitted. But, if at later stages of pressure checks, the inflation pressure drops below the first value, the test tyre shall be rejected and the test repeated with afresh tyre after cause of the drop in pressure is ascertained and defect rectified.

H-5 EXAMINATION OF TYRE AFTER TEST

On completion of the cumulative test running time, the tyre shall be cut and examined. There shall be no evidence of broken cords, tread separation, ply or bead separation or cracking of tread of side-wall rubber deep enough to expose the carcass cords fabric.

Table 17 Endurance Test Schedule

(*Clauses* 4.5 *and* H-4)

Sl No.	Tyres	Speed (Percent of Rated Speed)	Stage I		Stage II		Stage III	
			Load [1)]	Time h	Load [1)]	Time h	Load [1)]	Time h
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
i)	Motorcycle tyres (with rim diameter code more than 12)	40	100	4	108	6	117	24
ii)	Scooter (with rim diameter code not more than 12) and moped tyres	64	100	4	108	6	117	24
iii)	Scooter derivative (three wheeler) tyres	57	66	4	84	6	101	24

[1)] The figures indicated are percentage of the maximum load carrying capacity.

ANNEX J

(*Clause* 5)

ARRANGEMENT OF TYRE MARKINGS

J-1 EXAMPLE

b≥4 mm	b	100/80 R 18 53S	TUBELESS	MAR 04

These markings define a tyre:

a) Nominal section width of 100;
b) Nominal aspect ratio of 80;
c) Radial ply structure (R);
d) Rim diameter of 457 mm the code for which is 18;
e) Load capacity of 206 kg corresponding to load index 53 (*see* Annex A);
f) Speed category S (maximum speed 180 km/h);
g) Fitted without an inner tube (tubeless); and
h) Manufactured during Month, March of the Year 2004.

The size of markings, other than these can be of a minimum height of 2.5 mm. The position and order of the markings constituting the tyre designation shall be as follows:

a) The tyre size designation including the nominal section width, the nominal aspect ratio, the symbol of the structure, where appropriate and the nominal rim diameter shall be combined as shown in the above example that is 100/80 R 18;
b) The load capacity index and the speed category symbol shall be placed near the tyre size designation. They may either precede or follow this or be located above or below it;
c) The descriptions 'TUBELESS' and 'REINFORCED' or 'REINF' may be further away from the dimensional description;

d) In the case of tyres suitable for speeds above 240 km/h, the letter codes 'V' or 'Z', as applicable, shall be marked in front of the structure marking (for example 140/60ZR18). The reference load capacity index and speed category symbol shall be marked within parentheses as applicable [*see* **5**(n)]

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

Table 18 Examples of Tyre Designation for Code Designated Tyres

[*Clause* 5(c)]

Sl No.	Tyre Type		Tyre Size Designation				
		Nominal Section Width Code, Sl	Structure Code, 'D' or ' — ' for Diagonal, and 'R' for Radial	Nominal Rim Diameter Code, d	Load Index/ Maximum Load Carrying Capacity	Speed Symbol	Ply Rating
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
i)	Moped	1¾	—	19	64	H	
ii)	Motorcycle	4.00	—	18	64	P	4PR
		3.50	—	10	64	P	4PR

Table 19 Examples of Tyre Designation for ISO Designated Tyres

[*Clause* 5(c)]

Sl No.	Tyre Type	Nominal Section Width Code	Nominal Aspect Ratio, Ra	Structure Code, 'D' for Diagonal and 'R' for Radial	Nominal Rim Diameter Coded	Load Index/Maximum Load Carrying Capacity	Speed Symbol
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
i)	Motorcycle	120	90	—	18	65	S
		140	80	R	17	69	H

Table 20 Type Test Schedule

(*Clause* 6.1)

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

Table 21 Conformity of Production Tests/Acceptance Tests

(*Clause* 7.3)

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

ANNEX K

(*Clause* 6.2.2)

INFORMATION TO 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 **3.23** 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. Sketch, or a representative photograph, which identify the tyre tread pattern. Sketch of the inflated tyre mounted on the measuring rim showing the relevant dimensions. 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)

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