**AIS-064 (Part 2)**

AUTOMOTIVE INDUSTRY STANDARD

# Automotive Vehicles – Retreaded Pneumatic Tyres for Passenger Car

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ON BEHALF OF
AUTOMOTIVE INDUSTRY STANDARDS COMMITTEE

UNDER
CENTRAL MOTOR VEHICLE RULES - TECHNICAL STANDING COMMITTEE

SET-UP BY
MINISTRY OF SHIPPING, ROAD TRANSPORT & HIGHWAYS
( DEPARTMENT OF ROAD TRANSPORT & HIGHWAYS)
GOVERNMENT OF INDIA

November 2005

Status chart of the Standard to be used by the purchaser for updating the record

| Sr. No. | Corr-igenda. | Amend-ment | Revision | Date | Remark | Misc. |
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**General remarks:**

## INTRODUCTION

The Government of India felt the need for a permanent agency to expedite the publication of standards and development of test facilities in parallel when the work on the preparation of the standards is going on, as the development of improved safety critical parts can be undertaken only after the publication of the standard and commissioning of test facilities. To this end, the Ministry of Surface Transport (MoST) has constituted a permanent Automotive Industry Standards Committee (AISC) vide order No. RT-11028/11/97-MVL dated September 15,1997. The standards prepared by AISC will be approved by the permanent CMVR Technical Standing Committee (CTSC). After approval, the Automotive Research Association of India, (ARAI), Pune, being the secretariat of the AIS Committee, has published this standard. For better dissemination of this information ARAI may publish this document on their Web site.

The retreaded pneumatic tyre is an important safety critical item. Now steps have been taken to place retreaded tyres on a similar footing to "OE" tyres with the introduction of this standard. To ensure safety of operation of retreaded tyres and vehicles, there was a need for a standard specifying the performance requirements of the retreaded pneumatic tyres.

Considerable assistance has been taken from ECE R 108 ( Amendment 1, Supplement 1 to the original version of the regulation- date of entry into force Oct. 30, 2003) "Uniform provisions concerning the approval for production of retreaded pneumatic tyres for motor vehicles and their trailers" and National and International tyre standards.

The Automotive Industry Standards Committee (AISC) responsible for preparation of this standard is given in Annex : H

# Automotive Vehicles -Retreaded Pneumatic Tyres for Passenger Car

## 1.0 SCOPE

This standard prescribes to the production of retreaded tyres indended to be fitted to private (passenger) cars and their trailers used on the road. It does not however apply to:

1.1 Retreaded tyres for commercial vehicles and their trailers.

1.2 Retreaded tyres with a speed capability below 120 km/h or above 240 km/h. (limit of below 120km/hr is not applicable for bias ply tyres)

1.3 Tyres for cycles and motor cycles.

1.4 Tyres originally produced without speed symbols. (This clause shall be applicable after 3 years from the date of commencement of tyre approval of new tyres)

1.5 Tyres originally produced without type approval. (This clause shall be applicable after 3 years from the date of commencement of tyre approval of new tyres)

1.6 Tyres designed exclusively for competition or off road use and marked accordingly.

1.7 Tyres designated as “T” type temporary use spares.

## 2.0 REFERENCES

2.1 ECE R 108 : Uniform provisions concerning the Approval for Production of Retreaded Pneumatic Tyres for Motor Vehicles and their Trailers

2.2 AIS-044 (Part 2): Automotive Vehicles – Pneumatic Tyres for Passenger Car Vehicles

## 3.0 DEFINITIONS – see also figure in Annex G

3.1 "**Range of retreaded pneumatic tyres**" means a range of retreaded pneumatic tyres as quoted in Paragraph 5.1.4

3.2 "**Structure**" of a pneumatic tyre means the technical characteristics of the tyre’s carcass. The following structures are distinguished in particular:

3.2.1 "**Diagonal or "bias-ply**" describes a pneumatic-tyre structure in which the ply cords extend to the beads and are laid at alternate angles of substantially less than 90° to the centre line of the tread;

3.2.2 "**Bias-belted**" describes a pneumatic-tyre structure of diagonal (bias-ply) type in which the carcass is restricted by a belt comprising two or more layers of substantially inextensible cord material laid at alternate angles close to those of the carcass;

3.2.3 "**Radial**" describes a pneumatic tyre structure in which the ply cords extend to the beads and are laid substantially at 90° to the centre line of the tread, the carcass being stabilised by an essentially inextensible circumferential belt;

**3.3 "Category of Use"**

3.3.1 **Normal tyre** is a tyre intended for normal road use only.

3.3.2 " **Snow tyre** " is a tyre whose tread pattern, or tread pattern and structure is primarily designed to ensure in mud and fresh or melting snow, a performance better than that of a normal tyre. The tread pattern of a snow tyre generally consists of groove (rib) and solid block elements more widely spaced than on a normal tyre.

3.3.3 **Temporary use spare tyre** is a tyre different from that intended to be fitted to any vehicle for normal driving conditions but intended only for temporary use under restricted driving conditions.

3.3.4 **"T" type temporary use spare tyre** is a type of temporary use spare tyre designed for use at inflation pressures higher than those established for standard and reinforced tyres.

**3.4** "**Bead**" means the part of a pneumatic tyre which is of such shape and structure as to fit the rim and hold the tyre on it.

**3.5** "**Cord**" means the strands forming the fabric of the plies in pneumatic tyre

**3.6** "**Ply"**means a layer of "rubber" coated parallel cords.

**3.7 "Belt"** applies to a radial ply or bias belted tyre and means a layer or layers of material or materials underneath the tread, laid substantially in the direction of the center line of the tread to restrict the carcass in a circumferential direction.

**3.8 "Breaker"** applies to a diagonal ply tyre and means an intermediate ply between the carcass and tread.

**3.9 "Chafer"** means material in the bead area to protect the carcass against chafing or abrasion by the wheel rim.

**3.10** "**Carcass**" means that structural part of a pneumatic tyre other than the tread and outermost "rubber" side walls which, when inflated, supports the load.

**3.11** "**Tread**" means that part of a pneumatic tyre which is designed to come into contact with the ground, protects the carcass against mechanical damage and contributes to ground adhesion.

**3.12** "**Side wall"** means the part of a pneumatic tyre between the tread and the area designed to be covered by the rim flange.

**3.13** **"Lower area of tyre"** means the area included between the line of maximum section width of a tyre and area designed to be covered by the edge of rim.

**3.14** "**Tread groove**" means the space between the adjacent ribs or blocks in the tread pattern.

**3.15** **"Principal grooves"** means the wide grooves situated in the central zone of the tread, which cover approximately three-quarters of the breadth of the tread.

**3.16** "**Section width**" means the linear distance between the outsides of the side walls of an inflated pneumatic tyre, when fitted to the specified measuring rim, and excluding elevations due to labelling (marking), decoration or protective bands or ribs.

**3.17** "**Overall width**" means the linear distance between the outsides of the sidewalls of an inflated pneumatic tyre, when fitted to the specified measuring rim and including labelling (marking), decoration and protective bands or ribs.

**3.18** " **Nominal Section height**" means a distance equal to half the difference between the outer diameter of the tyre and the nominal rim diameter.

**3.19** "**Nominal aspect ratio (Ra)"** means the one hundred times the number obtained by dividing the number expressing the nominal section height by the number expressing the nominal section width, both dimensions being in the same units.

**3.20** "**Outer diameter**" means the overall diameter of an inflated newly retreaded tyre.

**3.21** "**Tyre-size designation**" means a designation showing:

3.21.1 **The nominal section width**. This must be expressed in millimeters, except in cases of tyres for which the size designation is shown in the first column of the tables in Annex A of AIS-044 (Part2).

3.21.2 **The nominal aspect ratio** except in cases of tyres for which the size designation is shown in the first column of the tables in Annex A of AIS-044 (Part2).

3.21.3 **A conventional number "d"** (the "d" symbol) denoting the nominal rim diameter of the rim and corresponding to its diameter expressed either by codes (numbers below 100) or in millimeters (numbers above 100). Numbers corresponding to both types of measurements may be used in the designation.

**3.22** "**Nominal rim diameter (d)"** means the diameter of the rim on which a tyre is designed to be mounted.

**3.23** "**Rim**" means the support, either for a tyre-and-tube assembly, or for a tubeless tyre, on which the tyre beads are seated.

**3.24** "**Measuring rim**" means the rim specified as a 'measuring rim width' or 'design rim width' for a particular tyre designation in any edition of one or more of the International Tyre Standards.

**3.25** "**Test rim**" means any rim specified as approved or recommended or permitted in one of the International Tyre Standards for a tyre of that size designation and type.

**3.26** **"International Tyre Standard"** means any one of the following standard documents:

a) The European Tyre and Rim Technical Organisation (ETRTO): 'Standard Manual'

b) The Tire and Rim Association Inc. (TRA): 'Year Book'

c) The Japan Automobile Tire Manufacturers Association (JATMA): 'Year Book'

**3.27** "**Chunking**" means the breaking away of pieces of rubber from the tread;

**3.28** "**Cord separation**" means the parting of the cords from their rubber coating;

**3.29** "**Ply separation**" means the parting of adjacent plies;

**3.30** "**Tread separation**" means the pulling away of the tread from the carcass

**3.31** "**Tread-wear indicators**" means the projections within the tread grooves designed to give a visual indication of the degree of wear of the tread

**3.32** **"Service description"** means the specific combination of the load index and speed symbol of the tyre.

**3.33** "**Load index**" means a numerical code which indicates the maximum load the tyre can support. The list of load indices and the corresponding loads are shown in Annex A.

**3.34** "**Speed symbol**" means an alphabetical symbol indicating the speed at which the tyre can carry the load given by the associated load index.

The speed symbols and corresponding speeds are shown in the table below:

| Speed Category symbol | Maximum speed (km/h) |
|---|---|
| L | 120 |
| M | 130 |
| N | 140 |
| P | 150 |

| | |
|---|---|
| Q | 160 |
| R | 170 |
| S | 180 |
| T | 190 |
| U | 200 |
| H | 210 |
| V | 240 |

**3.35** "**Maximum Load rating'** means the maximum mass which the tyre is rated to support.

**3.35.1** For speed not exceeding 210 km/h the maximum load rating shall not exceed the value associated with the load capacity index of the tyre.

**3.35.2** For speed higher than 210km/h, but not exceeding 240 km/h (tyres classified with Speed Category Symbol "V") the maximum load rating shall not exceed the percentage of the value associated with the load capacity index of the tyre, indicated in the table below, with reference to the speed capability of the car to which the tyre is fitted.

| Maximum speed (km/h) | Maximum Load Rating (%) |
|---|---|
| 215 | 98.5 |
| 220 | 97 |
| 225 | 95.5 |
| 230 | 94 |
| 235 | 92.5 |
| 240 | 91 |

For intermediate maximum speeds linear interpolations of the maximum load rating is permissible.

**3.36** "**Retreading production unit**" means a site or group of localized sites where finished retread tyres are produced.

**3.37** "**Retreading**" means the generic term for reconditioning a used tyre by replacing the worn tread with new material. It may also include renovation of the outermost sidewall surface. It covers the following process methods:

**3.37.1** "**Top capping**" replacement of the tread

**3.37.2** "**Re-capping**" replacement of the tread and with the new material extending over part of the sidewall.

**3.37.3** "**Bead to bead**" replacement of the tread and renovation of the sidewall including all or part of the lower area of the tyre.

**3.38** "**Casing**" is the worn tyre comprising carcass and remaining tread and sidewall material.

**3.39** **"Buffing**" is the process of removing old material from the casing to prepare the surface for the new material.

**3.40** "**Repair**" is the remedial work carried out to damaged casings within recognized limits.

**3.41** "**Tread material**" is material in a condition suitable for replacing the worn tread. It can be in several forms for example:

**3.41.1** "**Camel-back**" pre-cut lengths of material which have been extruded to give the required cross section profile and subsequently fitted cold to the prepared casing. The new material must be cured.

**3.41.2** "**Strip-wound**" a ribbon of tread material which is directly extruded and wound on to the prepared casing and build up to the required cross sectional contour. The new material must be cured.

**3.41.3** "**Direct extrusion**" tread material extruded to give the required cross sectional profile and directly extruded on the prepared casing. The new material must be cured.

**3.41.4** "**Pre-cured**" a previously formed and cured tread applied directly to the prepared casing. The new material must be bonded to the casing.

**3.42** "**Sidewall Veneer**" is material used to cover the sidewalls of the casing thereby allowing the required markings to be formed.

**3.43** "**Cushion gum**" is material used as a bonding layer between new tread and casing and for repairing minor damage.

**3.44** "**Cement"** is an adhesive solution to hold new materials in place prior to the curing process.

**3.45** "**Cure**" is the terms used to describe the change in physical properties of the new material which is brought about usually by the application of heat and pressure for a set period of time under controlled conditions.

**3.46** "**Radial run out**" means the variation in radius of the tyre measured around the outer circumference of the tread surface.

**3.47** "**Imbalance**" means a measurement of the variation in distribution of mass around the center axis of the tyre. It can be measured as other "Static" or "Dynamic" imbalance.

## 4.0 MARKINGS

4.1 An example of the arrangement of retreaded tyre markings is shown in Annex B to this Standard.

4.2 Retreaded tyres shall display on both sidewalls in the case of symmetrical tyres and at least on the outer sidewall in the case of asymmetrical tyres.

4.2.1 The brand name or trademark.

4.2.2 The tyre size designation as defined in paragraph 3.21.

4.2.3 An indication of the structure as follows

4.2.3.1 On diagonal (bias-ply) tyres no indication, or the letter "D" placed in front of the rim-diameter marking

4.2.3.2 On radial-ply tyres: the letter "R" placed in front of the rim-diameter marking and, optionally, the word "RADIAL"

4.2.3.3 On bias – belted tyres, the letter "B" placed in front of the rim-diameter marking , and in addition the word "BIAS-BELTED"

4.2.4 The service description comprising.

4.2.4.1 The speed-category symbol (or symbols) ,

4.2.4.2 An indication of the tyre's nominal load capacity in the form of the load index prescribed in Paragraph 3.33.

4.2.4.3 An indication of the tyre's nominal speed capability in the form of the symbol prescribed in Paragraph 3.34.

4.2.5 The word "TUBELESS" if the tyre is designed for use without an inner tube.

4.2.6 The inscription M+S or MS or M.S. or M&S in the case of snow tyre.

4.2.7 The date of retreading as follows:

4.2.7.1 In the form of Month and Year code in which the tyre was retreaded. For example , the marking MAR02 could indicate a tyre which was retreaded in Month March of the Year 2002. (OR) In the form of a group of four digits, the first two showing the Week number and the second two showing the Year in which the tyre was retreaded. The date code can cover a period of production from the week indicated by the week number up to and including the week number plus three. For example, the marking "2503" could indicate a tyre which was retreaded in Weeks 25 of the Year 2003.

This date code may be marked on one sidewall only.

4.2.8 The term 'RETREAD". At the request of retreader, the same term in other languages may also be added.

4.3 Prior to approval tyres shall exhibit a free space sufficiently large to accommodate an approval mark as referred to in para 6.8 and as shown in AIS-037

4.4 Following approval, the markings referred to in paragraph 6.8 and as shown in AIS-037 shall be affixed in the free space referred to in paragraph 4.3. This marking may be affixed to one sidewall only.

4.5 The markings referred to in paragraph 4.2 and the approval mark prescribed in paragraphs 4.4 and 6.8 shall be clearly legible and shall be moulded on to or into the tyre or shall be permanently marked on to the tyre.

4.6 As far as any of the original manufacturer's specifications are still legible after the tyres have been retreaded, they shall be regarded as specifications of the retreader for the retreaded tyre. If these original specifications do not apply after retreading they shall be completely removed.

4.7 The original approval mark and approval number and any other subsequent retreading production unit's approval mark and number, if no longer applicable, shall be removed

4.8 The number of times tyre retreaded shall be marked on the tyre.

## 5.0 APPLICATION FOR APPROVAL

The following procedures are applicable to the approval of a tyre retreading production unit.

5.1 The application for approval of a retreading production unit shall be submitted by the holder of the trade name or trade mark to be applied to the tyre or by his duly accredited representative. It shall specify:

5.1.1 An outline of the structure of the company producing the retreaded tyres.

5.1.2 A brief description of the quality management system, which ensures the effective control of the tyre retreading procedures to meet the requirements of this Standard.

5.1.3 The trade names or marks to be applied to the retreaded tyres produced.

5.1.4 The following information in relation to the range of tyres to be retreaded:

5.1.4.1 The range of tyre sizes;

5.1.4.2 The structure of tyres (diagonal or bias ply, bias belted or radial)

5.1.4.3 The category of use of tyres (normal or snow tyres etc.)

5.1.4.4 The system of retreading and the method of application of the new materials to be used, as defined in Paragraphs 3.37 and 3.41;

5.1.4.5 The maximum speed symbol of the tyres to be retreaded.

5.1.4.6 The maximum load index/load in kg and ply rating (PR) of the tyres to be retreaded

5.1.4.7 The nominated International Tyre Standard to which the range of tyre conform.

## 6 APPROVAL

6.1 Retread tyres requires the approval of the retreading production unit by the responsible authorities in accordance with the requirements of this standard. The responsible authoroties takes the necessary measures as described in this standard in order to ensure that the tyres retreaded in the respective production unit will meet with the requirements stated in this standard. The retread production unit shall be fully responsible for ensuring that the retreaded tyres will meet the requirements of this standard and that they will perform adequately in normal use.

6.2 In addition to the normal requirements for the initial assessment of the tyre retreading production unit, the approval test agency shall be satisfied that the procedures, operation, instructions and specification documentation provided by material suppliers are in a language readily understood by the tyre retreading production unit operatives.

6.3 The approval test agency shall ensure that the procedures and operations documentation for each production unit contains specifications, appropriate to the repair materials and processes used, of the limits of repairable damage or penetrations to the tyre carcass, whether such damage is existing or is caused during the processes of preparation for retreading.

6.4 Before granting approval the test agency must be satisfied that retreaded tyres conform to this standard and that the tests prescribed in Paragraphs 7.7 or 7.8 have been successfully carried out on at least 5 and not necessarily more than 20 samples of retreated tyres representative of the range of tyres produced by the retreading production unit.

6.5 In the case of each failure being recorded during tests, two further samples of the same specification tyre shall be tested. If either or both of these second two samples fail, then a final submission of two samples shall be tested.

If either or both of the final two samples fail, then the application for approval of the retreading production unit shall be rejected.

6.6 If all the requirements of this standard are met, then approval shall be granted and an approval number shall be assigned to each retreading production unit approved. The approval number shall be preceded by standard number and letter “R” signifying that the approval applies to a tyre retreaded as prescribed in this standard The same authority shall not assign the same number to another production unit covered by this standard.

6.7 Notice of approval or extension, refusal or withdrawal of approval or of production definitely discontinued pursuant to this standard as per AIS- 037 and AIS-017.

6.8 There shall be affixed conspicuously to every retreaded tyre conforming to this standard, in the space referred to in Paragraph 4.3 and in addition to the markings prescribed in Paragraph 4.2, an international approval mark consisting of:

6.8.1 An approval number as described in Paragraph 6.6

6.9 AIS-037 gives details of the arrangements of the type approval number

## 7 REQUIREMENTS

7.1 Tyres shall not be accepted for first retread unless they have been type approved and bear either an approval mark, except that this requirement shall not be mandatory until 3 years from date of commencement of tyre approval of new tyres

7.2 Tyre which have been previously retreaded shall not be accepted for further retreading (Not applicable for bias ply tyres).

7.3 The age of the casing accepted for retreading shall not exceed 7 years, based on the digits showing the year of manufacture of the original tyre; e.g. the tyre marked with a month and year code or date code .

7.4 Conditions before retreading:

7.4.1 Tyres shall be clean and dry before inspection.

7.4.2 Before buffing, each tyre shall be thoroughly examined both internally and externally to ensure its suitability for retreading.

7.4.3 Tyres where damage is visible which has resulted from overload or underinflation shall not be retreaded.

7.4.4 Tyres showing any of the following damage shall not be accepted for retreading:

7.4.4.1
a) extensive cracking extending through to the carcass;
b) carcass penetrations or damage to casings above “H” speed symbol except where these casings are to be down-rated to a lower speed symbol;
c) previous repairs to damage outside specified injury limits-see Paragraph 6.3,
d) carcass break up;
e) appreciable oil or chemical attack
f) multiple damage too close together;
g) damaged or broken bead
h) non repairable deterioration of or damage to inner liner;
i) bead damage other than minor “rubber” only damage;
j) exposed cords due to tread wear or sidewall scuffing;
k) non-repairable tread or sidewall material separation from the carcass;
l) structural damage in the area of the sidewall.
m) deterioration due to weathering effect

7.4.5 Radial ply tyre carcasses with separation in the belt, other than slight belt edge looseness, shall not be accepted for retreading.

**7.5 Preparation:**

7.5.1 After buffing, and before the application of new material, each tyre shall be thoroughly re-examined at least externally to ensure its continued suitability for retreading.

7.5.2 The entire surface to which new material is to be applied shall have been prepared without overheating. The buffed surface texture shall not contain deep buffing lacerations or loose material.

7.5.3 Where procured material is to be used the contours of the prepared are shall meet the requirements of the material manufacturer.

7.5.4 Loose cord ends are not permissible.

7.5.5 Casing cords shall not be damaged during the preparation process

7.5.6 Buffing damage to the belt of radial tyres shall be limited to localized damage to the outermost layer only.

7.5.7 Buffing damage limits for diagonal ply tyres shall be as follows:

7.5.7.1 For two ply construction, there shall not be any damage to the carcass except for slight localized buffing damage to the casing joint.

7.5.7.2 For two ply plus breaker construction of tubeless type tyres, there shall not be any damage to the carcass or breaker.

7.5.7.3 For two ply plus breaker construction of tube type tyres, localised damage to the breaker is permissible.

7.5.7.4 For four ply, or more, construction of tubeless type tyres, there shall not be any damage to the carcass or breaker.

7.5.7.5 For four ply, or more, construction of tube type tyres, damage shall be limited to the outermost ply in the crown area only.

7.5.8 Exposed steel parts shall be treated as soon as possible with appropriate material as defined by the manufacturer of that appropriate material.

**7.6 Retreading:**

7.6.1 The retreader must ensure that either the manufacturer or the supplier of repair materials, including patches, is responsible for the following:

a) defining method(s) of application and storage, if requested by the retreader, in the local language of the state in which the materials are to be used.

b) defining limits of damage for which the materials are designed, if requested by the retreader, in the national language of the country in which the materials are to be used.

c) ensuring that reinforced patches for tyres, if correctly applied in carcass repairs, are suitable for the purpose.

d) ensuring that patches are capable of withstanding twice the maximum inflation pressure as given by the tyre manufacturer.

Ensuring the suitability of any other repair materials for the service intended.

7.6.2 The retreader shall be responsible for the correct application of the repair material and for ensuring that the repair is free from any defects which may affect the satisfactory service life of the tyre.

7.6.3 The retreader shall ensure that either the manufacturer or the supplier of tread and sidewall material issues specifications concerning the conditions of storage and use of the material in order to guarantee the material's qualities. If requested by the retreader, this information shall be in the local language of the state in which the materials are to be used.

7.6.4 The retreader must ensure that the repair material and/or compound is documented in a manufacturer's or supplier's certificate. The material compound shall be as per the details/ specification of retreading material specifications/ retreader. Bonding gum, cushion gum, vulcanizing solution and tread rubber used for tyre retreading shall be compatible and preferable of the same make.

7.6.5 The processed tyre shall be cured as soon as possible after the completion of all repairs and building-up operations and at the latest according to the material manufacturer's specifications.

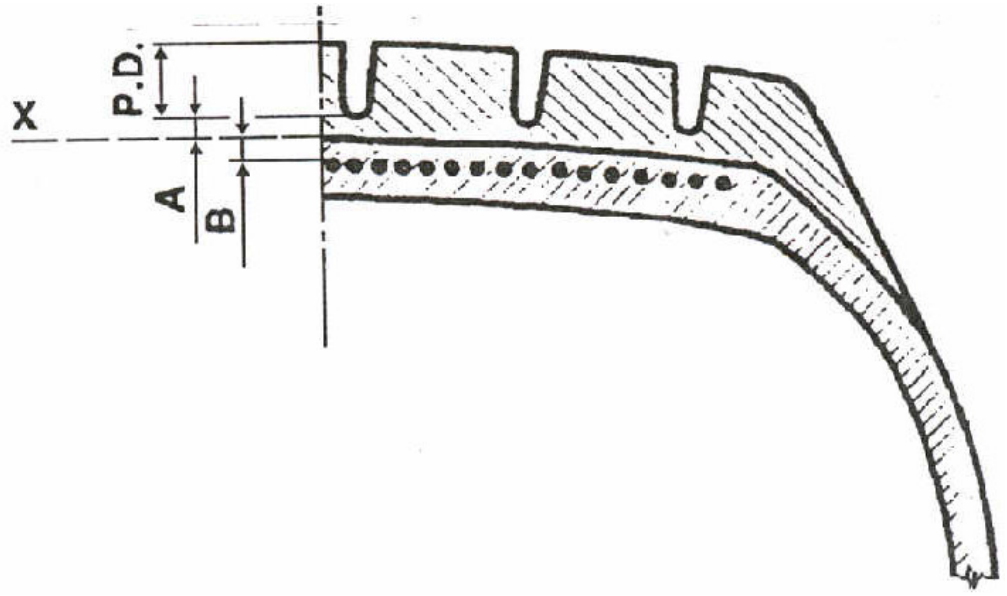
7.6.6 The tyre shall be cured for the length of time and at the temperature and pressure, appropriate to, and specified for, the materials and processing equipment used.

7.6.7 The dimensions of the mould shall be appropriate to the thickness of the new material and the size of the buffed casing. Radial ply tyres, when moulded, shall be cured in radial or radially divided moulds only.

7.6.8 The thickness of original material after buffing and the average thickness of any new material under the tread pattern, after retreading shall be as given in Paragraphs 7.6.8.1 and 7.6.8.2. The thickness of material at any point either across the breadth of the tread or around the circumference of the tyre shall be controlled in such a way that the provisions of Paragraphs 7.7.5 and 7.7.6 are met.

7.6.8.1 For radial ply and bias belted tyres (mm)

| | |
|---|---|
| $1.5 \leq (A+B) \leq 5$ | (minimum 1.5mm; maximum 5.0 mm) |
| $A \geq 1$ | (minimum 1.00mm) |
| $B \geq 0.5$ | (minimum 0.5mm) |




P.D. = Pattern depth

X = Buff line

A = Average thickness of new material under pattern

B = Minimum thickness of original material above belt after buffing

7.6.8.2 For diagonal (Bias ply) tyres:

The thickness of original material above the breaker shall be≥ 0.00 mm.

The average thickness of new material above the buffed casing line shall be ≥ 2.00 mm.

The combined thickness of original and new material beneath the base of the grooves of the tread pattern shall be ≥ 2.00 and ≤ 5.00 mm.

7.6.9 The service description of a retreaded tyre shall not show either a higher speed symbol or a higher load index than that of the original, first life, tyre.

7.6.10 The minimum speed capability of a retreaded tyre shall be 120 km/h ("L" speed symbol) except for bias ply tyres and the maximum shall be 240 km/h ("V" speed symbol)

7.6.11 Tread wear indicators shall be incorporated as follows:

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

7.6.11.2 However, in the case of tyres designed for mounting on rims of a nominal diameter of code 12 or less, four rows of tread wear indicators are permissible.

7.6.11.3 The tread wear indicators shall provide a means of indicating, with a tolerance of +0.60/-0.0mm, when the tread grooves are no longer more than 1.6 mm deep.

7.6.11.4 The height of the tread wear indicators shall be determined by measuring the difference between the depth from the tread surface to the top of the tread wear indicators and the base of the tread grooves, close to the slope at the base of tread wear indicators.

**7.7 Inspection:**

7.7.1 After curing, whilst a degree of heat is retained in a tyre, each retreaded tyre shall be examined to ensure that it is free from any apparent defects. During or after retreading the tyre must be inflated to at least 1.5 bar for examination. Where there is any apparent defect in the profile of the tyre (e.g. blister, depression etc.) the tyre shall be specifically examined to determine the cause of this defect.

7.7.2 Before, during or after retreading the tyre shall be checked at least once for the integrity of its structure by means of a suitable inspection method.

7.7.3 For the purposes of quality control a number of retreaded tyres shall be subjected to destructive and/or non-destructive testing or examination. The quantity of tyres checked and the results shall be recorded.

7.7.4 After retreading, the dimensions of the retreaded tyre, when measured in accordance with Annex C to this standard, must conform either to dimensions calculated according to the procedures in Paragraph 8 or to Annex A of AIS-044 (Part 2) or Tyre sizes covered in other International tyre standard (ECE, JATMA, ETRTO

and T&RA) shall meet the dimensional requirements of respective standards.

Further, if same size of tyre with different dimensions appears in more than one

standard. It shall meet the dimension requirement of any one standard as per

priority ITTAC, T&RA, JATMA, ECE, ETRTO.

7.7.5 The radial run out of the retreaded tyre shall not exceed 1.5mm ( +0.4 mm measuring tolerance) [For record only and this provisions shall not be mandatory for 2 years from the date of notification of this standard]

7.7.6 The maximum static imbalance of the retreaded tyre, measured at the rim diameter, shall not exceed 1.5% of the mass of the tyre. [For record only and this provisions shall be mandatory after 2 years from the date of notification of this standard]

7.7.7 Tread wear indicators shall conform to the requirements of Paragraph 7.6.11.

**7.8 Performance Test:**

7.8.1 Load/Speed Performance Test

7.8.1.1 Tyres retreaded to comply with this standard shall be capable of meeting the load/speed performance test as specified in Annex D to this standard.

7.8.2.1 A retreaded tyre which after undergoing the load/speed performance test does not exhibit any tread separation, ply separation, cord separation, chunking or broken cords shall be deemed to have passed the test.

7.8.3.1 The outer diameter of the tyre, measured six hours after the load/speed endurance test, must not differ by more than ±3.5% from the outer diameter as measured before the test.

**7.8.2 Endurance Performance Test**

7.8.2.1 The pneumatic tyre shall undergo a endurance performance test carried out by the procedure described in Annex E to this standard.

7.8.2.2 A tyre which after undergoing the endurance performance test does not exhibit any tread separation, ply separation, cord separation, chunking or broken cords shall be deemed to have passed the test.

**7.8.3 Tyre Strength Test**

7.8.3.1 The tyre strength test (Plunger test) shall be carried out on a tyre in accordance with method set out in Annex F.

The minimum breaking energy value at any measuring point shall not be less than the value mentioned in below table.

**Static Breaking Energy for Passenger Car Tyres (DIAGONAL PLY)**

| Tyre Size | Ply Rating | Plunger Diameter mm | Inflation Pressure kPa | Breaking Energy | |
|---|---|---|---|---|---|
| | | | | Rayon J(kg-cm) Minimum | Nylon J(kg-cm) Minimum |
| Upto 6.00 (nominal section) | 4 | 19± 0.2 | 165 | 113 (1152) | 181 (1845) |
| | 6 | 19± 0.2 | 195 | 169 (1723) | 271 (2763) |
| Above 6.00 (nominal section) Including F78-15 | 4 | 19± 0.2 | 195 | 186 (1896) | 294 (2998) |
| | 6 | 19± 0.2 | 195 | 280 (2852) | 441 (4497) |
| | 8 | 19± 0.2 | 220 | 373 (3802) | 588 (5996) |

NOTES :

1 Recommended rim sizes shall be used for the breaking energy test.

2 For F78-15 4PR breaking energy test, inflation pressure will be 170 Kpa.

**Static Breaking Energy for Passenger Car Tyres ( RADIAL PLY)**

| Tyre Size | Plunger Diameter mm | Inflation Pressure kPa | Breaking Energy |
|---|---|---|---|
| Nominal Section Width | | | J(kg-cm) Minimum |
| Under 160 | 19± 1.6 | 180±5 | 220 (2245) |
| 160 or more | 19± 1.6 | 180±5 | 295 (3010) |

## 8 SPECIFICATION

8.1 Tyres retreaded to comply with this standard shall conform to the following dimensions:

8.1.1 Section Width:

8.1.1.1 The section width shall be calculated by the following formula:

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

Where

S: is the actual section width in millimeters as measured on the test rim;

$S_1$ is the value of the "Design Section Width", referred to the measuring rim, as quoted in the international tyre standard specified by the retreader for the tyre size in question;

A is the width of the test rim in millimeters;

$A_1$ is the width in millimeters of the measuring rim as quoted in the International Tyre standard specified by the retreader for the tyre size in question.

K is a factor and shall be taken to equal 0.4

**8.1.2 Outer Diameter:**

8.1.2.1 The theoretical outer diameter of a retreaded tyre shall be calculated by the following formula:

$D = d + 2H$

Where:

D: is the theoretical outer diameter in millimeters;

d is the conventional number defined in Paragraph 3.21.3., in millimeters;

H is nominal section height in millimeters and is equal to $S_n$ multiplied by 0.01 Ra
where:

$S_n$ is the nominal section width in millimeters;

$R_a$ is the nominal aspect ratio

All of the above symbols are as quoted in the tyre size designation as shown on the sidewall of the tyre in conformity with the requirements of Paragraph 4.2.2. and as defined in Paragraph 3.21

8.1.2.2 However, for tyres whose designation is given in the first column of the tables in Annex A to AIS-044 (Part 2), the outer diameter shall be that given in those tables.

8.1.3 Method of Measuring Retreaded Tyres:

8.1.3.1 The dimensions of retreaded tyres shall be measured in accordance with the procedures given in Annex C to this standard

**8.1.4 Section Width specification:**

8.1.4.1 The actual overall width may be less than the section width or widths determined in Paragraph 8.1

8.1.4.2 The actual overall width may also exceed the value or values determined in Paragraph 8.1, by

8.1.4.2.1 4% in the case of radial ply tyres and

8.1.4.2.2 6% in the case of diagonal (bias-ply) or bias belted tyres.

8.1.4.2.3 In addition, if the tyres has a special protective band, the width may be greater by up to 8 mm above the tolerances given by paragraphs 8.1.4.2.1 and 8.1.4.2.2

**8.1.5 Outer Diameter Specifications:**

8.1.5.1 The actual outer diameter of a retreaded tyre must not be outside the values of $D_{min}$ and $D_{max}$ obtained by the following formulae:

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

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

Where:

8.1.5.1.1 For sizes not given in the tables in Annex A of AIS-044 (Part 2) and other International tyre standard viz., ECE, JATMA, ETRTO and T&RA, “H” and “d” are as defined in paragraph 8.1.2.1.

8.1.5.1.2 For sizes mentioned in paragraph 8.1.2.2. above:

$H = 0.5 (D-d)$

Where “D” is the outer diameter and “d” the Nominal rim diameter quoted in the above-mentioned tables for the size in question.

8.1.5.1.3 The coefficient "a" = 0.97

8.1.5.1.4 The coefficient "b" is:

| | Radial tyres | Diagonal (bias-ply) and bias belted tyres |
|---|---|---|
| For normal use tyres | 1.04 | 1.08 |

8.1.5.2 For snow tyres the maximum outer diameter ($D_{max}$) calculated in Paragraph 8.1.5.1 may be exceeded by not more than 1%

## 9 MODIFICATIONS TO THE APPROVAL

9.1 Every modification concerning a retreading production unit amending any of the information given by the retreading production unit in the Application for Approval, see paragraph 5, shall be notified to the approval authority which approved the retreading production unit. That authority may then either:

9.1.1 Consider that the modifications made are unlikely to have an appreciable adverse effect and that in any case the retreading production unit still meets the requirements; or

9.1.2 Require a further investigation of the approval

9.2 Confirmation of, or refusal of, approval, specifying the modifications, shall be communicated by the procedure specified in Paragraph 6.7

## 10 CONFORMITY OF PRODUCTION

The conformity of production procedures shall comply with those set out in the AIS –037

10.1 The retreading production unit approved according to this standard shall conform to the requirements set out in Paragraph 7.

10.2 The holder of the approval shall ensure that, during each year of production and spread throughout that year, at least the following number of tyres, representative of the range being produced, is checked and tested as prescribed in this standard.

10.2.1 0.01% of the total annual production but in any case not less than 5 and not necessarily more than 20.

10.3 If the requirements of Paragraph 10.2 are carried out by or under the control of the approval authority, the results may be used as part of, or instead of, those prescribed in Paragraph 10.4

10.4 The test agency which has approved the retreading production unit may at any time verify the conformity control methods applied in each production facility. For each production facility the type approval authority shall take samples at random during each and every production year and at least the following number of tyres, representative of the range being produced, shall be checked and tested as prescribed in this standard.

10.4.1 0.01% of the total annual production but in any case not less than 5 and not necessarily more than 20.

10.5 The tests and checks of Paragraph 10.4 may replace those required in Paragraph 10.2.

## 11. PENALTIES FOR NON-CONFORMITY OF PRODUCTION

11.1 The approval granted in respect of a retreading production unit pursuant to this standard may be withdrawn if the requirements of Paragraph 10 are not complied with or if the retreading production unit or the retreaded tyres produced by that retreading production unit have failed to meet the requirements prescribed in that paragraph.

11.2 Penalties for non-conformance of conformity of production shall be as detailed in AIS-037

## 12 PRODUCTION DEFINITELY DISCONTINUED

The authority which granted the approval of the retreading production unit shall be informed if operations and manufacture of retreaded tyres approved within the scope of this standard cease.

**ANNEX A**
( See para 3.33)

## LOAD CAPACITY INDICES

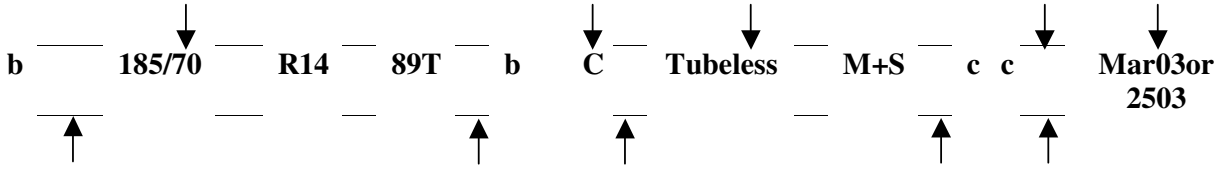
Li = Load-capacity index

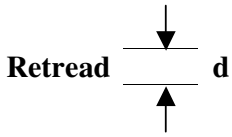
Kg = Corresponding mass of the vehicle which is to be carried

| Li | Kg | Li | Kg | Li | Kg | Li | Kg |
|---|---|---|---|---|---|---|---|
| 0 | 45 | 31 | 109 | 62 | 265 | 93 | 650 |
| 1 | 46.2 | 32 | 112 | 63 | 272 | 94 | 670 |
| 2 | 47.5 | 33 | 115 | 64 | 280 | 95 | 690 |
| 3 | 48.7 | 34 | 118 | 65 | 290 | 96 | 710 |
| 4 | 50 | 35 | 121 | 66 | 300 | 97 | 730 |
| 5 | 51.5 | 36 | 125 | 67 | 307 | 98 | 750 |
| 6 | 53 | 37 | 128 | 68 | 315 | 99 | 775 |
| 7 | 54.5 | 38 | 132 | 69 | 325 | 100 | 800 |
| 8 | 56 | 39 | 136 | 70 | 335 | 101 | 825 |
| 9 | 58 | 40 | 140 | 71 | 345 | 102 | 850 |
| 10 | 60 | 41 | 145 | 72 | 355 | 103 | 875 |
| 11 | 61.5 | 42 | 150 | 73 | 365 | 104 | 900 |
| 12 | 63 | 43 | 155 | 74 | 375 | 105 | 925 |
| 13 | 65 | 44 | 160 | 75 | 387 | 106 | 950 |
| 14 | 67 | 45 | 165 | 76 | 400 | 107 | 975 |
| 15 | 69 | 46 | 170 | 77 | 412 | 108 | 1000 |
| 16 | 71 | 47 | 175 | 78 | 425 | 109 | 1030 |
| 17 | 73 | 48 | 180 | 79 | 437 | 110 | 1060 |
| 18 | 75 | 49 | 185 | 80 | 450 | 111 | 1090 |
| 19 | 77.5 | 50 | 190 | 81 | 462 | 112 | 1120 |
| 20 | 80 | 51 | 195 | 82 | 475 | 113 | 1150 |
| 21 | 82.5 | 52 | 200 | 83 | 487 | 114 | 1180 |
| 22 | 85 | 53 | 206 | 84 | 500 | 115 | 1215 |
| 23 | 87.5 | 54 | 212 | 85 | 515 | 116 | 1250 |
| 24 | 90 | 55 | 218 | 86 | 530 | 117 | 1285 |
| 25 | 92.5 | 56 | 224 | 87 | 545 | 118 | 1320 |
| 26 | 95 | 57 | 230 | 88 | 560 | 119 | 1360 |
| 27 | 97.5 | 58 | 236 | 89 | 580 | 120 | 1400 |
| 28 | 100 | 59 | 243 | 90 | 600 | | |
| 29 | 103 | 60 | 250 | 91 | 615 | | |
| 30 | 106 | 61 | 257 | 92 | 630 | | |

**ANNEX B**
( See para 4.1)

**ARRANGEMENT OF RETREAD TYRE MARKINGS**
**Example of the markings to be borne by retreaded tyres placed on the market after the entry into force of this standard**




b: 6mm (min)
c: 4mm (min)
d: 3mm (min)
These markings define a retreaded tyre:
having a nominal section width of 185;
having a nominal aspect ratio of 70;
of radial-ply structure ( R );
having a nominal rim diameter of code 14;
having a service description ”89T” indicating a load capacity of 580 kg corresponding to a load index of “89” and a maximum speed capability of 190 km/h corresponding to a
speed symbol “T”;
for fitting without an inner tube (“tubelsss”);
of snow type (M+S);
Retreaded month and year code (i.e) in March of the year 2003 or in the weeks 25 of the year 2003.

The positioning and order of the markings constituting the tyre designation shall be as follows:

a) the size designation, comprising the nominal section width, the nominal aspect ratio, the type-of-structure symbol (where applicable) and the nominal rim diameter shall be grouped as shown in the above example: 185/70 R14;

b) the service description comprising the load index and the speed symbol shall be placed near the size designation. It may either precede the size designation or follow it or be placed above or below it;

c) the symbols “TUBELESS” , “REINFORCED” , and “M + S” may be at a distance from the size designation.

d) The word ‘RETREAD” may be at a distance from the size designation.

## ANNEX C
( See para 8.1.3)

## METHOD OF MEASURING PNEUMATIC TYRES

**C1 PREPARING THE TYRE**

C1.1 The tyre shall be mounted on the test rim specified by the retreader and inflated to the pressure of 3 to 3.5 bar.

C1.2 The tyre pressure shall be adjusted as follows:

C1.2.1 For standard bias belted tyres – to 1.7 bar;

C1.2.2 For diagonal (bias ply) tyres – to;

| | Pressure (bar) for Speed symbol | | |
|---|---|---|---|
| Ply rating | L,M,N | P,Q,R,S | T,U,H,V |
| 4 | 1.7 | 2.0 | - |
| 6 | 2.1 | 2.4 | 2.6 |
| 8 | 2.5 | 2.8 | 3.0 |

C1.2.3 For standard radial tyres – to 1.8 bar

C1.2.4 For reinforced tyres-to 2.3 bar

**C 2.0 MEASURING PROCEDURE**

C.2.1 The tyre, mounted on its rim, shall be conditioned at the ambient room temperature for not less than 24 h, save as otherwise required by paragraph 7.8.3 of this standard.

C.2.2 The tyre pressure shall be readjusted to the level specified in Paragraph 1.2 of this annex.

C.2.3 The overall width shall be measured at six equally spaced points around the tyre, taking account of the thickness of any protective ribs or bands. The highest reading obtained shall be taken as the overall width.

C.2.4 The outer diameter shall be calculated from a measurement of the maximum circumference of the inflated tyre.

## ANNEX D

( See para 7.8.1)

## PROCEDURE FOR LOAD/SPEED PERFORMANCE TEST

### D.1 PREPARING THE TYRE

D.1.1 Mount a retreaded tyre on the test rim specified by the retreader.

D.1.2 Inflate the tyre to the appropriate pressure as given (in bar) in the table below:

| Speed Category | Diagonal (bias–ply) tyres (in bar) | | | Radial Tyres (in bar) | | Bias-belted tyres (in bar) |
|---|---|---|---|---|---|---|
| | Ply-rating | | | Standard | Reinforced | Standard |
| | 4 | 6 | 8 | | | |
| L,M,N | 2.3 | 2.7 | 3.0 | 2.4 | - | - |
| P,Q,R,S | 2.6 | 3.0 | 3.3 | 2.6 | 3.0 | 2.6 |
| T,U,H | 2.8 | 3.2 | 3.5 | 2.8 | 3.2 | 2.8 |
| V | 3.0 | 3.4 | 3.7 | 3.0 | 3.4 | - |

D.1.3 The retreading production unit may request, giving reasons, the use of a test inflation pressure different from those given in Paragraph 1.2 of this annex. In this case the tyre shall be inflated to the requested pressure.

D.1.4 Condition the tyre and wheel assembly at test-room temperature for not less than three hours.

D.1.5 Readjust the tyre pressure to that specified in paragraph 1.2 or 1.3 of this annex.

### D.2 TEST PROCEDURE

D.2.1 Mount the tyre and wheel assembly on a test axle and press it against the outer face of a smooth surfaced power driven test drum either 1.70m ±1% or 2.00m ±1% diameter.

D.2.2 Apply to the test axle a load equal to 80% of;

D.2.2.1 The maximum load rating corresponding to the Load index for tyres with Speed symbols L to H inclusive,

D.2.2.2 The maximum load rating associated with a maximum speed of 240 km/h for tyres of Speed Symbol “V” (see paragraph 3.35.2 of this standard)

D.2.3 Throughout the test the tyre pressure must not be corrected and the test load must be kept constant.

D.2.4 During the test the temperature in the test room must be maintained at between 20° and 40°C unless the tyre manufacturer or retreader agrees to a higher temperature.

D.2.5 The endurance test programme shall be carried out without interruption and shall be as follows:

D.2.5.1 Time taken from zero speed to initial test speed: 10 minutes;

D.2.5.2 Initial test speed: prescribed maximum speed for the tyre concerned, less 40 km/h in the case of a test drum of 1.70m ± 1% diameter or less 30 km/h in the case of a test drum of 2.00 m±1% diameter.

D.2.5.3 Successive speed increments: 10 km/h upto the maximum test speed;

D.2.5.4 Duration of test at each speed step except the last: 10 minutes;

D.2.5.5 Duration of test at last speed step:20 minutes;

D.2.5.6 Maximum test speed: prescribed maximum speed for the tyre concerned, less 10 km/h in the case of a test drum of 1.70 m ±1% diameter or the prescribed maximum speed in the case of a test drum of 2.00 m ± 1% diameter.

**ANNEX E**
( See para 7.8.2)

## ENDURANCE PERFORMANCE TEST

### E 1.1 APPARATUS

The test wheel shall be a flat-smooth-faced wheel having diameter of 1. 7 m $\pm$ 1 %. The surface width of the wheel shall be more than the loaded tyre tread width. The air surrounding the tyre during the test shall be at a temperature of 20 to 40°C, or at a higher temperature if acceptable to the tyre manufacturer.

### E 1.2 PREPARATION OF TYRE FOR THE TEST

Condition the inflated tyre/rim-wheel assembly in an ambient atmosphere 20 to 40°C or higher if acceptable to the tyre manufacturer for a minimum period of 3 h. Readjust if necessary, the tyre pressure to the original inflation pressure immediately before the test.

### E 1.3 TEST PROCEDURE

Mount the conditioned tyre/rim-wheel assembly on a test machine axle and press the tyre tread against the face of the test drum at the initial (Stage-1) Test Load, followed by the Test Loads stage II and III, as those specified in the following table.

**Table – Endurance Test Parameters**

**Test Inflation Pressure 180 kPa**

| Test Load kg | | Maximum Load capability x Percentage of Maximum Load |
|---|---|---|
| Test speed km/h | | 81 |
| Test stage | Test period h. | Percentage of Maximum Rated load |
| 1 | 4 | 85 |
| 2 | 6 | 90 |
| 3 | 24 | 100 |

**ANNEX F**

( See para 7.8.3)

**TYRE STRENGTH TEST (PLUNGER TEST)**

**F 1.1 APPARATUS**

The equipment consists of a cylindrical steel plunger, having a hemispherical end of a diameter specified in the 7.8.3 for type of tyre and a device to force the plunger rod into a tyre at the rate specified in 1.3 of Annex F.

**F 1.2 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 bew conducted for at least 3 hours after which the pressure shall be adjusted, if necessary, to the test inflation pressure specified in 7.8.3.

**F 1.3 TEST PROCEDURE**

The plunger rod shall be forced into the tread of the tyre/wheel assembly mounted as described in F 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 ± 1.5 mm per minute 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 five energy values obtained at the break, using the formula given in F1.4.

**F 1.4** 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 = arithmetic mean of force at break (or bottoming) in N ; and

P = arithmetic mean of penetration at break (or bottoming) in mm.

**F 1.5** 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.

**ANNEX G**
( See para 3)

Explanatory Figure

Clause 3 of the Standard

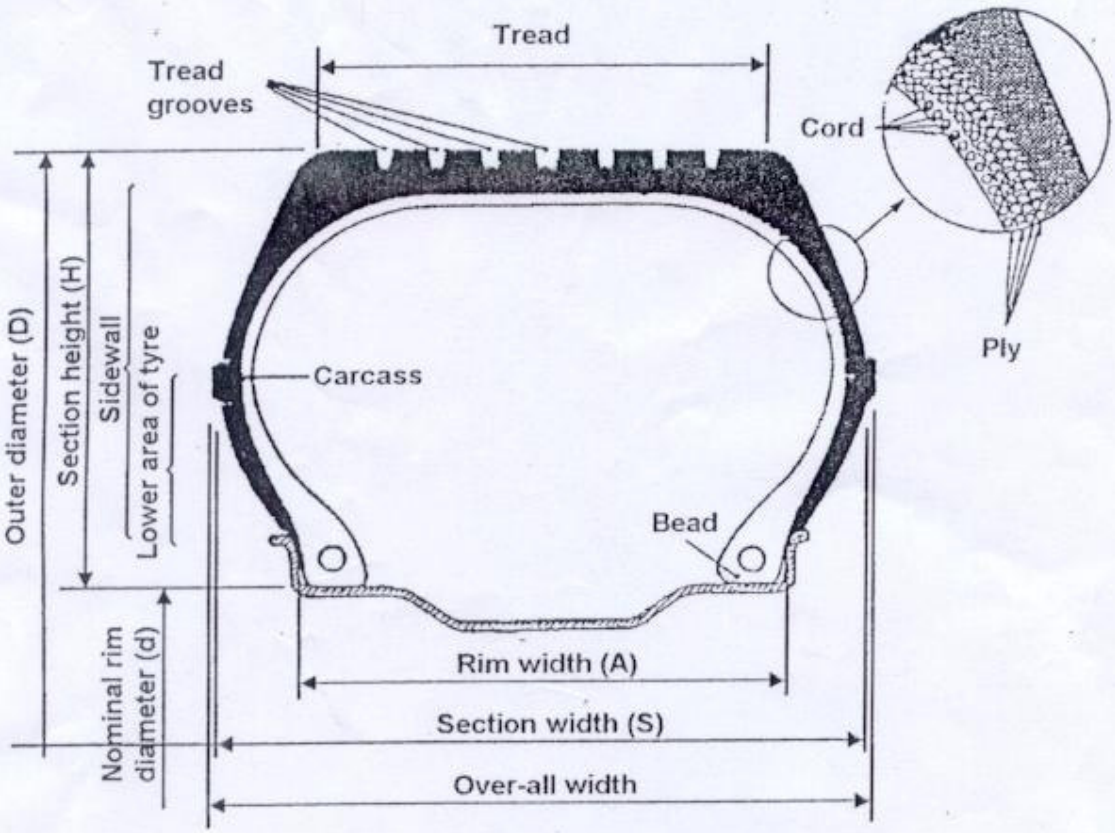



FIG.1

**ANNEX H**

(See Introduction)

**COMMITTEE COMPOSITION ***

**Automotive Industry Standards Committee**

| **Chairman** | |
|---|---|
| Shri B. Bhanot | Director<br>The Automotive Research Association of India, Pune |
| **Members** | **Representing** |
| Shri Alok Rawat | Ministry of Shipping, Road Transport & Highways,<br>( Department of Road Transport & Highways )<br>New Delhi |
| Shri Sushil Kumar | Department of Heavy Industry, Ministry of Heavy Industries & Public Enterprises, New Delhi |
| Shri. Chandan Saha | Office of the Development Commissioner<br>Small Scale Industries,<br>Ministry of Small Scale Industries, New Delhi |
| Shri K. K. Goel<br>Shri K. K. Vashistha<br>(Alternate) | Bureau of Indian Standards, New Delhi |
| Shri A. S. Lakra<br>Shri D. P. Saste<br>(Alternate) | Central Institute of Road Transport, Pune |
| Director | Indian Institute of Petroleum, Dehra Dun |
| Shri R.C. Sethi<br>Shri N. Karuppaiah<br>(Alternate) | Vehicles Research & Development Establishment, Ahmednagar |
| Shri Rajat Nandi | Society of Indian Automobile Manufacturers |
| Shri T.C. Gopalan<br>Shri Ramakant Garg<br>(Alternate) | Tractor Manufacturers Association, New Delhi |
| Shri K.N.D. Nambudiripad | Automotive Components Manufacturers Association |
| Shri G. P. Banerji | Automotive Components Manufacturers Association |

Member Secretary
Mrs. Rashmi Urdhwareshe
Sr. Assistant Director
The Automotive Research Association of India, Pune

* At the time of approval of this Automotive Industry Standard (AIS)