भारतीय मानक

स्वचल वाहन — रिम — सामान्य अपेक्षाएँ

भाग 1 नामपद्धति, पदनाम, मुहरांकन तथा मापन

(दूसरा पुनरीक्षण)

Indian Standard

AUTOMOTIVE VEHICLES — RIMS — GENERAL REQUIREMENTS

PART 1 NOMENCLATURE, DESIGNATION, MARKING AND MEASUREMENT

(Second Revision)

ICS 01.040.43; 43.040.50

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

July 2009

Price Group 8

FOREWORD

This Indian Standard (Part 1) (Second Revision) 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.

This standard was first published in 1984 and revised in 1993. The second revision is being based on the experience gained after publication of standard and availability of new designs. This standard has been revised to keep pace with the latest technological advancement in the field of wheels/rims for all types of vehicles.

This standard aims at uniform rims profiles that will match the tyres in obtaining proper fitment. The sizes, designations and markings have also been standardized to facilitate uniform adoption during manufacture.

This standard is one of the parts pertaining to rims for various types of automotive vehicles. The other parts in this series are:

(Part 2) : 2009	Passenger car (*second revision*)
(Part 3) : 2009	Commercial vehicles rims (*second revision*)
(Part 4) : 2009	Scooter and scooter derivative rims (*first revision*)
(Part 5) : 2009	Moped, motorcycle and motorcycle derivative rims (*second revision*)
(Part 6) : 2009	Rims for agricultural tractors, tillers and implements (*second revision*)
(Part 7) : 2009	Industrial truck rims (*first revision*)
(Part 8) : 2009	Earthmoving machine rims (*first revision*)

This part is in general agreement with ISO 3911:1977 'Wheel/rim nomenclature, designation, marking and units of measurements' published by the International Organization for Standardization (ISO).

These parts do not lay down methods of testing and performance requirements for wheels/rims pertaining to the respective tyres of automotive vehicles but lay down only the profiles and other general requirements. For passenger car wheels and truck and bus wheels/rims reference may be made to the following Indian Standards for methods of testing performance requirements:

IS No.	*Title*
9436 : 1980	Performance requirements and method of tests for wheels for passenger cars
9438 : 1980	Performance requirements and method of tests for wheels/rims for trucks and buses

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.

Indian Standard

AUTOMOTIVE VEHICLES — RIMS — GENERAL REQUIREMENTS

PART 1 NOMENCLATURE, DESIGNATION, MARKING AND MEASUREMENT

(Second Revision)

1 SCOPE

1.1 This standard (Part 1) covers the nomenclature, designation, marking, methods and units of measurement and other requirements for wheels/rims.

1.2 The figures given in this standard are intended to define fundamental wheel/rim terms rather than to provide all the wheel design features comprehensively.

2 DEFINITIONS AND NOMENCLATURE

Following definitions and nomenclatures shall apply.

2.1 **Wheel** — A rotating load carrying member between the tyre and the axle. It usually consists of two major parts:

a) The rim; and
b) The wheel disc.

2.1.1 *Rim* — The part of the wheel on which the tyre is mounted and supported.

2.1.2 *Wheel Disc* — That part of the wheel which is the supporting member between the axle and the rim.

2.1.3 *Single Wheel* — A wheel which supports one tyre on one end of an axle.

2.1.4 *Inset Wheel* — A wheel so constructed that the centre line of the rim is located inboard of the attachment face of the disc. Inset is the distance from the attachment face of the disc to the centre line of the rim [*see* Fig. 1(a)].

2.1.5 *Zeroset Wheel* — A wheel so constructed that the centre line of the rim is coincident with the attachment face of the disc [*see* Fig. 1(b)].

2.1.6 *Outset Wheel* — A wheel so constructed that the centre line of the rim is located outboard of the attachment face of the disc. Outset is the distance from the attachment face of the disc to the centre line of the rim [*see* Fig. 1(c)].

NOTE — Track, the distance between the centre line of the tyres on an axle, increases as the outset of the wheels is increased.

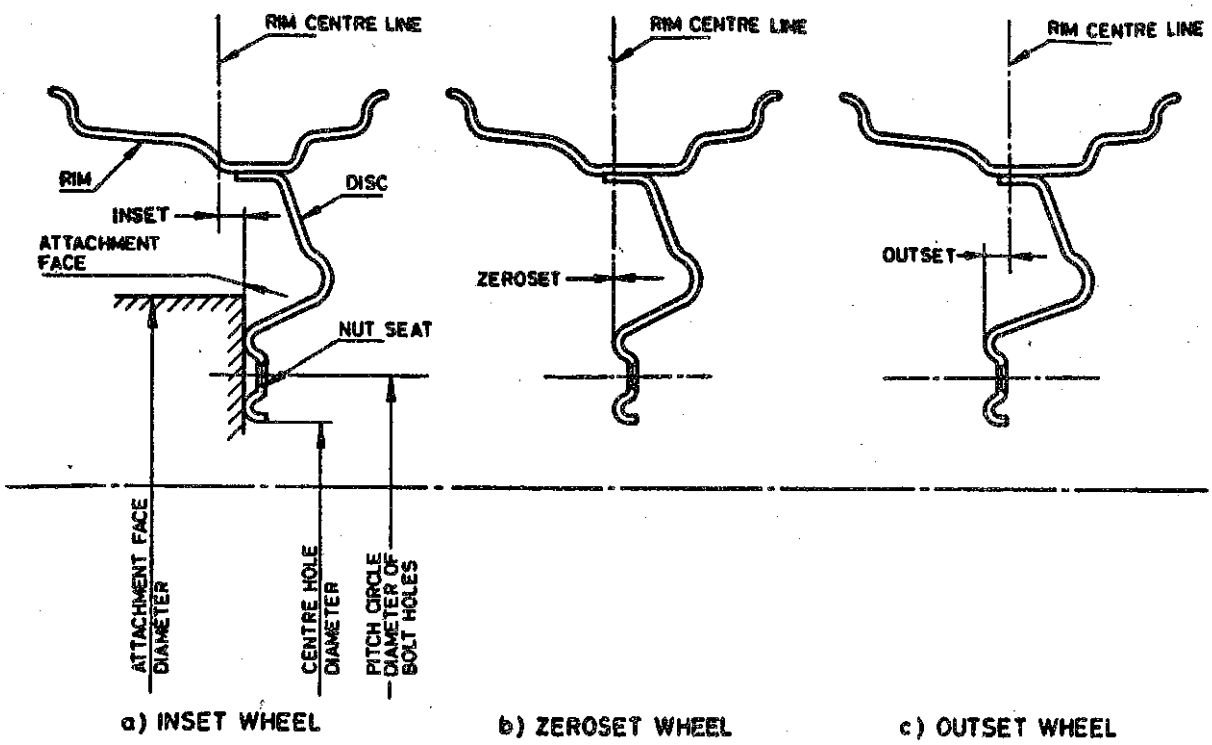


FIG. 1 PASSENGER CAR AND LIGHT COMMERCIAL VEHICLE DISC WHEEL NOMENCLATURE

2.1.7 *Dual Wheel* — A wheel of the type shown in Fig. 2 or a wheel with sufficient inset and configuration so that two such wheels, when assembled with each other, support two tyres on one end of an axle.

2.1.8 *Dual Spacing* — The distance between the centre lines of the rim to provide the required clearance between the tyres (*see* Fig. 2).

2.1.9 *Offset* (*Half Dual Spacing*) — The distance between the centre line of the rim and the outer face of the disc and is equal to the inset plus the nominal thickness of the disc.

2.2 Types of Wheel

2.2.1 *Wheel* — A permanent combination of a rim and a wheel disc (*see* Fig. 1 and Fig. 2).

2.2.2 *Divided Wheel* — A wheel so constructed that its two main parts, the rim portions of which may or may not be the same in width, when securely fastened together, combine to form a rim having two fixed flanges (*see* Fig. 3).

2.2.3 *Reversible Wheel* — A wheel so constructed that its wheel disc can be mounted on either face to provide inset (narrow track) or outset (wide track) (*see* Fig. 4).

2.2.4 *Adjustable Wheel* — A wheel so constructed that the rim can be repositioned axially relative to the wheel disc. Adjustments can be made: (a) manually, or (b) by power of the vehicle (*see* Fig. 5).

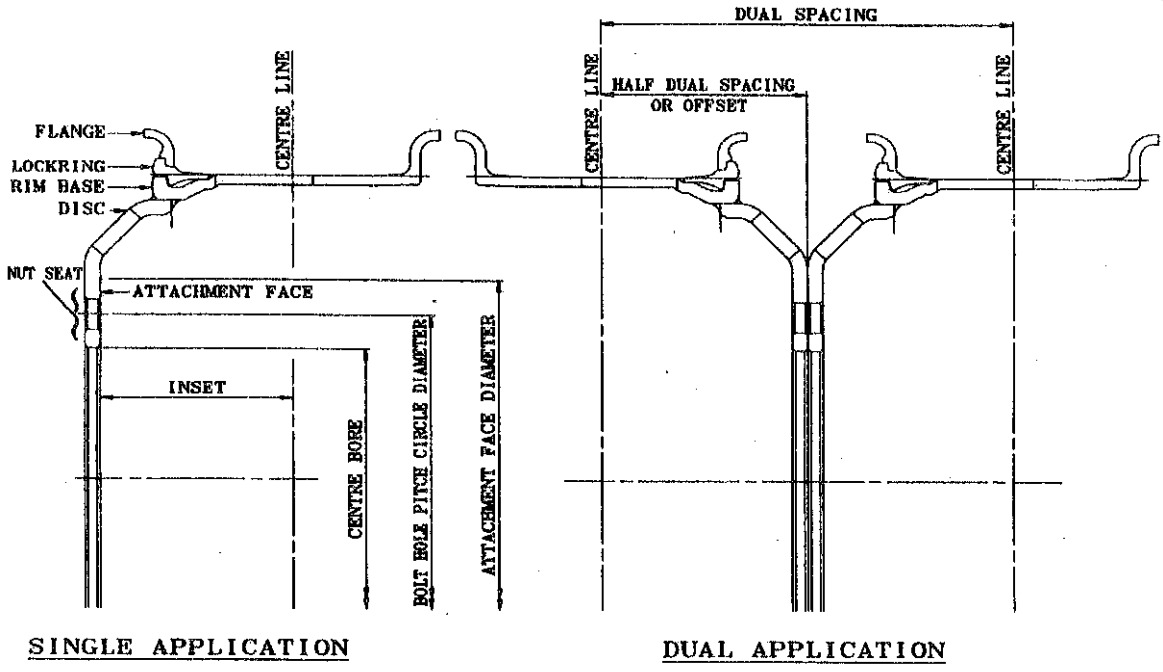


FIG. 2 COMMERCIAL VEHICLE WHEEL NOMENCLATURE

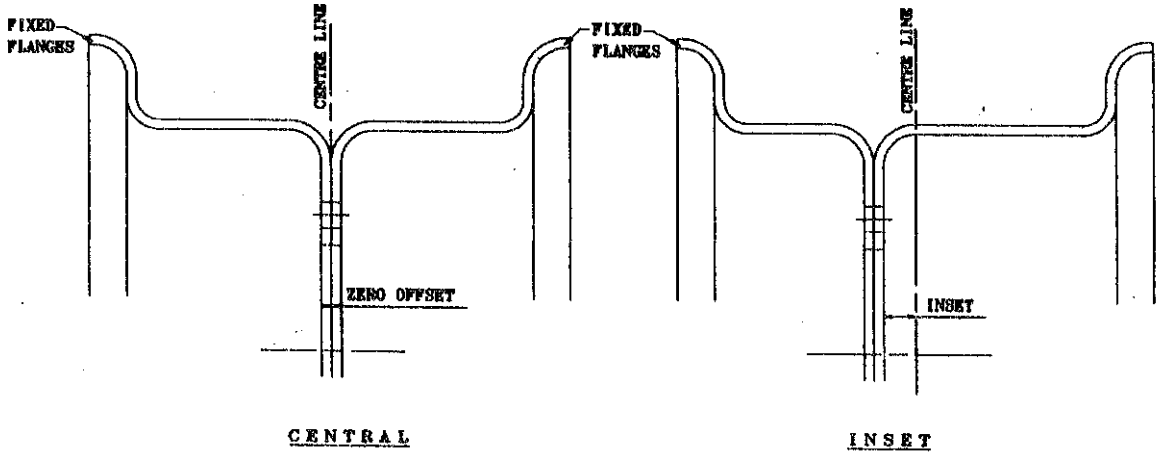


FIG. 3 DIVIDED WHEEL NOMENCLATURE

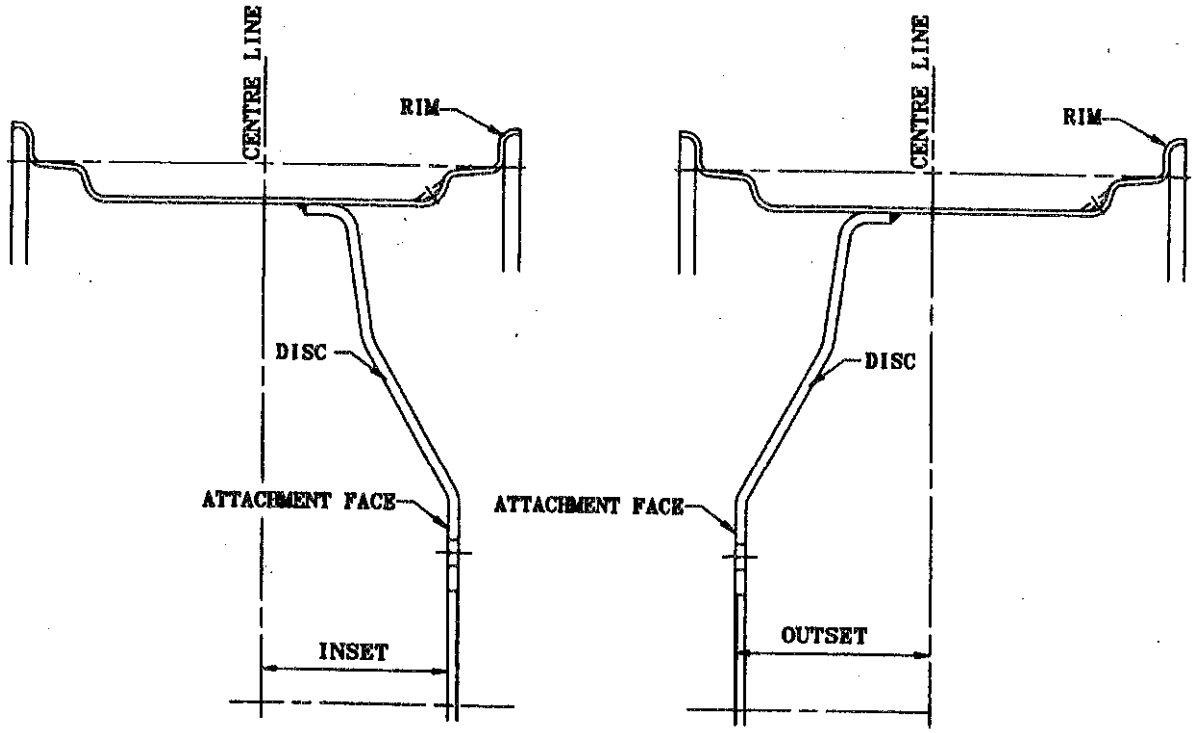


FIG. 4 REVERSIBLE WHEEL NOMENCLATURE

2.2.5 *Spoke Wheel* — A wheel so constructed that its rim is joined to the centre piece by a series of wire spokes (*see* Fig. 6).

2.2.6 *Fork Lift Wheel* (*see* Fig. 7)

2.3 Rim Nomenclature

2.3.1 *Flange* — That part of the rim which provides lateral support to the tyre (*see A*, *B*, *G*, R_2 and R_6 in Fig. 8).

2.3.2 *Bead Seat* — That part of the rim which provides radial support to the tyre (*see D*, *P*, *B* and R_3 in Fig. 8).

2.3.3 *Well* — That part of the rim so located with sufficient depth and width to enable the tyre beads to be mounted and demounted over the mounting side rim flange or bead seat taper (*see* R_4, α, *M*, *H*, *L* and R_5 in Fig. 8).

2.3.4 *Valve Hole* (*Valve Aperture*) — The hole or slot in the rim which accommodates the valve for tyre inflation (*see V*, *F* in Fig. 8). For detail of valve hole aperture (*see* Fig. 21A, 21B, 21C, 21D, 21E, 21F, 21G and 21H).

2.3.5 *Gutter* — The groove in the rim base in which rim parts, such as a spring lock ring or a detachable spring flange fit and are retained by the gutter tip (*see S* and *T* in Fig. 8).

2.3.6 Other nomenclature shall be as given in Fig. 8.

2.4 Rim Types

2.4.1 *One-Piece* (*Drop-Centre*) *Rim* — A rim which is of one-piece construction and incorporates a well (*see* Fig. 9).

2.4.2 *Two-Piece Rim* (*see* Fig. 10)

2.4.3 *Three-Piece Rim* (*see* Fig. 11)

2.4.4 *Four-Piece Rim* (*see* Fig. 12)

2.4.5 *Five-Piece Rim* (*see* Fig. 13)

2.4.6 *Cylindrical Bead Seat Rim for Motorcycles* (*see* Fig. 14)

3 SIZE DESIGNATION OF WHEEL/RIM

3.1 Present Designation

The wheels/rims shall be designated by the following order by figures representing:

a) Nominal rim width code;
b) Rim profile;
c) Nominal rim diameter code;
d) A letter or letters signifying the tyre-side profile of the rim (usually the profile designation follows the nominal rim width; it may, however, precede or include the nominal rim width);
e) *Off the road* — The symbol '/' followed by a figure or figures indicates the flange, height; and
f) Number of the relevant Indian Standard,

Example:

RIM MARKING		RIM CONTOUR		NOMINAL DIAMETER CODE	SPECIAL FEATURES
		WIDTH CODE	PROFILE		
		PASSENGER CARS			
4½ J × 15	Or 15 × 4½ J	4½	J	15	—
4½ J × 15 H2	Or 15 × 4½ J H2	4½	J	15	H2- Hump Designation
		COMMERCIAL VEHICLES			
5.0-20 (5.0×20)	Or 20-5.0 (20×5.0)	5	—	20	—
22.5×7.50	Or 7.50×22.5	7.50	—	22.5	—
10.00 V-20 (10.00 V×20)	Or 20-10.00 V (20×10.00 V)	10	V	20	—
		AGRICULTURAL TRACTORS			
W 15 L ×28	Or 28 × W 15 L	15	L	28	—
		MOTOR CYCLES			
16×1.20	Or 1.20×16	1.20	—	16	—
18 × 2.15	Or 2.15× 18	2.15	—	18	—
18×MT 2.15 H2	Or MT 2.15 ×18 H2	2.15	MT	18	—
		SCOOTERS			
8-2.10	Or 2.10-8	2.10	—	8	—
		INDUSTRIAL/LIFT TRUCKS			
5.00F-10	Or 10-5.00F	5.00	F	10	—
		EARTHMOVING EQUIPMENT			
8.00TG-24 SDC	Or 24-8.00TG SDC	8.00	TG	24	SEMI-DROP CENTRE (SDC)
11.25-25/2.0	Or 25-11.25/2.0	11.25	—	25	CODE OF FLANGE HEIGHT (/2.0)
25×14.00/1.3	Or 14.00/1.3×25	14.00	—	25	CODE OF FLANGE HEIGHT (/1.3)

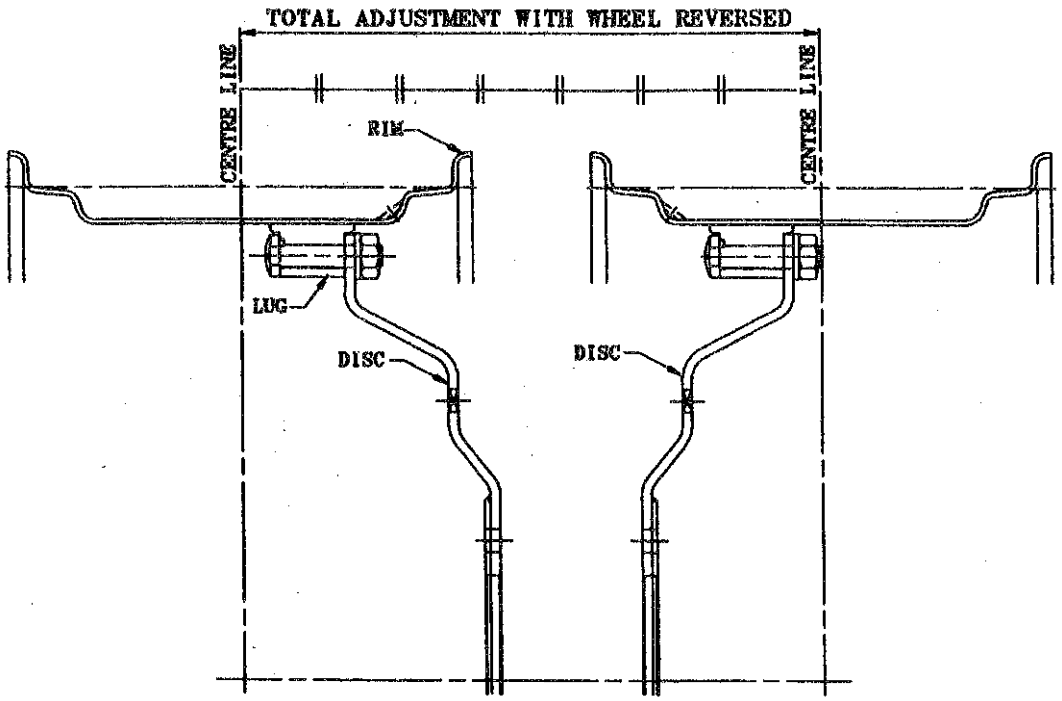
4 MARKING

Wheels with integral or permanently affixed rims and rims separate or demountable shall be legibly marked with their size designation. The marking shall be visible after the tyre is mounted and inflated.

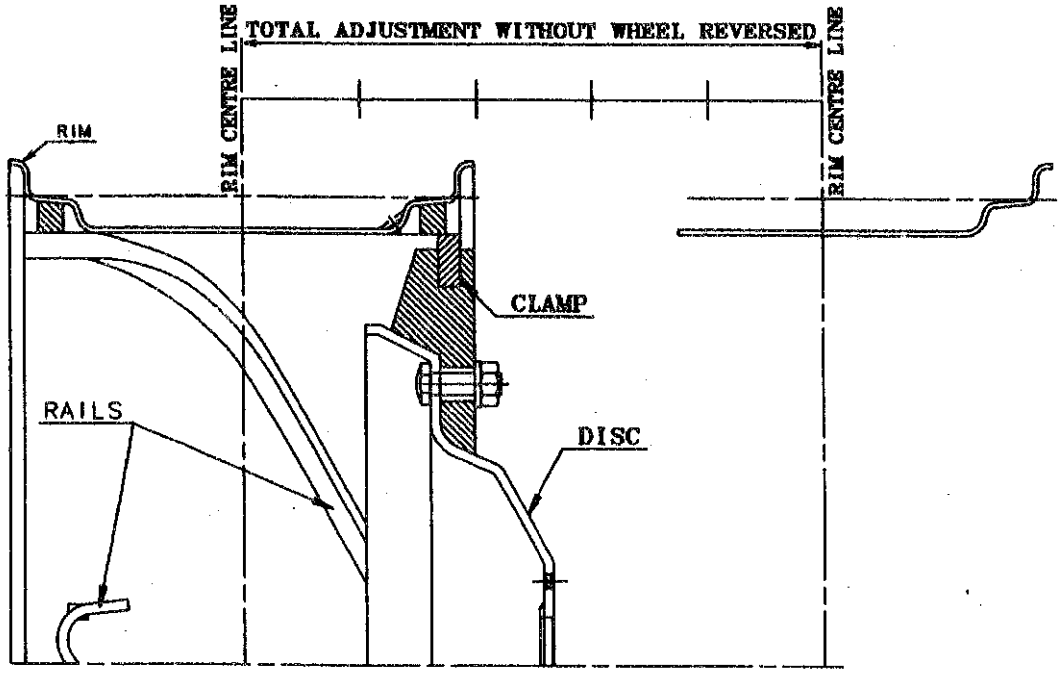
4.1 Marking of Rims

Rims delivered without disc and being in compliance with the relevant Indian Standard shall be durably and legibly marked with the following:

a) Size designation;



a) MANUALLY ADJUSTABLE



b) POWER ADJUSTABLE

FIG. 5 ADJUSTABLE WHEEL NOMENCLATURE

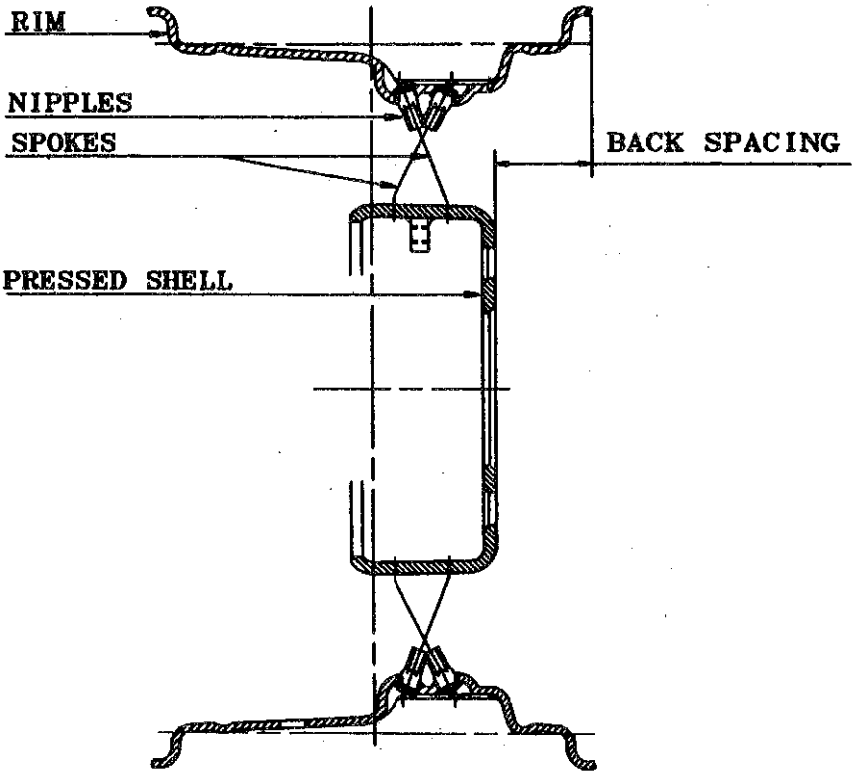


FIG. 6 SPOKE WHEEL NOMENCLATURE

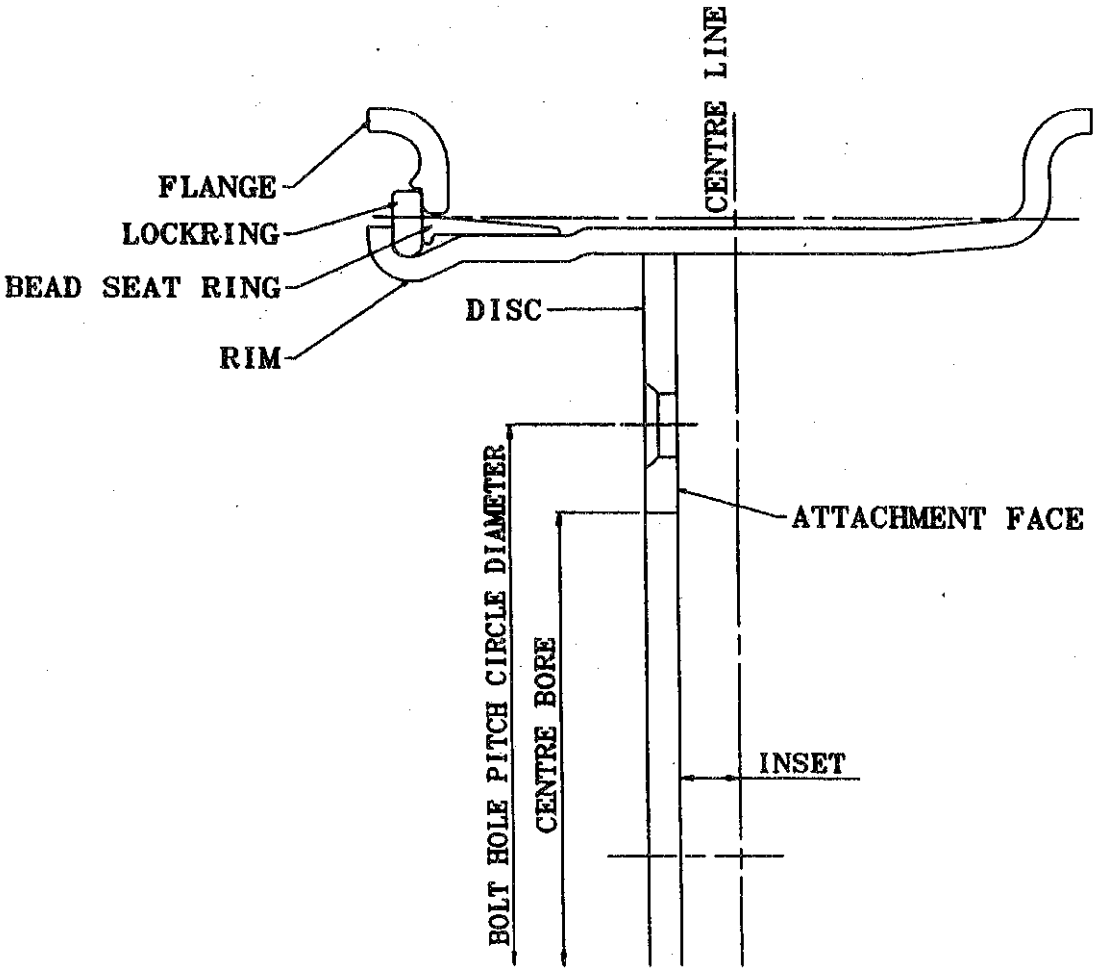
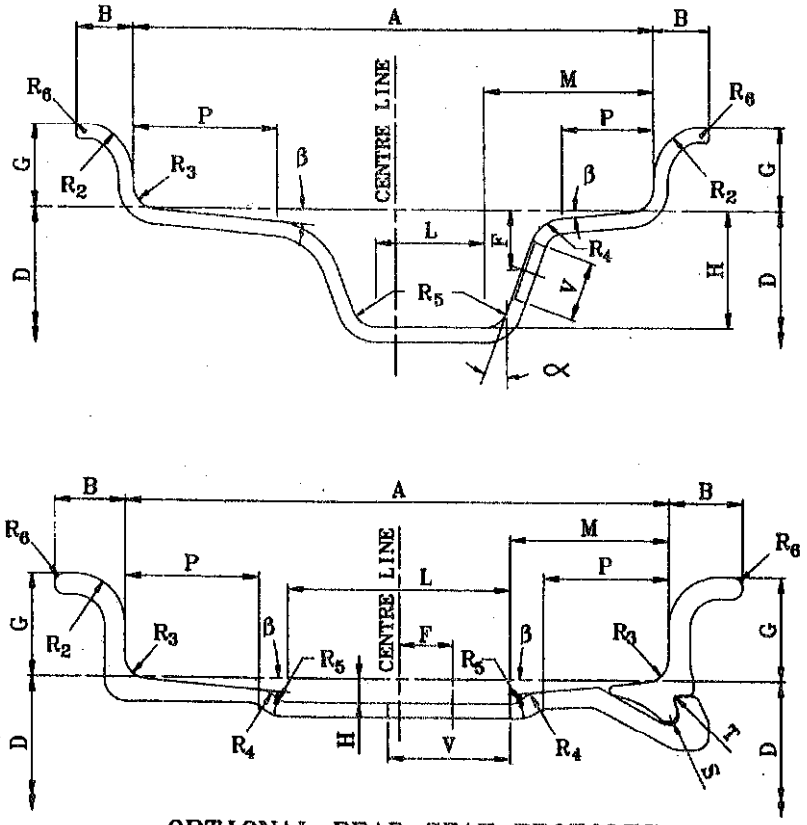
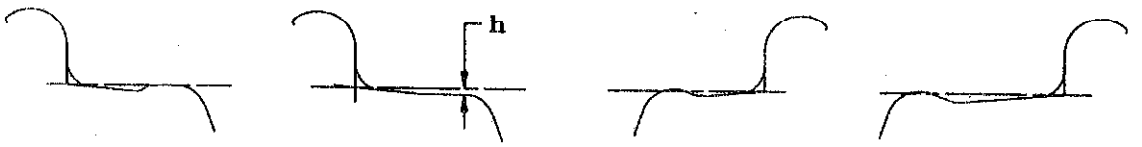


FIG. 7 FORKLIFT WHEEL NOMENCLATURE



OPTIONAL BEAD SEAT PROFILES



FLAT HUMP (FH) SPECIAL HUMP (SL) ROUND HUMP (RH) CONTRE PENTE (CP)

OPTIONAL BEAD SEAT PROFILES

Flat Hump (FH)	Special Ledge (SL)	Round Hump (RH)	Contre Pente (CP)
D	Specified rim diameter	α	Well angle
A	Specified rim width	H	Well depth
G	Flange height	L	Well width
B	Flange width	M	Well position
R_2	Flange radius	R_5	Well bottom radius
R_6	Flange edge radius	V	Valve hole
P	Bead seat width	F	Valve hole location
R_3	Bead seat radius	S	Gutter groove
β	Bead seat angle	T	Gutter tip
R_4	Well top radius	h	Ledge dimension

NOTE — Options may be permitted for bead seat contour as agreed between the rim and vehicle manufacturers in which case the rim shall bear identification for the safety hump as below:

Hump Type	*Bead Seat Contour*		*Marking (on Rim)*
	Outboard	Inboard	
Hump	Hump	Normal	H
Double hump	Hump	Hump	H2
Flat hump	Flat hump	Normal	FH
Combination hump	Flat hump	Hump	CH

FIG. 8 RIM TYRE SIDE PROFILE NOMENCLATURE AND OPTIONAL BEAD SEAT PROFILE

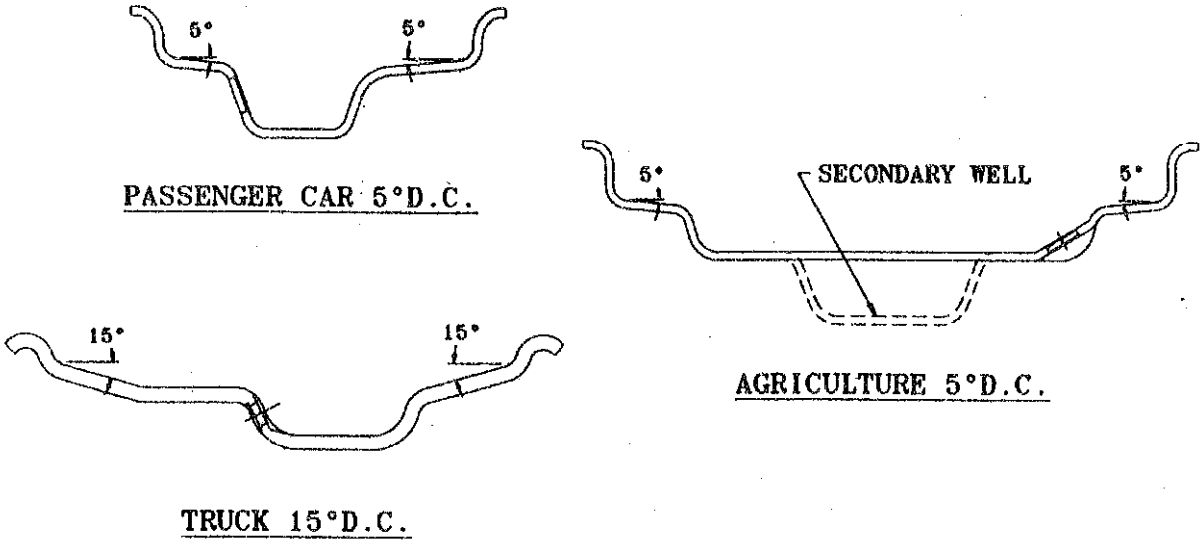


FIG. 9 ONE-PIECE (DROP-CENTER) RIM NOMENCLATURE

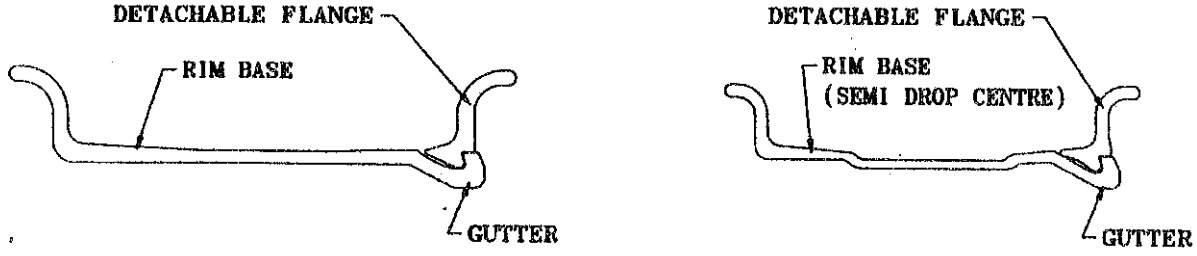


FIG. 10 TWO-PIECE RIM NOMENCLATURE

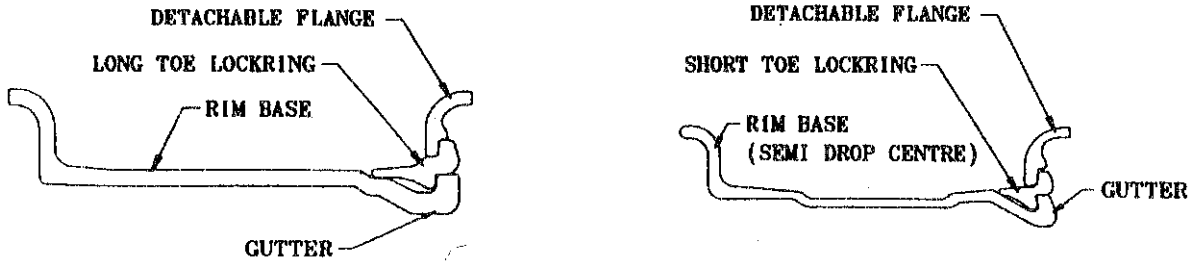


FIG. 11 THREE-PIECE RIM NOMENCLATURE

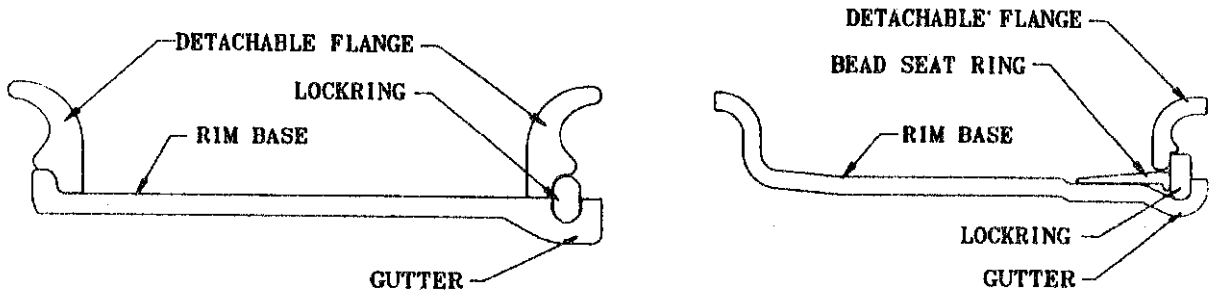


FIG. 12 FOUR-PIECE RIM NOMENCLATURE

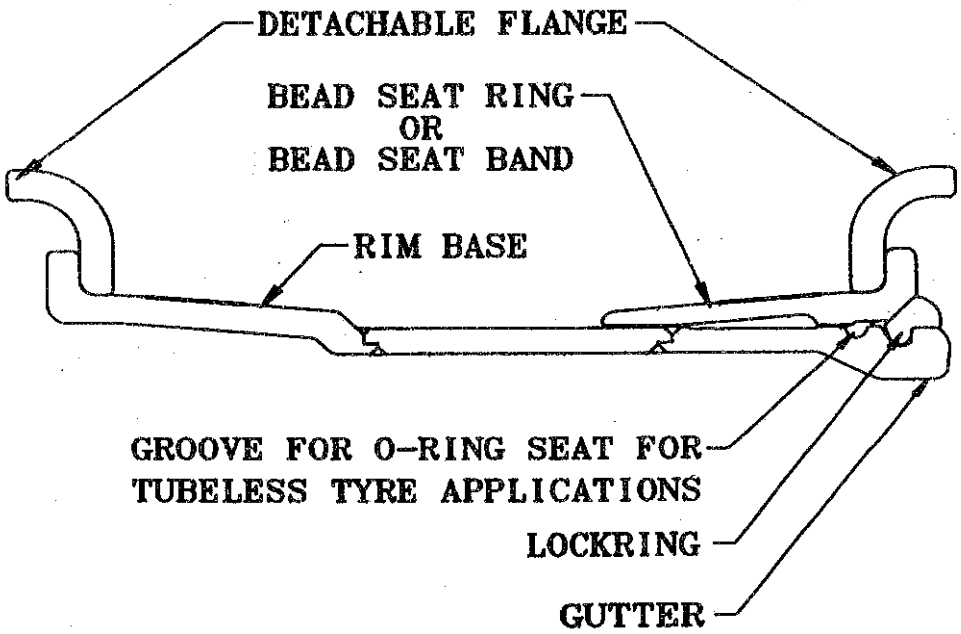


FIG. 13 FIVE-PIECE RIM NOMENCLATURE

b) Indication of the source of manufacture; and

c) Rim bead seat contour type, if applicable.

4.1.1 The letters shall not be smaller than 3 mm and impressed to a depth or embossed to a height of not less than 0.13 mm.

4.1.2 The rims shall be marked on the outer side as shown in Fig. 15 and Fig. 16 so that the marking is visible after the tyre is mounted and inflated.

In the case of lack of space on the outside, the rim may be marked inside (*see* Fig. 17).

4.2 Marking of Disc Wheels

Disc wheels being in compliance with the relevant Indian Standard shall be durably and legibly marked with the following:

a) Size designation;

b) Indication of the source of manufacture;

c) Date of manufacturing: year and month or year and quarter of the year (for example 8403 indicates March 1984; 84 III indicates third quarter of 1984); and

d) Half dual spacing or inset may also be marked.

4.2.1 The marking shall be recessed and without sharp edges and letters shall not be smaller than 3 mm and impressed to a depth or embossed to a height not less than 0.13 mm.

ONE PIECE RIM (SHALLOW WELL) – USED WITH SPOKES
CYLINDRICAL BEAD SEAT RIM

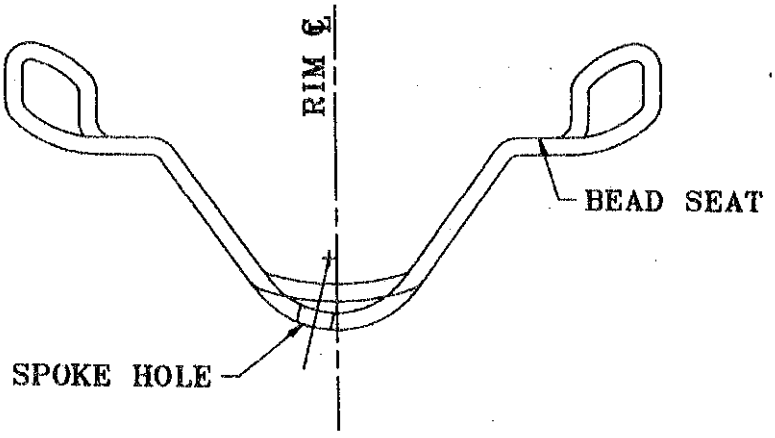


FIG. 14 CYLINDRICAL BEAD SEAT RIM FOR MOTOR CYCLES

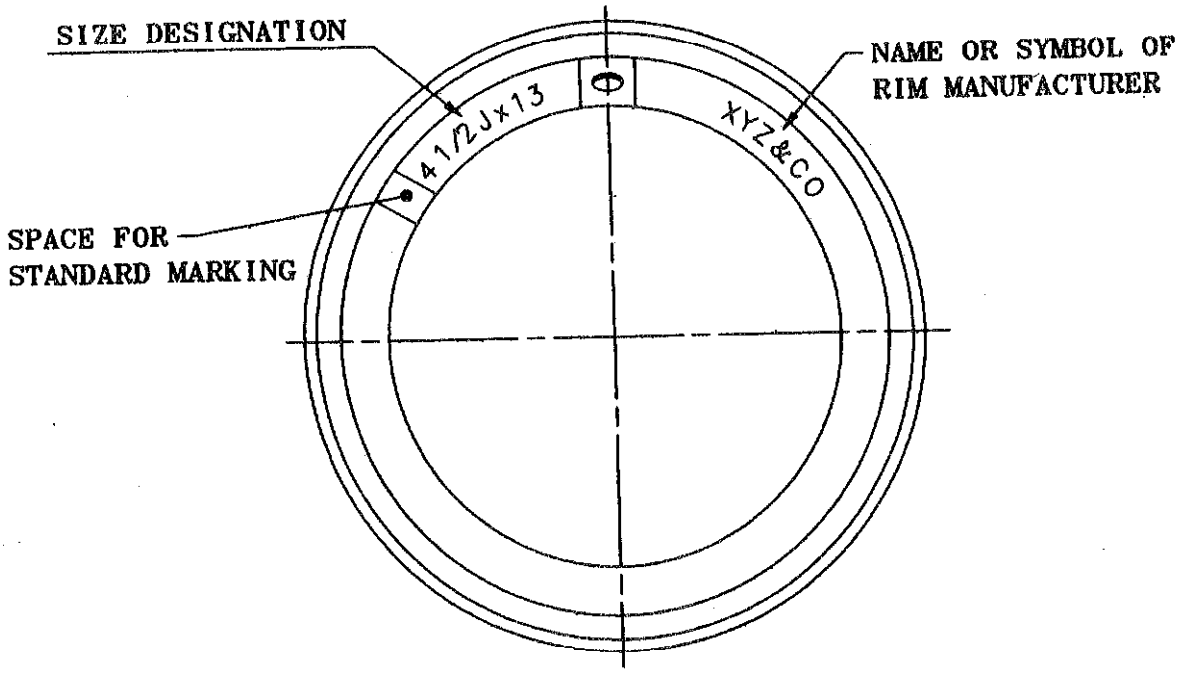


FIG. 15 EXAMPLE OF OUTER SIDE RIM MARKING

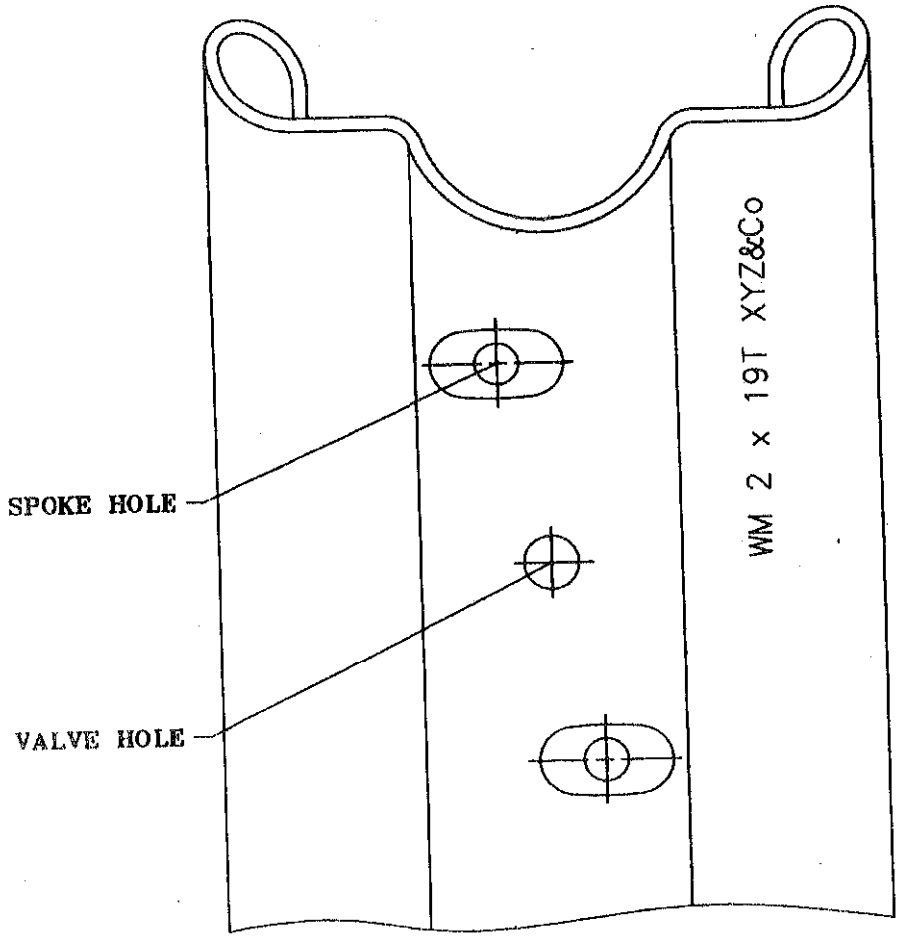


FIG. 16 EXAMPLE OF OUTSIDE RIM MARKING OF SPOKED RIMS

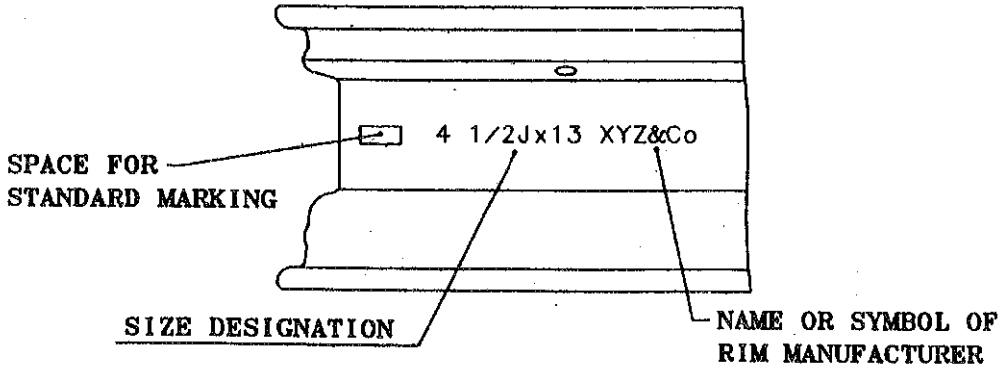


FIG. 17 EXAMPLE OF INSIDE RIM MARKING

4.2.2 The disc wheels shall be marked on the outer side. An example of marking is shown in Fig. 18.

5 METHODS OF RIM MEASUREMENT

Rims with a taper bead seat are measured by ball spring steel tape as located in position in Fig. 19.

5.1 For ball diameter of tape refer to the relevant Indian Standard on rim dimensions. The method is applicable to all 5° or 10.5° mean taper bead seat rim contours.

5.2 Measurement for Motorcycle/Moped Rims

The measurement of the cylindrical bead seat rim circumference shall be made on rims ready for mounting with a tape gauge whose length is related to mandrel diameter, specific for a specified rim diameter (*see* Fig. 20).

The tape shall be marked with details of rim width code and nominal rim diameter.

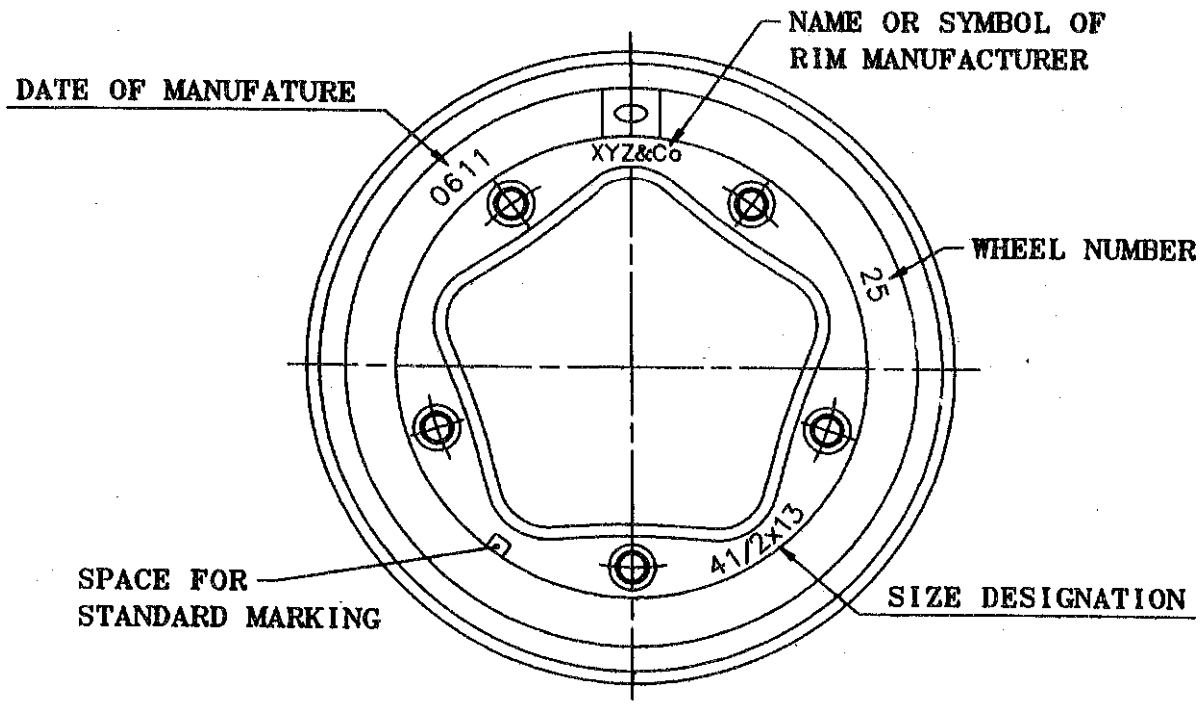
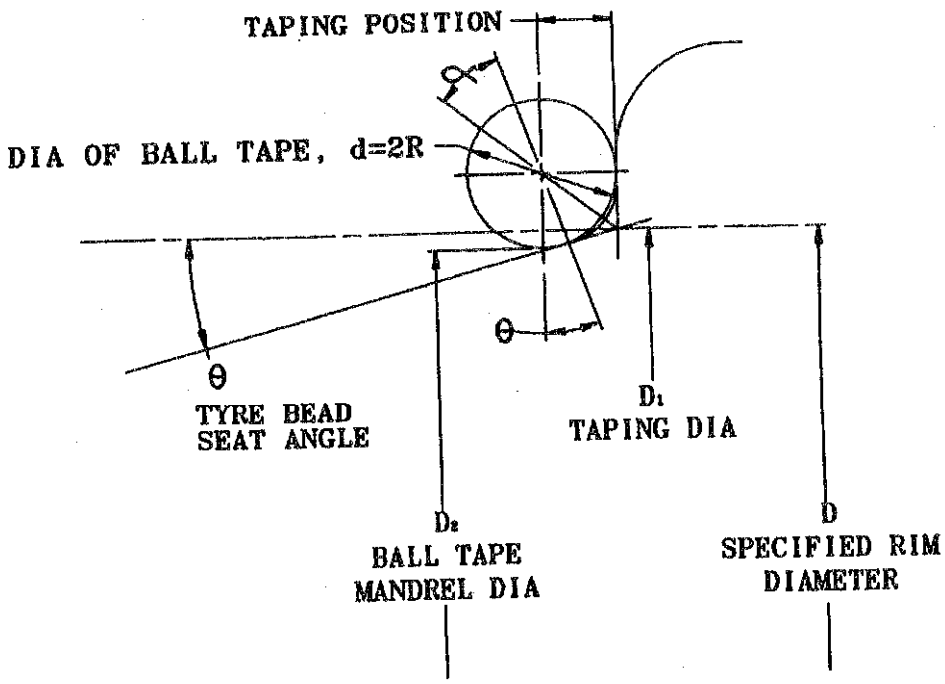


FIG. 18 EXAMPLE OF OUTER RIM MARKING



$$D_2 = D + 2\,(L - R)$$

$$L = R \tan \alpha$$

$$\alpha = \frac{90° - \theta}{2}$$

$$D_2 = D - d\left[1 - \tan \frac{(90° - \theta)}{2}\right]$$

For 5° Taper bead seat rim

$$D_2 = D - 0.836\ 7\ d$$

For 10° – 30° Taper bead seat rim

$$D_2 = D - 0.168\ 31\ d$$

FIG. 19 METHOD OF USING TAPE

5.2.1 *Accuracy of Measurement*

For accurate measurement the individual circumference on each bead seat shall be measured and corrected to 20°C and checked against the data given in the relevant part of this Indian Standard. (In this case the tape width '*W*' is free.)

5.3 Diameter and circumference and mandrel dimensions shall be as per Fig. 22, Fig. 23 and Fig. 24 and Tables 1 to 4.

6 UNIT

The dimensional data for rims shall be expressed in millimeters, and angular measurement in degrees. Load-carrying capacity shall be expressed in kilograms (kg). Tyre inflation pressure shall be expressed in kilopascals (kPa) [1kPa = 10^3 N/m^2 = 0.01 kgf/cm^2 (within 2 percent error)].

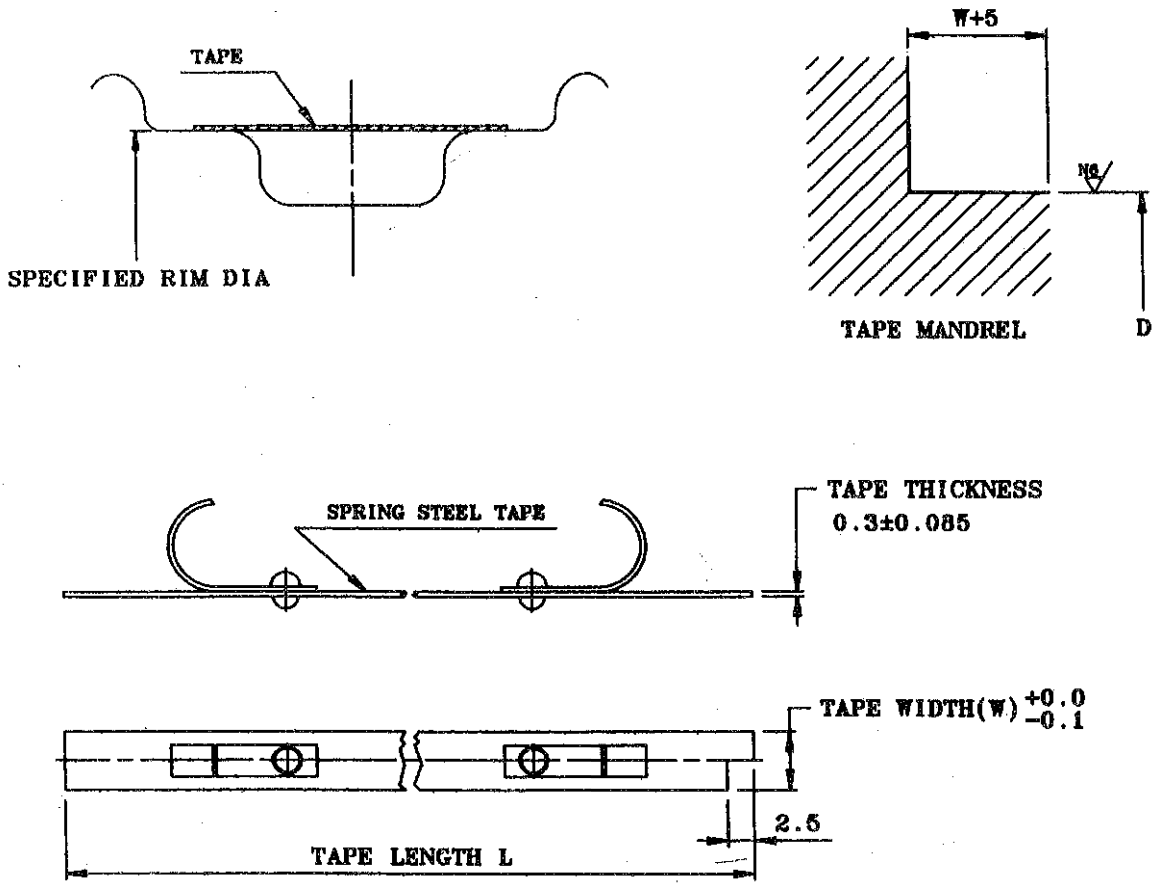
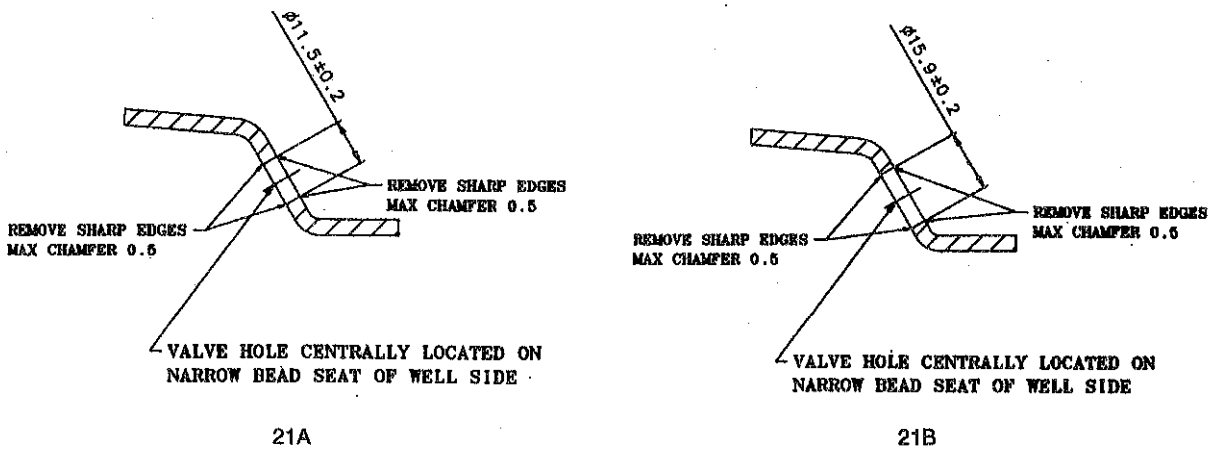


FIG. 20 MEASUREMENT OF CYLINDRICAL BEAD SEAT RIM



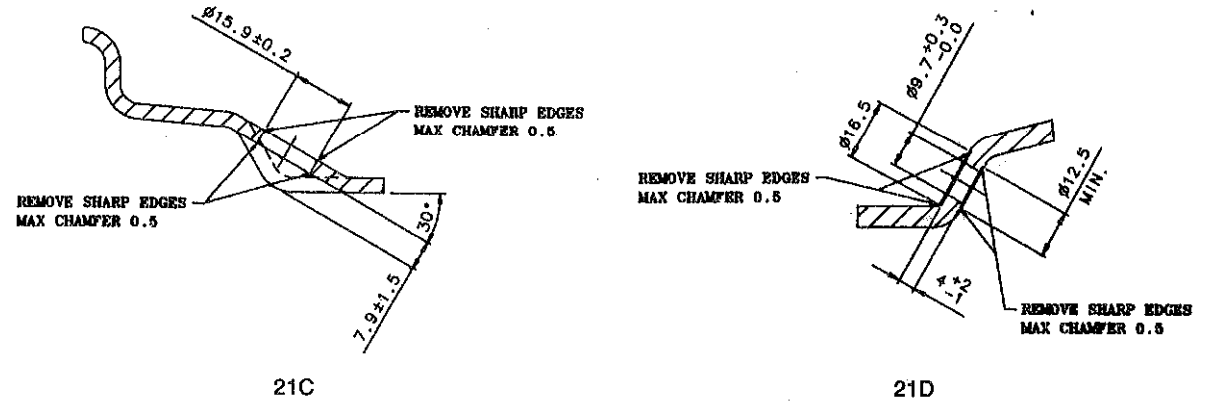
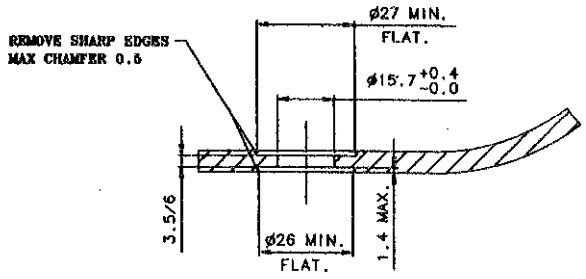
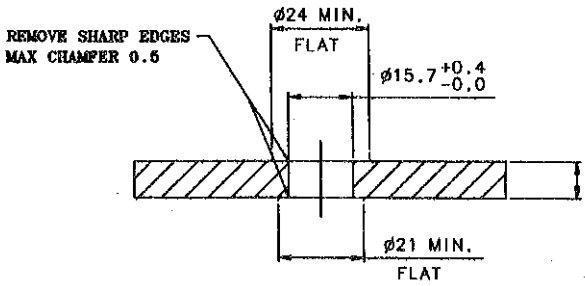


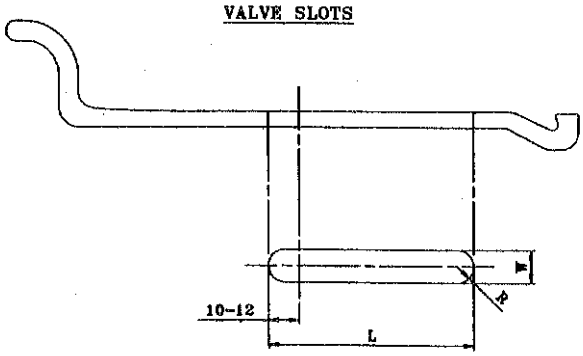
FIG. 21 VALVE HOLE APERTURE — *Continued*



21E



21F

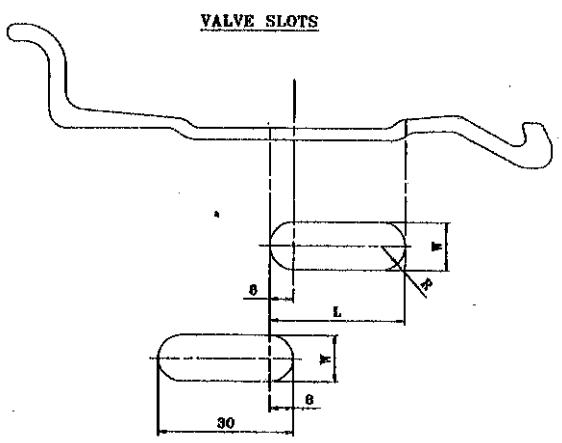


All dimensions in millimetres.

VALVE SLOT DETAILS

Nominal Size Designation	*L*	*W*	*R*
B6.0	54	16	8
B6.5	63.5	16	8
B7.0	73	16	8
	96	16	8
B7.5	73	16	8
	96	16	8
B8.0	73	16	8
	96	16	8
B8.5	73	16	8
7.00T	75	15	7.5
	96	15	7.5
7.50V	105	15	7.5
8.50V5°	100	16	8
10.00V5°	120	16	8
10.00W	150	16	8

21G



All dimensions in millimetres.

Nominal Size Designation	*L*	*W*	*R*
5.50 F x 16	45	16 (+0,-2)	8
	35	16 (+0,-2)	8
6.00 G x 16	45	16 (+0,-2)	8
6.00 G x 16	30	16 (+0,-2)	8
6.00 G x 16	28.6	12.8	8
6.00 G x 16	30.0	12	6

21H

FIG. 21 VALVE HOLE APERTURE

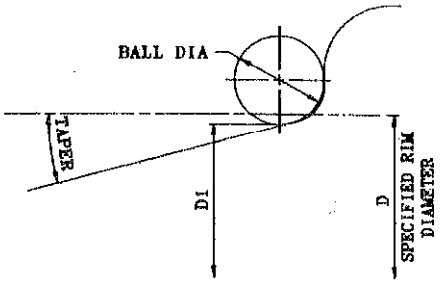


FIG. 22 MANDREL DIMENSIONS

MANDREL DIMENSIONS

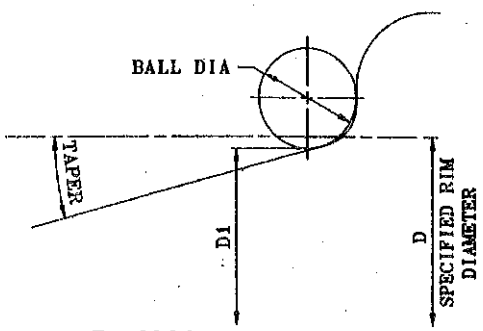


FIG. 23 MANDREL DIMENSIONS

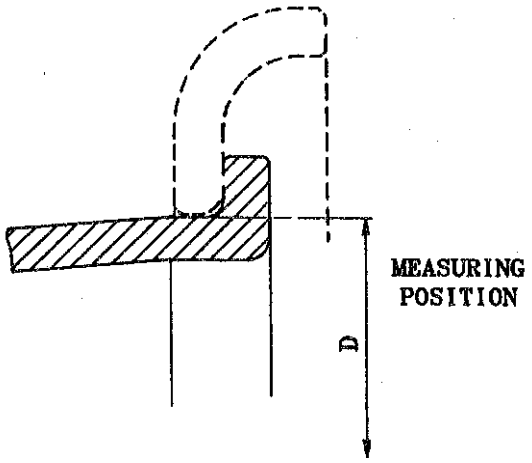


FIG. 24 DIMENSIONS FOR MEASUREMENT OF RIMS WITH TWO MOUNTABLE FLANGES

Table 1 Dimensions for Measurement of Tapered Bead Seat Rims

(*Clause* 5.3)

Nominal Diameter	Dimensions		
	Specified Diameter D, mm	Nominal Mandrel Diameter D_1, mm	Nominal Mandrel Circumference, mm
3° Taper		Ball dia 20	
24[1]	616.0	614.93	1 931.9[1]
5° Taper		Ball dia 8	
4	100.8	100.14	314.6
6	151.6	150.94	474.2
8	202.4	201.74	633.8
9	227.8	227.14	713.6
10	253.2	252.54	793.4
12	304.0	303.34	953.0
13	329.4	328.73	1 032.7
13M/C[2]	332.2	331.53	1 041.5[2]
14M/C[2]	357.6	356.93	1 121.3[2]
15M/C[2]	383.0	382.33	1 201.1[2]
16M/C[3]	406.0	405.33	1 273.4[3]
17M/C[2]	433.8	433.13	1 360.7[2]
18M/C[2]	459.2	458.53	1 440.5[2]
19M/C[2]	484.6	483.93	1 520.3[2]
19	487.4	486.69	1 529.0
21M/C[2]	535.4	534.73	1 679.9[2]
30	766.8	766.09	2 406.7
36	919.2	918.49	2 885.5
38	970.0	969.29	3 045.1

[1] Only for EM 11.25/2.375 with tolerance on circumference +1.2, -2.4 mm.
[2] Only for Motorcycle MT type rims with tolerance on circumference +1.5, -0.5 mm.
[3] Only for Motorcycle MT type rims with tolerance on circumference ±1.0 mm.

Table 2 Dimensions for Measurement of Tapered Bead Seat Rims

(*Clause* 5.3)

Nominal Diameter	Dimensions		
	Specified Diameter D, mm	Nominal Mandrel Diameter, D_1 mm	Nominal Mandrel Circumference, mm
5° Taper		Ball dia 10	
8	202.4	201.57	633.2
9	227.8	226.97	713
10	253.2	252.37	792.8
12	304.0	303.17	952.4
13	329.4	328.57	1 032.2
14	354.8	353.97	1 112
15	380.2	379.37	1 191.8
16	405.6	404.77	1 271.6
5° Taper		Ball dia 16	
8	202.4	201.7	631.7
9	227.8	226.47	711.5
10	253.2	251.87	791.3
12	304.0	302.67	950.9
13	329.4	328.07	1030.7
14	354.8	353.47	1 110.5
15	380.2	378.87	1 190.2
15[1]	387.4	386.01	1 212.7
15.3	388.3	386.98	1 215.7
16	405.6	404.27	1 270
17	436.6	435.22	1 367.3
18	462	460.62	1 447.1
19	487.4	486.02	1 526.9
20[1]	512.8	511.42	1 606.7
20[1]	514.4	513.01	1 611.7
21	538.2	536.82	1 686.5
22	563.6	562.22	1 766.3
24	614.4	613.02	1 925.9
24[1]	616	614.61	1 930.9
26	665.2	663.82	2 085.5
28	716	714.62	2 245.1
30	766.8	765.42	2 404.6
32	817.6	816.22	2 564.2
34	868.4	867.02	2 723.8
36	919.2	917.82	2 883.4
38	970	968.62	3 043
40	1 020.8	1 019.42	3 202.6
42	1 071.6	1 070.22	3 362.2
44	1 122.4	1 121.02	3 521.8
46	1 173.2	1 171.82	3 681.4
48	1 224	1 222.62	3 841
50	1 274.8	1 273.42	4 000.6
52	1 325.6	1 324.22	4 160.2
54	1 376.4	1 375.02	4 319.8
5° Taper		Ball dia 20	
25	635	633.33	1 989.7[2]

[1] Only for CV rims.

[2] Tolerance on circumference ± 2.4 mm.

Table 3 Dimensions for Measurement of 15° Drop-Centre Rims
(*Clause* 5.3)

Nominal Diameter	Dimensions		
	Specified Diameter D, mm	Nominal Mandrel Diameter D_1 mm	Nominal Mandrel Circumference, mm
15° Taper		Ball dia 16	
15.5	393.7	390.52	1 226.9
17.5	444.5	441.32	1 386.5
19.5	495.3	492.12	1 546
20.5	520.7	517.52	1 625.8
22.5	571.5	568.32	1 785.4
24.5	622.3	619.12	1 945
26.5	673.1	669.92	2 104.6
30.5	774.7	771.52	2 433.8

Table 4 Dimensions for Measurement of Rims with Two Demountable Flanges
(*Clause* 5.3)

Nominal Diameter	Dimensions		
	Specified Diameter D_1 mm	Circumference	
		Minimum π $(D - 0.8)$ mm	Maximum π $(D + 0.4$ mm)
25	635	1 992.4	1 996.2
29	736.6	2 311.6	2 315.4
33	838.2	2 630.8	2 634.5
35	889	2 790.4	2 794.1
39	990.6	3 109.5	3 113.3
43	1 092.2	3 428.7	3 432.5
45	1 143	3 588.3	3 592.1
49[1)]	1 244.6	3 907.5	3 912.5
51	1 295.4	4 067.1	4 072.1
57	1 447.8	4 545.9	4 550.9

[1)] Maximum circ D $(d + 0.8)$ for rims of diameter code 49 and over.

MGIPF—176 Deptt. of BIS/2009—19.8.2009—300 Books.

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This Indian Standard has been developed from Doc No. : TED 7 (550).

Amendments Issued Since Publication

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Printed by the Manager, Govt. of India Press, Faridabad