



**INDIAN
TYRE
TECHNICAL
ADVISORY
COMMITTEE**

STANDARDS MANUAL

2018

Indian Tyre Technical Advisory Committee

Automotive Tyre Manufacturers' Association

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INDIAN TYRE TECHNICAL ADVISORY COMMITTEE

STANDARDS MANUAL

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In 1966 the Executive Committee of the Automotive Tyre Industry in India (now called Automotive Tyre Manufacturers' Association - ATMA) recommended the formation of a committee consisting of the Technical representatives of the member firms who could meet to agree on common nomenclatures, basic dimensions and their tolerances for tyres and related products and the applicable load/inflation pressure characteristics. The purpose was to ensure that these items would be dimensionally interchangeable, irrespective of 'make' or 'brand'. This Technical Committee is known today as the Indian Tyre Technical Advisory Committee (ITTAC).

The Committee was authorised to seek, wherever desirable, the co-operation of any organisation whose objects are similar or complementary, for example, the Rim-Wheel or the Tube and Valve manufacturers, other Standards bodies etc. to promote a free exchange of Technical data pertaining to tyres, rims, tubes and valves with the ultimate objective of adequate product performance, simplification of range and standardisation.

Membership to the Indian Tyre Technical Advisory Committee is open to Companies having manufacturing facility in India (subject to approval by the ITTAC Committee). It has registered itself under the Societies Act bringing it in line with similar autonomous bodies worldwide. This action will help in closer interaction with Companies of international repute, upgrading and keeping abreast with the latest and most advanced technological developments in automotive tyres, tubes, valves and rims.

ITTAC has been serving as the Nodal Agency on all technical issues related to tyres, tubes, valves and rims and has been representing the Industry in deliberations relating to International Tyre Standards and Global Technical Regulations on Tyres under the internationally constituted Working Group of WP.29.

ITTAC is a corresponding member of the European Tyre and Rim Technical Organisation and is in liaison with other international organisations like the Tire and Rim Association Inc. and the Japan Automobile Tire Manufacturers Association Inc.

All the relevant information on tyres, rims and valves which are published in the ITTAC Standards Manual shall be considered as advisory only. Their use by anyone engaged in the Industry or Trade is entirely voluntary and the Committee disclaims responsibility for any infringement which may arise from the manufacture or use of any article described in the Committee's documents. Prospective users of the Standards Manual are responsible for protecting themselves against liability for infringement of patents.

The Committee is a non-profit making body. All expenses and charges for ITTAC publications are shared by the member firms.

The Committee is a Registered Society under the Societies Registration Act. XXI of 1860 and registered at Delhi.

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ABBREVIATIONS

The following is a key to the abbreviations referred to in the Manual.

Alt.	- Alternate
Agr.	- Agricultural
C/L	- Centre Line
CC	- Cross Country
Circum.	- Circumference
cm	- Centimetre
Cyl.	- Cylindrical
CV	- Commercial Vehicle
DBV	- Double Bend Valve
DC	- Drop Centre Rim
Dia.	- Diameter
Dimn.	- Dimension
Div.	- Divided Rim
DW	- Deep Well
ETRTO	- European Tyre & Rim Technical Organisation
FB	- Flat Base Rim
FH	- Flat Hump
GVW	- Gross Vehicle Weight
IS	- Indian Standard
ISO	- International Organization of Standardisation
kg	- Kilogram
kPa	- Kilo Pascal
km	- Kilometre
km/h	- Kilometre per hour
LT	- Light Truck
LI	- Load Index
Mtr.	- Metre
mm	- Millimetre
MS	- Mud and Snow
Max.	- Maximum
Min.	- Minimum
NA	- Not Applicable
NHS	- Not for Highway Service
OD	- Overall Diameter
OW	- Overall Width
OTR	- Off-The-Road
Perm.	- Permissible
Prem.	- Premium Depth
PR	- Ply Rating
psi-lbs/sq.-in	- Pounds per Square Inch.
RC	- Rolling Circumference
RDS	- Recommended Dual Spacing
Rec.	- Recommended
Ref.	- Reference
Reinf.	- Reinforced Type
SLR	- Static Loaded Radius
SW	- Section Width
Std.	- Standard Depth
SDC	- Semi Drop Centre
SB	- Single Bend
SI	- Standard International
Trac.	- Traction
TB	- Truck Bus
Tol.	- Tolerance
TLCC	- Tyre Load Carrying Capacity
TR/TRA	- Tyre and Rim Association
ULT	- Ultra Light Truck

INDEMNIFICATION

The recommendations contained in this publication are purely advisory in nature, with no obligation on the users to its adherence.

Though every effort has been made to ensure inbuilt safety in the products as well as protection to its users, the Indian Tyre Technical Advisory Committee shall not be held responsible for an accident or any safety risk that may arise in the implementation of these recommendations.

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UNITS OF MEASUREMENTS

Measurement of:	SI	Other Units	
Distance	(kilometre)	1 mile	= 1.609 km.
Dimensions	(millimetre)	1 inch	= 25.4 mm or 2.54 cm
Mass or Load	(kilogramme)	1 pound (lb)	= 0.4536 kg
Pressure	(kilo-Pascal)	1 psi	= 6.895 kPa.
		1 kg/sq.cm	= 98.066 kPa
		1 bar	= 100 kPa
Speed	(kilometre per hour)	1 mile/hr.	= 1.609 km/hr.
Energy	For converting Inch Pound to Joules, multiply by 0.1130		
	For converting Joules to kgfcm, divide by 0.09806		
Pressure	For converting Mega pascal (MPa) to PSI , multiply by 145		

PRESSURE UNIT: CONVERSION TABLE

kPa	psi	kPa	psi	kPa	psi	kPa	psi	kPa	psi	kPa	psi
6.895	1	75.845	11	44.795	21	213.745	31	282.695	41	689.500	100
13.790	2	82.740	12	151.690	22	220.640	32	289.590	42	723.975	105
20.685	3	89.635	13	158.585	23	227.535	33	296.485	43	758.450	110
27.580	4	96.530	14	165.480	24	234.430	34	303.380	44	792.925	115
34.475	5	103.425	15	172.375	25	241.325	35	310.275	45	827.400	120
41.370	6	110.320	16	179.270	26	248.220	36	344.750	50	861.875	125
48.265	7	117.215	17	186.165	27	255.115	37	413.700	60	896.350	130
55.160	8	124.110	18	193.060	28	262.010	38	482.650	70	930.825	135
62.055	9	131.005	19	199.955	29	268.905	39	551.600	80	965.300	140
68.950	10	137.900	20	206.850	30	275.800	40	620.550	90	999.775	145

ITTAC STANDARDS MANUAL

DEFINITIONS:

Tyre - An annular toroidal shaped inflatable envelope made of an elastic material, natural or synthetic rubber or a blend thereof, reinforced with textile cord ply fabric carcass (or steel for some ranges of radial ply tyre), enclosing bead rings. In a Diagonal ply (also called Bias Ply) tyre, the carcass ply cords extend to the beads diagonally to form a structure; in a Radial Ply tyre, the ply cords are laid substantially at 90° to the centre line of the tread, the carcass being stabilized by an essentially inextensible circumferential belt.

Bead - The part of the tyre, which is so shaped as to fit the rim and hold the tyre on to it. It has cores made of several strands of essentially inextensible steel wire with the end of the plies wrapped around the cores for anchorage.

Sidewall - The part of the tyre between the bead and the tread, which flexes in service.

Tread - This is the part of the tyre which comes in contact with the ground and through which the driving, braking and cornering forces are transmitted. It is made of a special rubber compound to give good wearing properties and in conjunction with the tread pattern to transmit these forces.

Ply - A layer of rubber coated fabric cords.

Carcass - The rubber-bonded cord structure of a tyre integral with the bead which provides the requisite strength to carry the load.

Breaker (Diagonal) - Intermediate rubberised fabric layers/plies between the carcass and the tread which helps bonding as well as protects the casing from road shocks.

Belt (Radial) - Layers of rubberised material underneath the tread with cords laid substantially in the direction of the tread centre-line that restricts the carcass in the circumferential direction and stiffens the tread area.

Tyre Size Designation - A tyre is generally identified by its nominal cross section code followed by the nominal rim diameter code, for example 5.20-13 where 5.20 is the nominal tyre width code and 13 is nominal rim diameter code in inches. For radial ply tyre, a letter R (to stand for radial ply construction) is used in place of “—” or “D” in the diagonal ply tyre designation. Tyres of millimetric range bear nominal cross section marking in mm as 145 R 14 with nominal rim diameter code “14”.

Ply Rating - The term Ply Rating is used to identify a given 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.

Design Dimensions - Basic dimensions of the new tyre, to be used for tyre design purposes.

New Tyre - A tyre, which has neither been used nor subjected to a retreading operation.

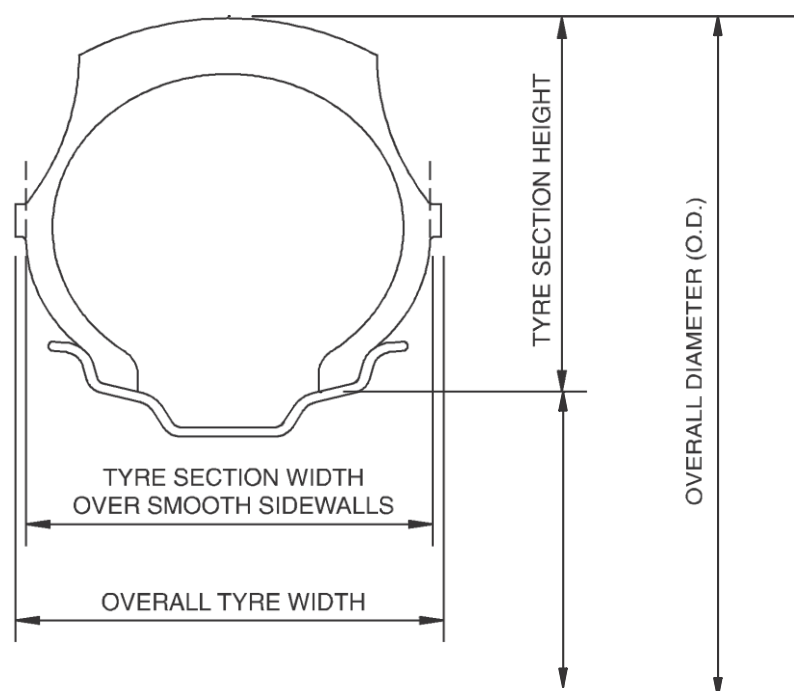
Tyre in Service (Grown Tyre) - A tyre, which has undergone expansion or growth, due to use in service. For deciding clearances for a vehicle design, the maximum dimensions for Tyre in Service, as tabulated in the Data Sheets, should be used.

Temporary Spare Tyre – These are special types of spare tyres. They differ from normal tyres fitted to a vehicle with regards to their principal characteristics like tyre marking, dimensions and conditions of use etc. They are intended for temporary use under restricted conditions. The 88% for vehicle normal load does not apply. For T-Type Tyres the inflation pressure in service is 420 kPa. Only one of these tyres is permitted in use on a vehicle, at any time.

Mud & Snow (M+S) Tyre - Tyre whose tread pattern and whose structure are primarily designed to ensure, in mud and fresh or melting snow, a performance better than of an ordinary (road-type) tyre. The tread pattern of a snow tyre generally consists of groove (rib) and/or solid block elements more widely spaced than on an ordinary (road type) tyre. Tyre can also be marked as MS, M&S, M.S and M-S.

Tyre Section Width - This is the average of at least six measurements, at approximately equidistant positions, over smooth sidewalls of the tyre body (NOT over elevations such as engravings, protective ribs, etc.) when kept inflated for 24 hours minimum but not loaded, on the measuring rim at the maximum specified pressure for duals if listed (See applicable Table) and prevailing atmospheric temperature and then adjusted to the original pressure before taking measurements (See sketch below).

Tyre Overall Width - This is the width of a tyre, as measured over sidewalls to the procedure mentioned above and includes elevations, such as engraved markings, protective ribs, etc. (See sketch below).



Tyre Overall Diameter - This is the diameter of an inflated tyre at the outermost surface of the tread, or twice the inflated Section Height of a tyre, plus the nominal Rim Diameter.

Nominal Aspect Ratio - One hundred times the ratio of the Design Section Height to the Nominal Section Width.

Inflation Pressure - Those given in the Data Tables are the basic minimum, and (called “cold” to stress the importance of tyre temperature at the time of checking) apply to pressures taken when the tyres have cooled down to ambient temperature and there is no pressure build-up due to running the tyre.

Load - in this Manual means mass and the unit is kilogram (kg).

Maximum Load/Inflation Pressure - The last value shown in a Data Table indicates the recommended maximum load, which the tyre of the applicable ply rating can carry when, operated at the corresponding maximum cold inflation pressure.

Minimum Inflation Pressure - The minimum acceptable inflation pressure must not be lower than the lowest inflation pressure corresponding to the lowest load in the stepped Load/Inflation Pressure table, regardless of any lower applied load.

Maximum Speed - This is the peak velocity attainable by a vehicle.

Recommended Dual Spacing (RDS) - The Overall Widths of the deflected new and (grown) tyre in service must not exceed the recommended dual spacing figure, which allows for deflection bulge under the specified loading and corresponding tyre inflation, and growth on inflation or in service, variations when run over road irregularities, protective side ribs and sidewall markings.

Tubeless Valves - Tubeless valves for Scooter, Motorcycle, Passenger Car, Truck and Bus tyres have been included in this edition of the Standards Manual. Suitability of these valves should be ascertained from the rim manufacturer. Wheel disc embellishments are also to be considered when selecting the valve. A large variety of tubeless Off-The-Road valves are available but the more common types are included in this manual.

Rim - The ‘Recommended’ size is preferred over any other, for obtaining optimum tyre and bead performance. Where the strength wise suitability of a rim-wheel is also involved, consult rim/wheel manufacturer to ascertain if the rim and wheel disc are of sufficient strength for the intended service (See RIM section). Rims of a “Approved” status are not recommended for vehicles of future new designs. Where used for existing designs, the tyre and wheel manufacturers should approve the suitability of the tyre/wheel assembly for the intended service.

Tyre Selection - Refer to individual section.

TYRE MARKINGS

- i. **Size Designation** - The size markings for the identification of tyres consists of nominal tyre width code and the nominal rim diameter code.
Example: 10.00-20 where 10.00 represents nominal tyre width code and 20 represents the nominal rim diameter code.
- ii. **Type of Construction:** For tyres of radial construction, the letter “R” replaces the dash.
Example: 10.00R20.
The word “Tubeless” wherever applicable.
- iii. **Ply Rating.**
- iv. **Maximum permissible load and inflation pressure for Single and Dual fitments/Load Index Manufacturers’ Serial Number, Brand Name, Country of manufacture**
- v. **Carcass Ply Materials:** “Nylon” or “Polyester” or “Steel” etc.
Marking of Belt material is optional, but Steel belts are usually indicated and desirable.
- vi. **Tread Wear Indicators (TWI):** As applicable to various tyre categories.
- vii. **Direction of Rotation:** An arrow marking on the sidewall of the tyre, to indicate the direction in which the tyre should rotate in service in the case of directional type tyres.
- viii. **Nominal Aspect Ratio wherever applicable.**
- ix. **Tyre Category wherever applicable Example: LT/C**
- x. **Speed Symbol wherever applicable.**

TYRE DESIGNATION

TRUCK

CODE DESIGNATED (DIAGONAL)	10.00 Nominal Section Width Code	– Construction Code “.” Diagonal	20 Nominal Rim Dia. Code	14PR Ply Rating	
CODE DESIGNATED (RADIAL)	11.00 Nominal Section Width Code	R Construction Code “R” Radial	20 Nominal Rim Dia. Code	16PR Ply Rating	
METRIC DESIGNATED (RADIAL)	295 Nominal Section Width Code	R Construction Code “R” Radial	22.5 Nominal Rim Dia. Code	152/148 Load Index Single/Dual	J Speed Symbol

LIGHT TRUCK

CODE DESIGNATED (DIAGONAL)	7.50 Nominal Section Width Code	– Construction Code “.” Diagonal	16 Nominal Rim Dia. Code	14PR Ply Rating	LT/C Tyre Category		
METRIC DESIGNATED (RADIAL)	225 Nominal Section Width Code	/ 75 Nominal Aspect Ratio	R Construction Code “R” Radial	15 Nominal Rim Dia. Code	LT/C Tyre Category	108/104 Load Index Single/Dual	J Speed Symbol
METRIC SERIES (RADIAL)	195 Nominal Section Width Code	/ 85 Nominal Aspect Ratio	R Construction Code “R” Radial	15 Nominal Rim Dia. Code	10PR Ply Rating	LT/C Tyre Category	Q Speed Symbol

PASSENGER

CODE DESIGNATED (DIAGONAL)	4.50 Nominal Section Width Code	- Construction Code “-” Diagonal	12 Nominal Rim Dia. Code	4PR Ply Rating		
METRIC SERIES (RADIAL)	195 Nominal Section Width Code	/ 70 Nominal Aspect Ratio	R Construction Code “R” Radial	15 Nominal Rim Dia. Code	92 Load Index	S Speed Symbol
ALPHA NUMERIC (DIAGONAL)	F Alpha Designation	78 Aspect Ratio	- Construction Code “-” Diagonal	15 Nominal Rim Dia. Code		

MOTORCYCLE

CODE DESIGNATED (DIAGONAL)	2.75 Nominal Section Width Code	- Construction Code “-” Diagonal		18 Nominal Rim Dia. Code	6PR Ply Rating			
METRIC (DIAGONAL)	130 Nominal Section Width Code	/ 90 Nominal Aspect Ratio		- Construction Code “-” Diagonal	15 Nominal Rim Dia. Code	M/C Tyre Category	62 Load Index	P Speed Symbol

MOPED

CODE DESIGNATED (DIAGONAL)	2 Nominal Section Width Code	- Construction Code “-” Diagonal	19 Nominal Rim Dia. Code	MOPED Tyre Category	STD / REINF Load Capacity
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INFLATION PRESSURES FOR TYRE MEASUREMENTS**(A) PASSENGER CAR TYRES****METRIC PASSENGER CAR TYRES – RADIAL PLY**

- a) 180 kPa for Standard Load Tyres, b) 220 kPa for Reinforced Tyres, c) 180 kPa for Standard Load S Type Temporary use spare tyres and d) 420 kPa for T Type temporary use spare tyres.

PASSENGER CAR TYRES – DIAGONAL PLY

Inflate Diagonal (Bias Ply) tyres to the maximum Inflation Pressure for that tyre size.

Ply Rating	Pressure (kPa)		
	Speed Category		
	L, M, N	P, Q, R, S	T, U, H, V
4	170	200	-
6	210	240	260
8	250	280	300

(B) TRUCK & LIGHT TRUCK TYRES DIAGONAL & RADIAL

Use inflation pressures corresponding to maximum load for Single fitment. However when Single and Dual loadings are given for a size the Inflation Pressure used should be that for the Maximum Dual fitment.

(C) OTHERS

Use inflation pressures corresponding to maximum load for the size.

PROCEDURE FOR TYRE MEASUREMENTS

The New tyre dimensions shall be measured by mounting the tyre on the recommended rim as given in the General Data Table and inflated to the pressures as stated above. The tyre should then be allowed to stand at room temperature for 24 hours, after which the pressure is re-adjusted to the original value before checking the dimensions.

SPEED SYMBOL

Indicates the speed at which the tyre can carry a load corresponding to its ply rating or load index or load equal to the recommended maximum load as given in the Standards Manual.

Correlation between speed symbol and speed category

Speed symbol	Speed category km/h	Speed symbol	Speed category km/h	Speed symbol	Speed category km/h
A1	5	D	65	Q	160
A2	10	E	70	R	170
A3	15	F	80	S	180
A4	20	G	90	T	190
A5	25	J	100	U	200
A6	30	K	110	H	210
A7	35	L	120	V	240
A8	40	M	130	W	270
B	50	N	140	Y	300
C	60	P	150		

NOTE: In the case of tyres suitable for speeds higher than 240 km/h the speed category of the tyre must be indicated by the letter 'Z' placed in front of the indication of the structure and indication of the load capacity index may be omitted.

GENERAL NOTES

TRAVELLING SPEEDS: Tyres shall not be used at higher speeds than those limits indicated at the top of the Load/Inflation data tables, or in the footnotes "Load/Speed relationship". Such indication of the speed capability of a tyre included in this manual must not be interpreted as ITTAC recommendation to exceed the legal speed limits that may be necessary for safety on roads and similar considerations.

ADJUSTMENTS TO TYRE SECTION WIDTHS/OVERALL WIDTHS OR DUAL SPACING: Within the parameters of specified permissibility of a wider or narrower rim than the Recommended rim size, the guidelines for the necessary adjustments are:

Section Width or Overall Width: 5 mm increase or reduction (as applicable) for every 0.50 difference in nominal rim width.

Dual Spacing (Recommended):	0.50 wider	+ 4 mm
	0.50 narrower	– 6 mm
	0.75 difference	+ or – 8 mm
	1.00 difference	+ or – 10 mm

For 2 and 3 Wheeler tyres the adjustment to tyre Section Width and Overall Width are as shown on Page 5-02.

LOAD INDEX

The Load Index is a numerical code, associated with the maximum load a tyre can carry in the Single or Dual application at the speed indicated by its Speed Symbol under the Specified Service conditions.

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TABLE
Correlation between Load Index and Tyre Load-Carrying Capacity (TLCC)

Load Index (LI)	TLCC kg	Load Index (LI)	TLCC kg	Load Index (LI)	TLCC kg	Load Index (LI)	TLCC kg	Load Index (LI)	TLCC kg	Load Index (LI)	TLCC kg	Load Index (LI)	TLCC kg
0	45	40	140	80	450	120	1400	160	4500	200	14000	240	45000
1	46.2	41	145	81	462	121	1450	161	4625	201	14500	241	46250
2	47.5	42	150	82	475	122	1500	162	4750	202	15000	242	47500
3	48.7	43	155	83	487	123	1550	163	4875	203	15500	243	48750
4	50	44	160	84	500	124	1600	164	5000	204	16000	244	50000
5	51.5	45	165	85	515	125	1650	165	5150	205	16500	245	51500
6	53	46	170	86	530	126	1700	166	5300	206	17000	246	53000
7	54.5	47	175	87	545	127	1750	167	5450	207	17500	247	54500
8	56	48	180	88	560	128	1800	168	5600	208	18000	248	56000
9	58	49	185	89	580	129	1850	169	5800	209	18500	249	58000
10	60	50	190	90	600	130	1900	170	6000	210	19000	250	60000
11	61.5	51	195	91	615	131	1950	171	6150	211	19500	251	61500
12	63	52	200	92	630	132	2000	172	6300	212	20000	252	63000
13	65	53	206	93	650	133	2060	173	6500	213	20600	253	65000
14	67	54	212	94	670	134	2120	174	6700	214	21200	254	67000
15	69	55	218	95	690	135	2180	175	6900	215	21800	255	69000
16	71	56	224	96	710	136	2240	176	7100	216	22400	256	71000
17	73	57	230	97	730	137	2300	177	7300	217	23000	257	73000
18	75	58	236	98	750	138	2360	178	7500	218	23600	258	75000
19	77.5	59	243	99	775	139	2430	179	7750	219	24300	259	77500
20	80	60	250	100	800	140	2500	180	8000	220	25000	260	80000
21	82.5	61	257	101	825	141	2575	181	8250	221	25750	261	82500
22	85	62	265	102	850	142	2650	182	8500	222	26500	262	85000
23	87.5	63	272	103	875	143	2725	183	8750	223	27250	263	87500
24	90	64	280	104	900	144	2800	184	9000	224	28000	264	90000
25	92.5	65	290	105	925	145	2900	185	9250	225	29000	265	92500
26	95	66	300	106	950	146	3000	186	9500	226	30000	266	95000
27	97.5	67	307	107	975	147	3075	187	9750	227	30750	267	97500
28	100	68	315	108	1000	148	3150	188	10000	228	31500	268	100000
29	103	69	325	109	1030	149	3250	189	10300	229	32500	269	103000
30	106	70	335	110	1060	150	3350	190	10600	230	33500	270	106000
31	109	71	345	111	1090	151	3450	191	10900	231	34500	271	109000
32	112	72	355	112	1120	152	3550	192	11200	232	35500	272	112000
33	115	73	365	113	1150	153	3650	193	11500	233	36500	273	115000
34	118	74	375	114	1180	154	3750	194	11800	234	37500	274	118000
35	121	75	387	115	1215	155	3875	195	12150	235	38750	275	121000
36	125	76	400	116	1250	156	4000	196	12500	236	40000	276	125000
37	128	77	412	117	1285	157	4125	197	12850	237	41250	277	128000
38	132	78	425	118	1320	158	4250	198	13200	238	42500	278	132000
39	136	79	437	119	1360	159	4375	199	13600	239	43750	279	136000