Product Knowledge Document

Tire Classification & Specification

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INTRODUCTION

A tire is a ring-shaped component that surrounds a wheel's rim to transfer a vehicle's load from the axle through the wheel to the ground and to provide traction on the surface travelled.

Most tires are pneumatically inflated structures, providing a flexible cushion to absorb shock as the tire rolls over rough features on the surface.

Tires provide a footprint that is designed to match the weight of the vehicle with the bearing strength of the surface that it rolls over providing a bearing pressure that will not deform the surface excessively.

INDIAN STANDARDS FOR TIRE INDUSTRY

There are four standards that is to be followed by the Indian Tire manufacturers as per the Notice sent by the Ministry of commerce & Industry, Department of Industrial Policy and Promotion , Govt. of India dated 11 Feb 2010

The below mentioned are the Standards –

1. **IS 15627 : 2005.**
2. **IS 15633 : 2009.**
3. **IS 13098 : 2012.**
4. **IS 15636 : 2012**

INDIAN STANDARDS FOR TIRE INDUSTRY

IS 15627 : 2005.

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

IS 15633 : 2009.

SCOPE – This Standard for Automotive vehicles – Pneumatic Tires for passenger car vehicles – Diagonal and Radial Ply provides guidelines on various aspects related to certification of tires along with Scheme of Testing and Inspection.

IS 15636 : 2012.

SCOPE – This Standard for Automotive Vehicles – Pneumatic Tires for Commercial Vehicles – Diagonal and Radial Ply – Specification provides the general, dimensional and performance requirements of new pneumatic tires designed primarily, but not only, for vehicles in categories M2, M3, N, T3 and T4 as defined in IS 14272 : 2011 " Automotive Vehicles – Types terminology. However , it does not apply to tire types identified by speed symbols corresponding to speeds below 80 Km/h.

INDIAN STANDARDS FOR TIRE INDUSTRY

IS 13098 : 2012.

SCOPE – This Standard for Automotive Vehicles – Tubes for Pneumatic Tires – specifies the requirement of tubes for pneumatic vehicles covered by L1, L2, L5, M, N and T categories of vehicles as defined in IS 14272 : 2011 " Automotive vehicles – Types, Terminology'.

TIRE – BUILDING BLOCKS

Building Blocks of a Tire

A. Tire Carcass - Rubber-coated layers of steel, fiberglass, rayon, and other materials located between the tread and plies, crisscrossing at angles, hold the plies in place.

B. Tire Spikes - Spies are special treads within the tread that improve traction on wet, dirty, sandy, or snowy road surfaces.

C. Tire Tread - The portion of the tire that comes in contact with the road.

D. Tire Grooves - The spaces between two adjacent tread ribs are also called tread grooves.

E. Tire Shoulder - The outer edge of the tread that wraps into the sidewall area.

F. Tire Sidewall - The sidewall of the tire protects cord plies and features tire markings and information such as tire size and type.

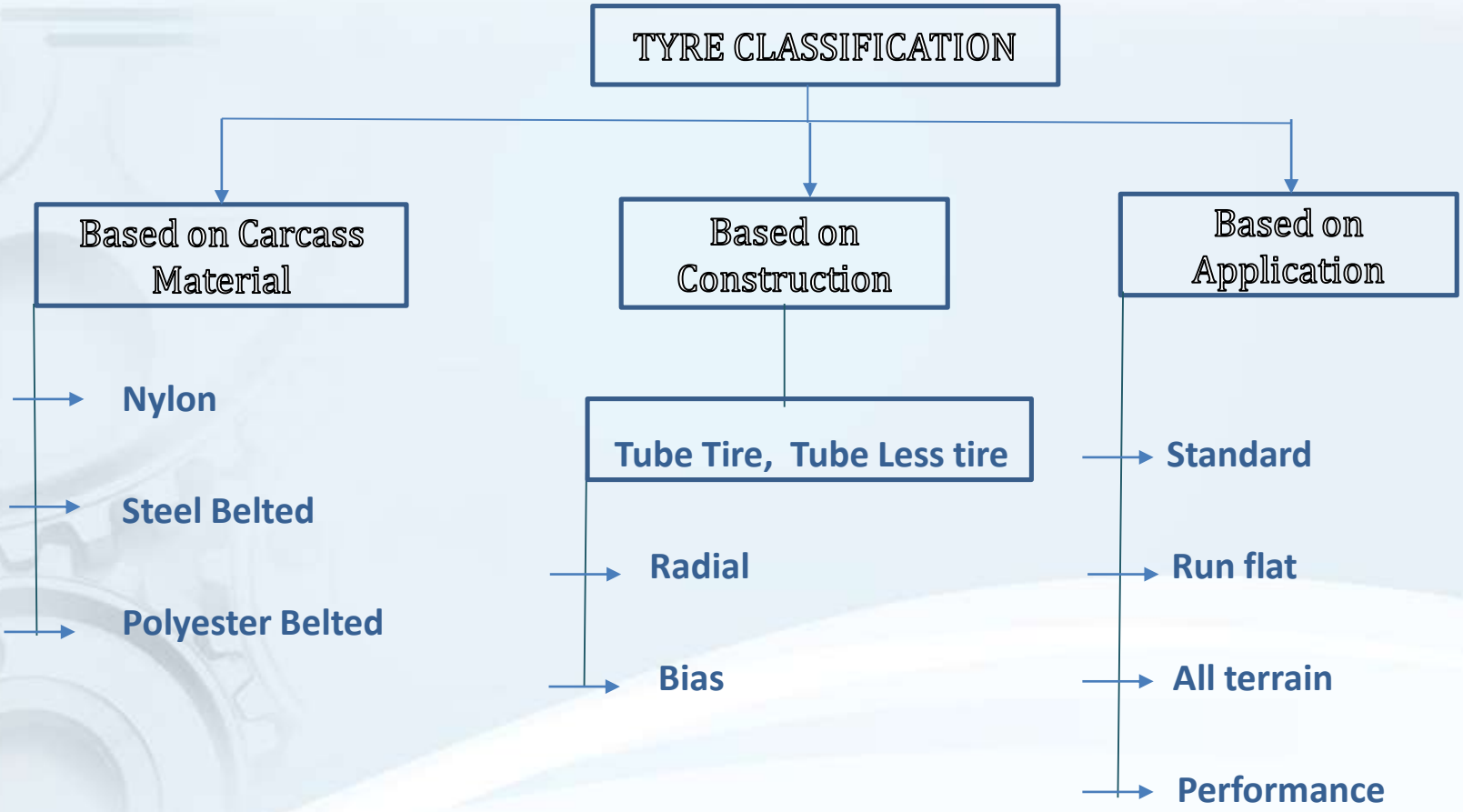
Building Blocks of a Tire

G. Tire Inner Liner - This is the innermost layer of a tubeless tire that prevents air from penetrating the tire.

H. Tire Bead - A rubber-coated loop of high-strength steel cable that allows a tire to stay "seated" on a rim.

I. Tire Body Plies - This is the tire itself, made up of several layers of plies. Plies, like polyester cord, run perpendicular to the tire's tread and are coated with rubber to help bond with other plies and belts to seal in air. Plies give tires strength and resistance to road damage.

TIRE CLASSIFICATION

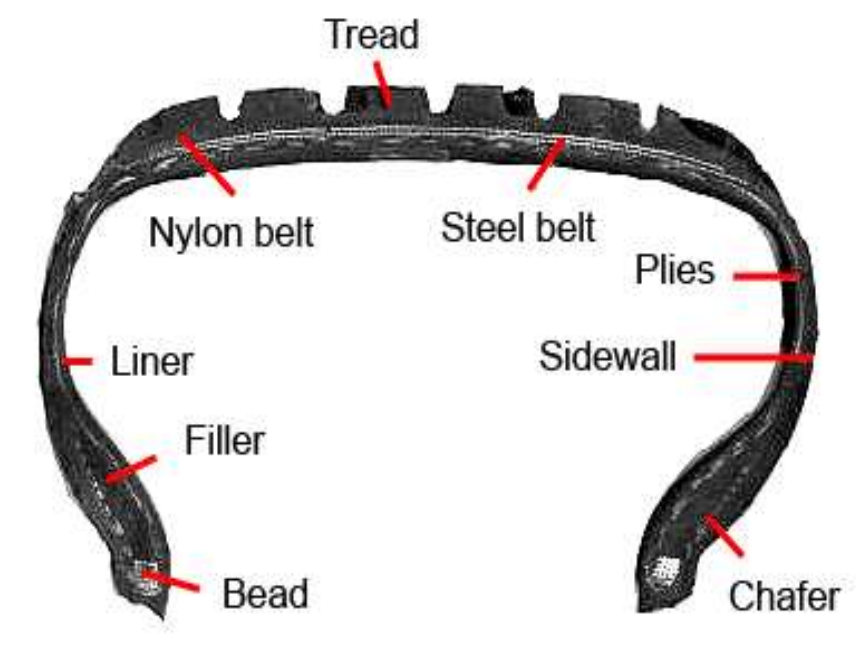


Tire Classification – Based on Carcass material

Tire Classification – Based on Carcass material

NYLON carcass

Tire with the carcass made of nylon or a composite of nylon with organic materials comes under this segment. These type of tires are mainly used on bicycle, unicycle, tricycle, or a trailer bike. They are also widely used on wheel chairs and hand cycles.

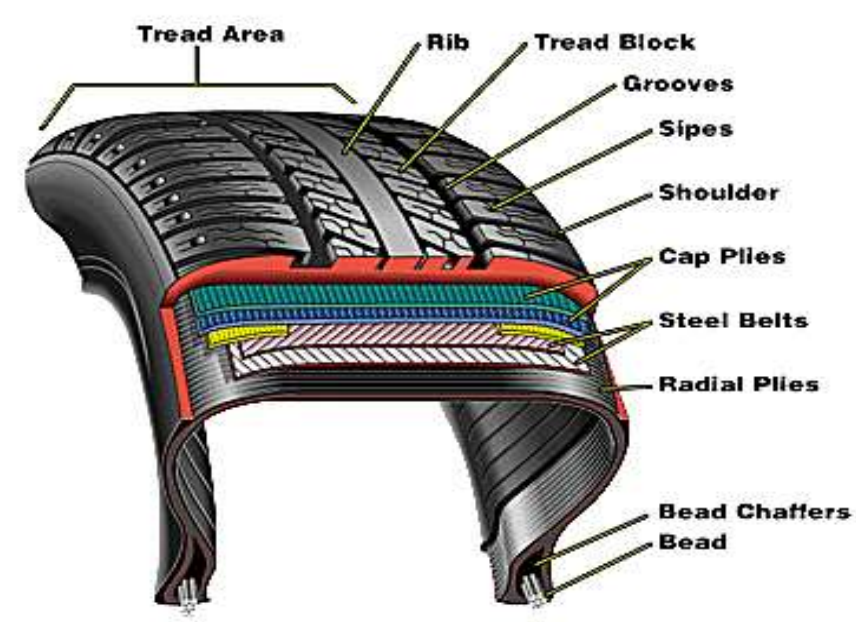


Tire Classification – Based on Carcass material

STEEL BELTED carcass

Tires containing carcass made of sufficiently high percentage of high-grade embedded steel comes under this segment. They are that effective in absorbing shocks during vehicle traction.

Cross Section



Tire Classification – Based on Carcass material

POLYSTER carcass

Radial tires having carcass plies of organic fibre cords including polyester cords such as polyamide cords. They are superior in heat performance such as heat resistance, heat-proof adhesion.

Cross Section

Tire Classification – Based on construction

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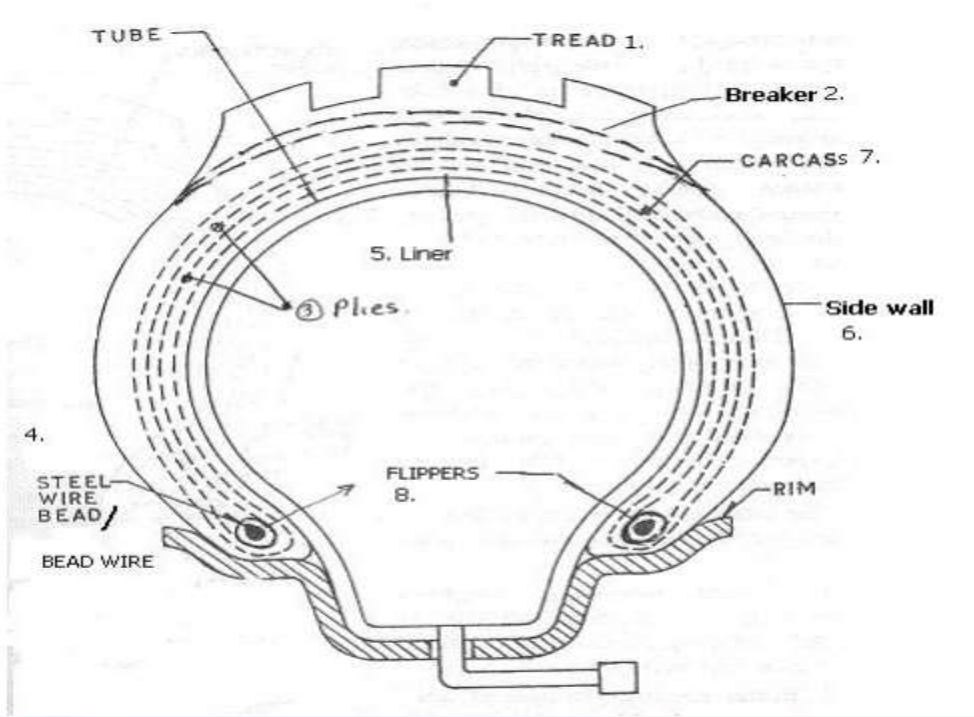
TUBE TYPE TIRE – Radial or bias tire that requires an inner tube to seal the air inside the tyre are called as tube type tire.

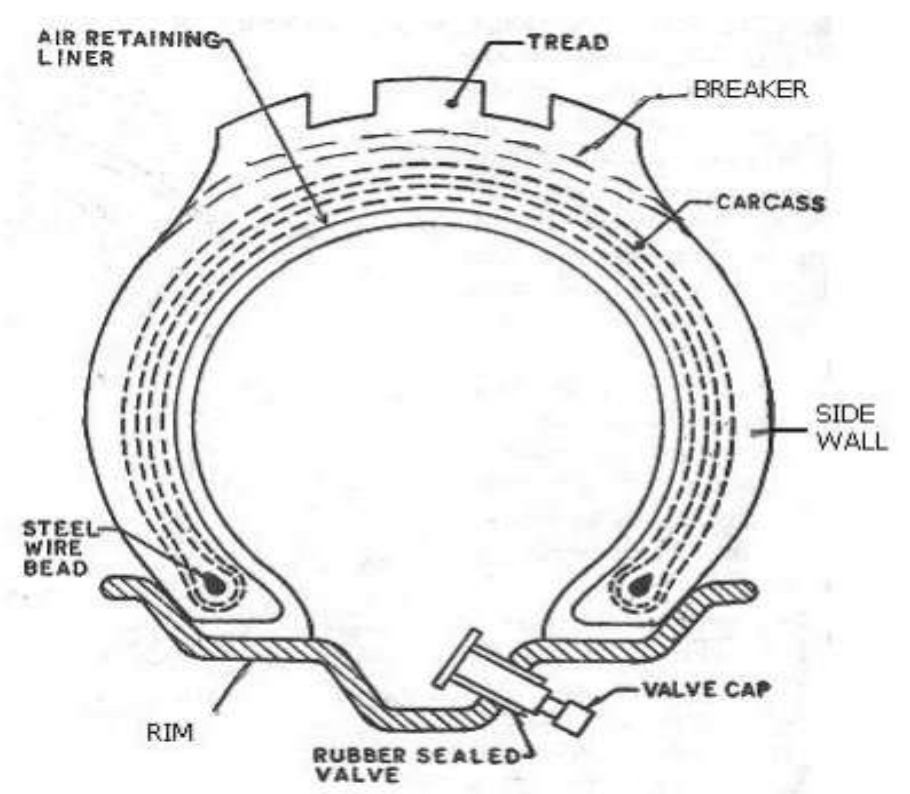
Cross Section



Tire Classification – Based on Construction

TUBE LESS TIRE – Radial or Bias Tires eliminating the inner tube by making the complete wheel and tyre assembly air-tight. A special, air-tight valve assembly is needed. This can be a tight fit into the rim, or it can be held with a nut and sealing washers.

Cross Section



Tire Classification – Based on Construction

RADIAL TIRE –

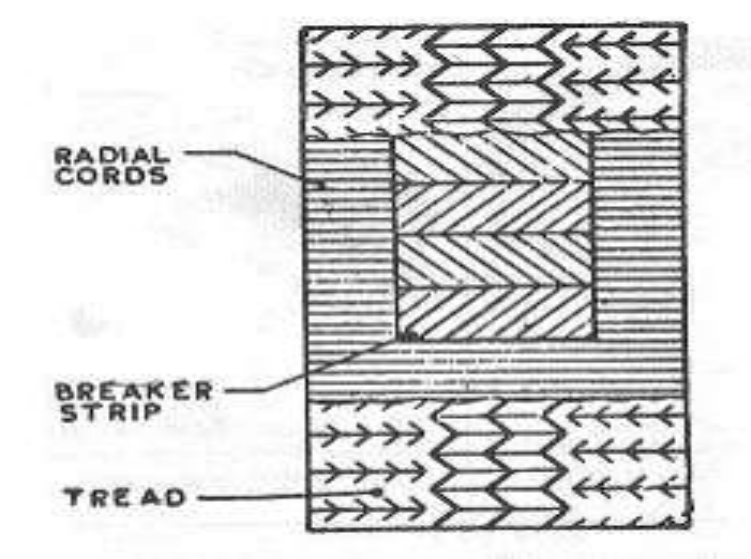
In this structure ply cords run in radial direction.

Over the basic structure run a number of breaker strips in circumferential direction.

Breakers are widely spaced to help in spreading shocks from road & prevent radial growth.

The inextensible breaker strips provide lateral & directional stability.

Cross Section –



Tire Classification – Based on Construction

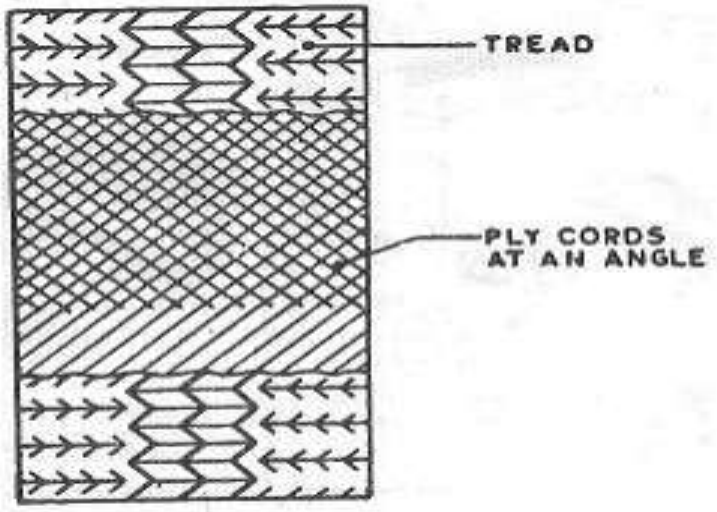
BIAS or CROSS PLY TIRE –

In this type, the ply cord are woven at an angle (30 – 40 Degree) to tire axis.

There are two layers which run in opposite direction as shown in below figure.

This construction allows carcass to retain its strength during tire rotation & provides comfortable ride.

Cross Section –



Cross-ply or bias ply carcass.

Comparison Between Radial and Cross Ply tire

	Radial - Tire		Cross - Ply Tire
1	Cords of tyre run in radial direction.	1	Layers of cord run in opposite direction.
2	Cord ply are woven in radial direction.	2	Cord ply are woven at an angle of (30 – 40 degree).
3	Radial tire are provided with breaker strips.	3	There is no breaker strip in this tire.
4	Tyre has low rolling resistance, thus better fuel efficiency.	4	Cross ply has more rolling resistance as compared.
5	Better directional stability.	5	Tyre has wobbling characteristics.
6	Greater sidewall flexibility % treads stiffness.	6	Sidewall flexibility & tread stiffness is lesser as compared to cross- ply tire.

Tire Classification – Based on Application

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STANDARD TIRE / GENERAL USAGE TIRE –

- General Usage tires, these are usually the OEM fitted tires you get with the car.
- These are the tires to go for if you are satisfied with your current tires performance and your expectations from tires are not very demanding.

ALL TERRAIN -

- All-terrain tires are usually found on utility vehicles that frequently drive on varying surfaces such as tarmac, dirt roads, sand, mud, rivers, rocky terrain, etc.
- All terrain tires have chunky lugs on the tyre tread, however, the lugs are tighter than that of off-road tyres.
- The chunky lugs on the tyre tread make it easier for the tyres to find traction on loose surfaces while smaller gaps between the lugs on the tyre tread reduce rolling noise on tarmac giving the user a trade off between a varying degree of surfaces.
- All-terrain tyres are usually made up of harder rubber making them more durable than standard road tyres in comparison.
- The sidewalls of these tyres are also usually reinforced to withstand impact from sharp rocks and other obstacles that can be encountered on off road trails.

Tire Classification – Based on Application

RUN FLAT TIRE –

- Run flat tyres are available in premium category (Both in Touring and Sporty types) They are designed to minimise loss of handling of a vehicle after a tyre puncture has occurred.
- It allows the car to be driven on the punctured tyre so that the driver does not have to change the tyre.
- However, after a puncture has occurred it can be driven only for a short distance (Typically about 80 km's) and under a limited speed (usually 80 km/h).

PERFORMANCE TIRE –

- Highway-Luxury or highway-Performance tires are usually found OEM fitted in premium vehicles.
- These are supposed to run mostly On Road and rarely off road. Their tread blocks may be quite similar to those of Car tyre patterns.
- Such tyres may not be very effective in gripping loose surfaces like sand or mud. However they provide much better performance in On Road and offer highly comfortable ride at higher speeds.
- The rubber compound used on the tread is also usually that of car tyres which provides excellent grip braking power in On road application.

Tire Classification – Based on Application

Speed Symbol	Max speed (Kmph)	Category
Q	160	Available in MUV tyres
S	180	Available in standard tyres
T	190	
H	210	Speeds of H & above are considered high speeds
V	240	
W	270	Available in Premium category tyres and premium/ luxury imported cars
Y	300	

Tire Classification – Based on Application

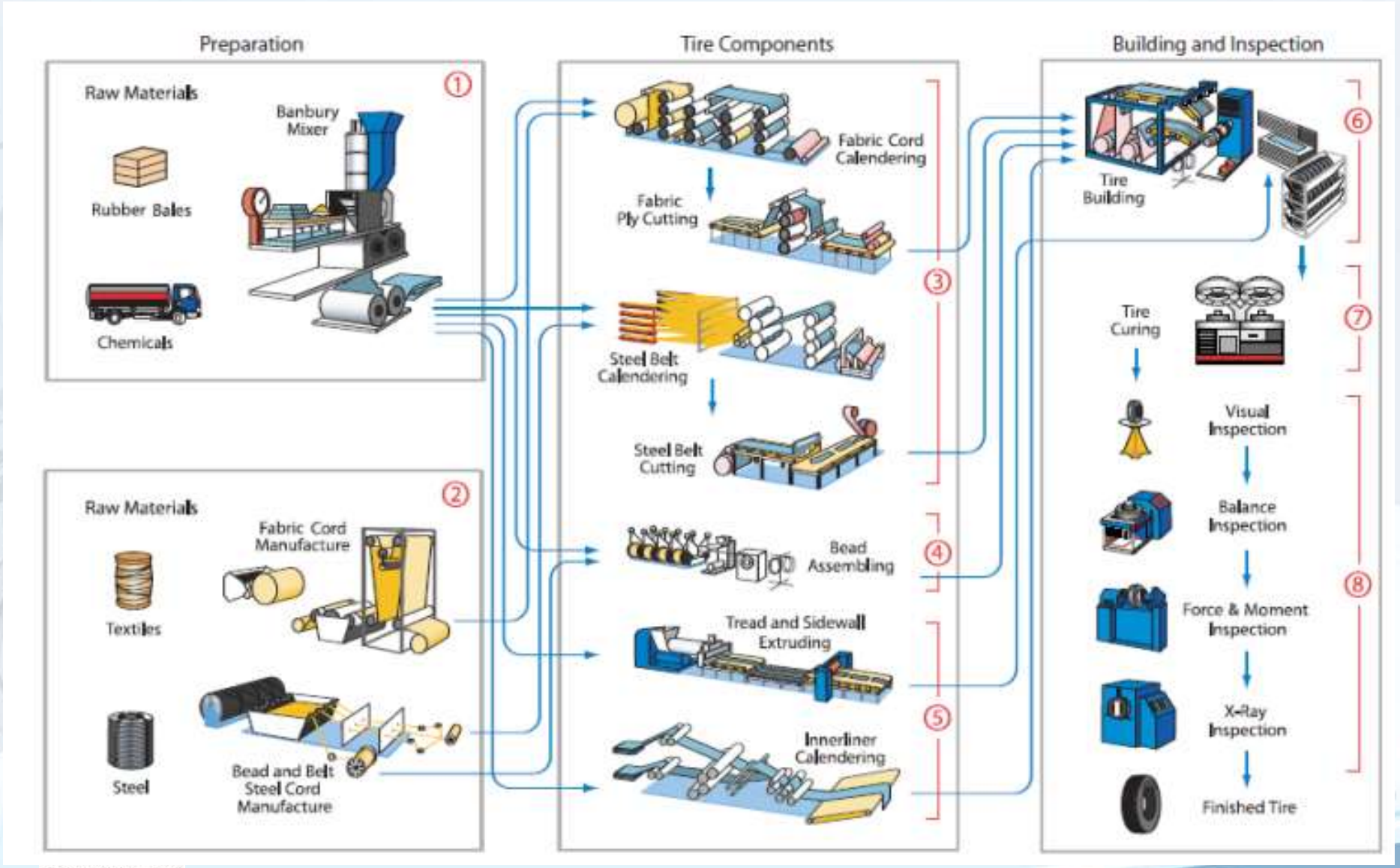
STANDARD TIRE

ALL TERRAIN TIRE

RUN FLAT TIRE

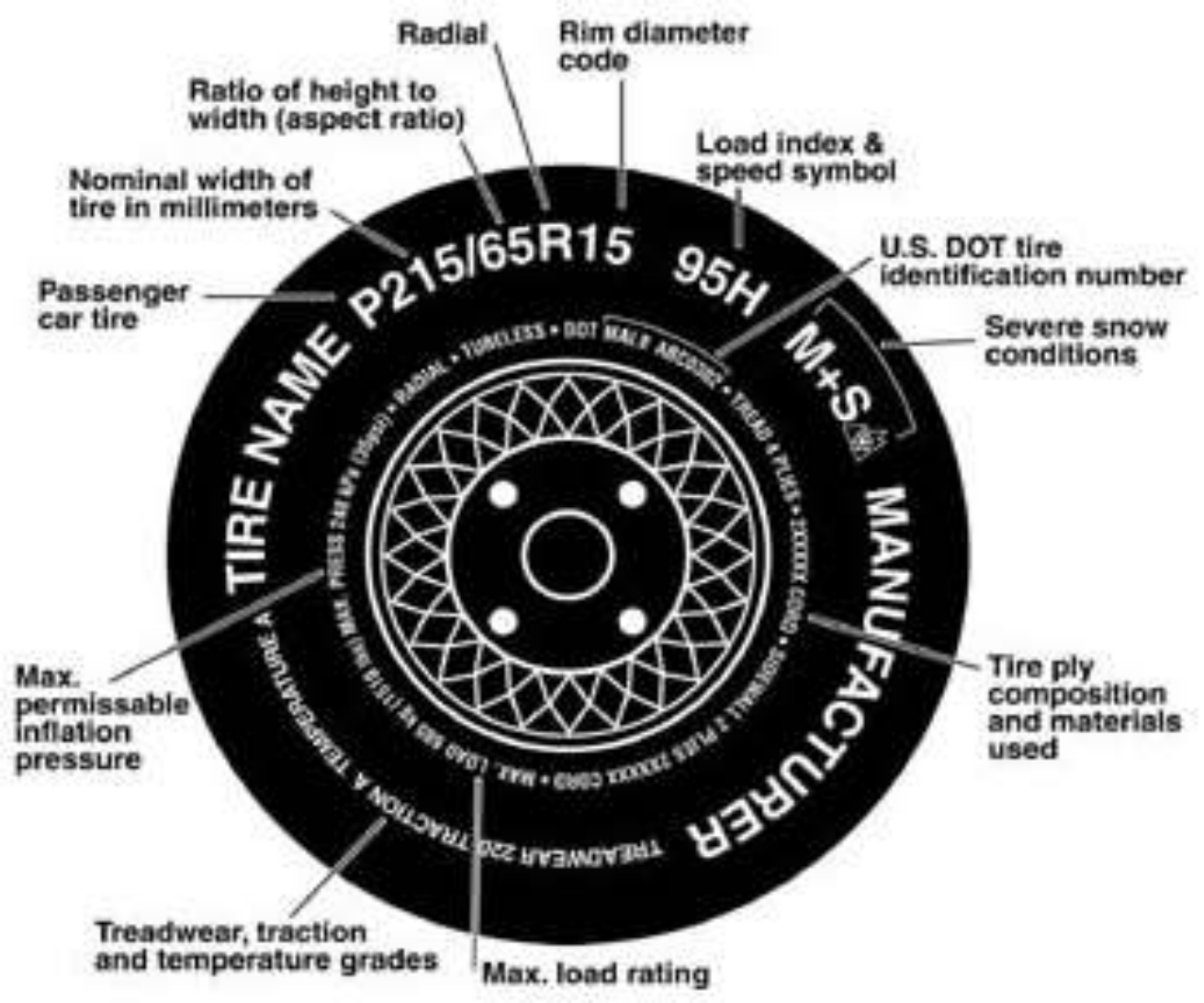
PERFORMANCE TIRE

MANUFACTURING FLOW

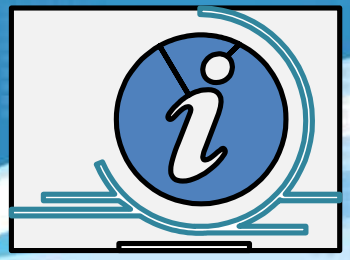


Tire Code

TIRE CODES



THANK YOU



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Are there any Questions?