

# Product Knowledge Document Rear Suspension (2 Wheeler) Classification, Specification and Working



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# INTRODUCTION

A suspension system or shock absorber is a mechanical device designed to smooth out or damp shock impulse, and dissipate kinetic energy. In a vehicle, it reduces the effect of traveling over rough ground, leading to improved ride quality, and increase in comfort due to substantially reduced amplitude of disturbances.



Shock absorbers consists of spring which determine posture and cushioning buffer action and a damper which suppresses vibration. On 2-wheeled vehicles, shock absorbers are separated into the categories of the “front fork” and “rear cushion”

The automobile frame & body is attached to the front & rear axle by Suspension system which minimizes the effect of road shocks transmitted to the frame, thus protecting the various working parts of the vehicle and the occupants of a motor vehicle.

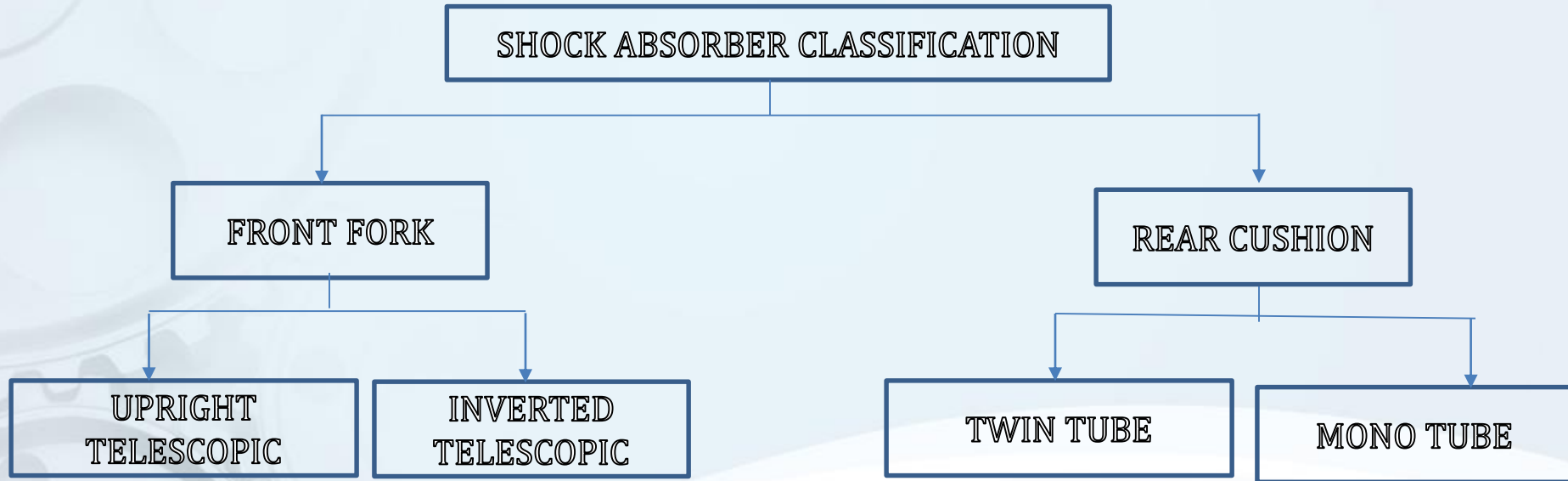


# SHOCKER ASSEMBLY – TYPES

QUALITY



# SHOCK ABSORBER CLASSIFICATION



# SUSPENSION SYSTEM – BUILDING BLOCKS

QUALITY



# BUILDING BLOCKS OF REAR SHOCKER ASSEMBLY – MONO TUBE

**Upper Mount:-** Upper mount serves as the mounting point for the top of vehicle's strut assemblies to connect to vehicle chassis.

**Piston Rod :-** Piston rod forces the piston down into the cylinder tube thereby putting the fluid below the piston and vice versa during rebound.

**Valves:-** They act as the opening and closing orifices for the oil flow and provide resistance to the oil flow thereby assisting in the dampening force.

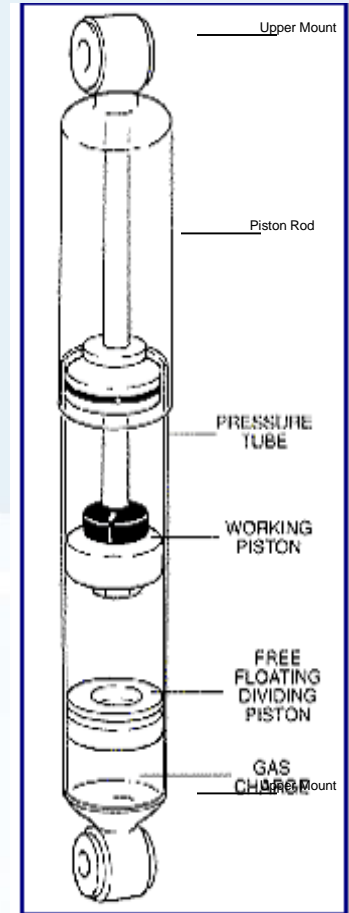
**Pressure Tube:-** It is the tube having piston assembly movement inside it.

**Working Piston:-** It is the major working piston which forces the floating piston in downward motion through hydraulic movement of oil when a shock is transmitted from vehicle chassis.

**Free Floating Piston with Seal:-** It acts as the separator or sealant between the gas chamber and oil chamber in the assembly which is free to float.

**Gas Charge:-** It is the gas filled chamber which on compression from free floating piston provide additional damping force.

**Lower Mount:-** Lower mount serves as the mounting point for the bottom of vehicle's strut assemblies to connect to vehicle chassis.



MONO  
TUBE DESIGN



# BUILDING BLOCKS OF REAR SHOCKER ASSEMBLY – TWIN TUBE

**Upper Mount:-** Upper mount serves as the mounting point for the top of vehicle's strut assemblies to connect to vehicle chassis.

**Piston Rod :-** Piston rod forces the piston down into the cylinder tube thereby putting the fluid below the piston and vice versa during rebound.

**Seal:-** It protects the oil from leaking out of the metal tube.

**Bushing:-** It protects wearing due to the contacting between two surface of seal and metal tube.

**Valves:-** They act as the opening and closing orifices for the oil flow and provide resistance to the oil flow thereby assisting in the dampening force.

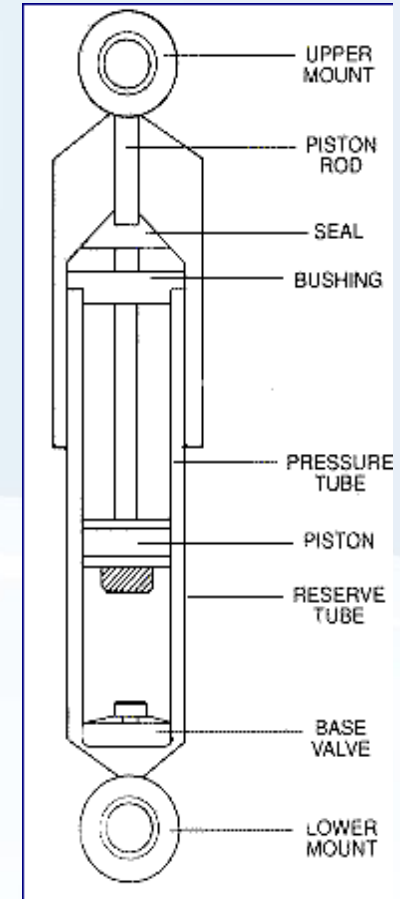
**Pressure Tube:-** It is the tube having piston assembly movement inside it.

**Piston:-** It dissipates and absorbs the vibration coming from the movement of vehicle.

**Reserve Tube:-** It serves as the reservoir medium for oil coming out of pressure tube due to piston rod assembly movement.

**Base Valve:-** It acts as the resistance medium for the fluid due to piston rod assembly movement and hence effectively dampens the effect of shock.

**Lower Mount:-** Lower mount serves as the mounting point for the bottom of vehicle's strut assemblies to connect to vehicle chassis.



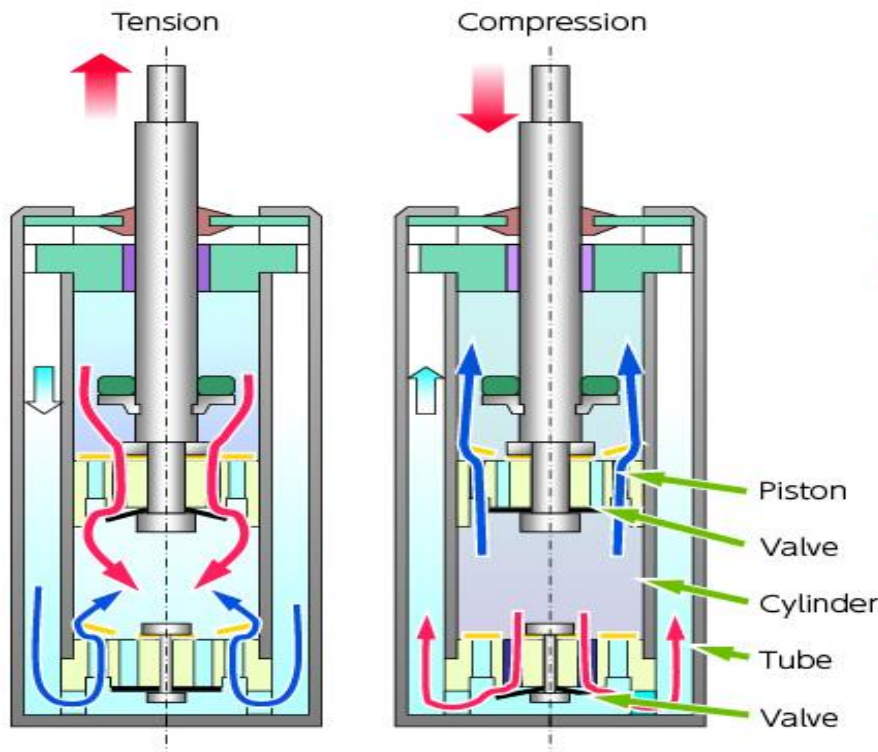
TWIN  
TUBE DESIGN

# REAR CUSHION ASSEMBLY – TYPES

QUALITY



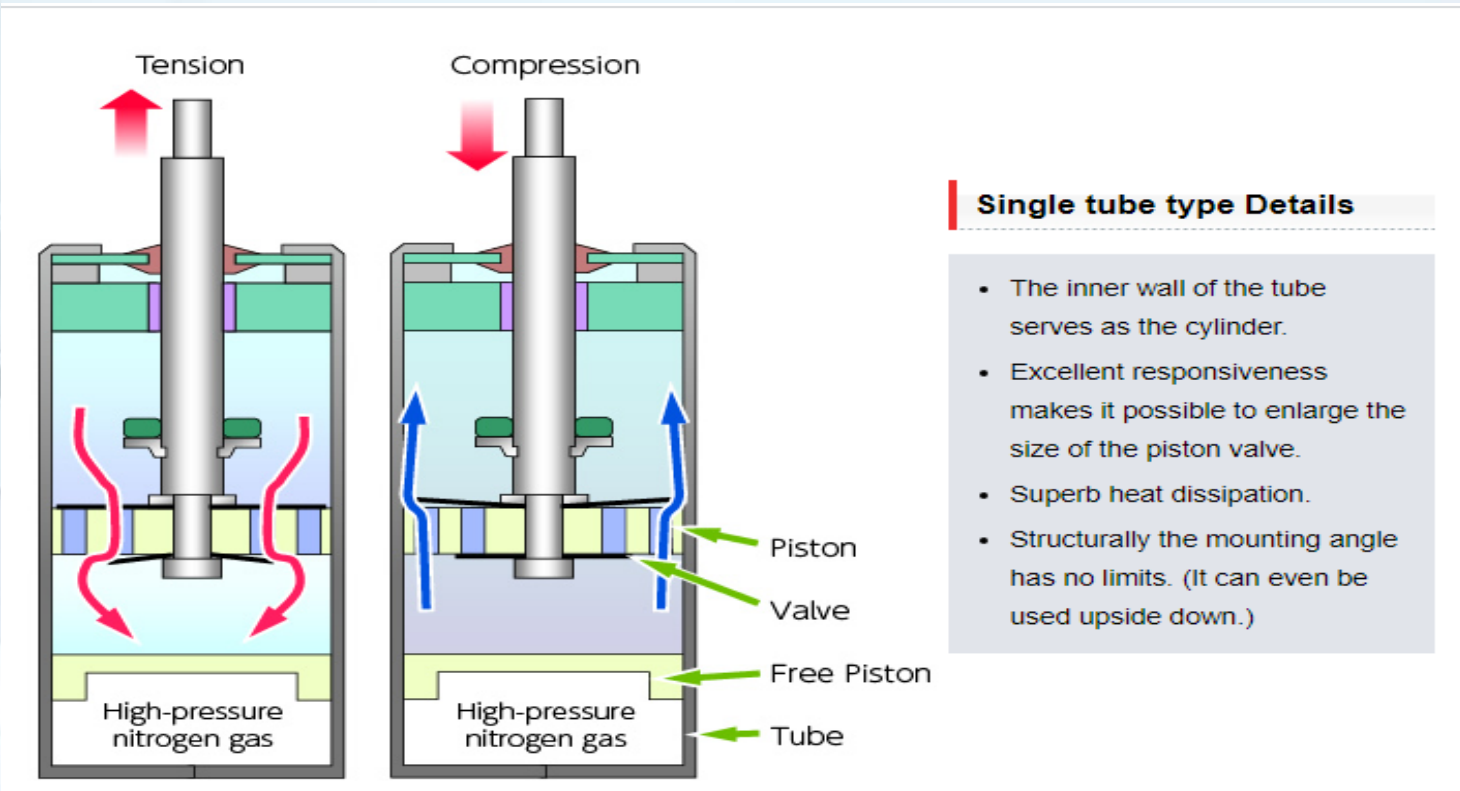
**Twin Tube Type :-** A twin tube shock absorber has a main outer tube and a secondary inner tube. The piston rod and piston cycle through hydraulic oil in the smaller inner tube of the shock, pushing oil into the outer tube.



#### Double tube type Details

- Double-tubed construction with a tube and cylinder.
- Design freedom is extremely high in order to avoid subjecting the oil seal to high pressure.

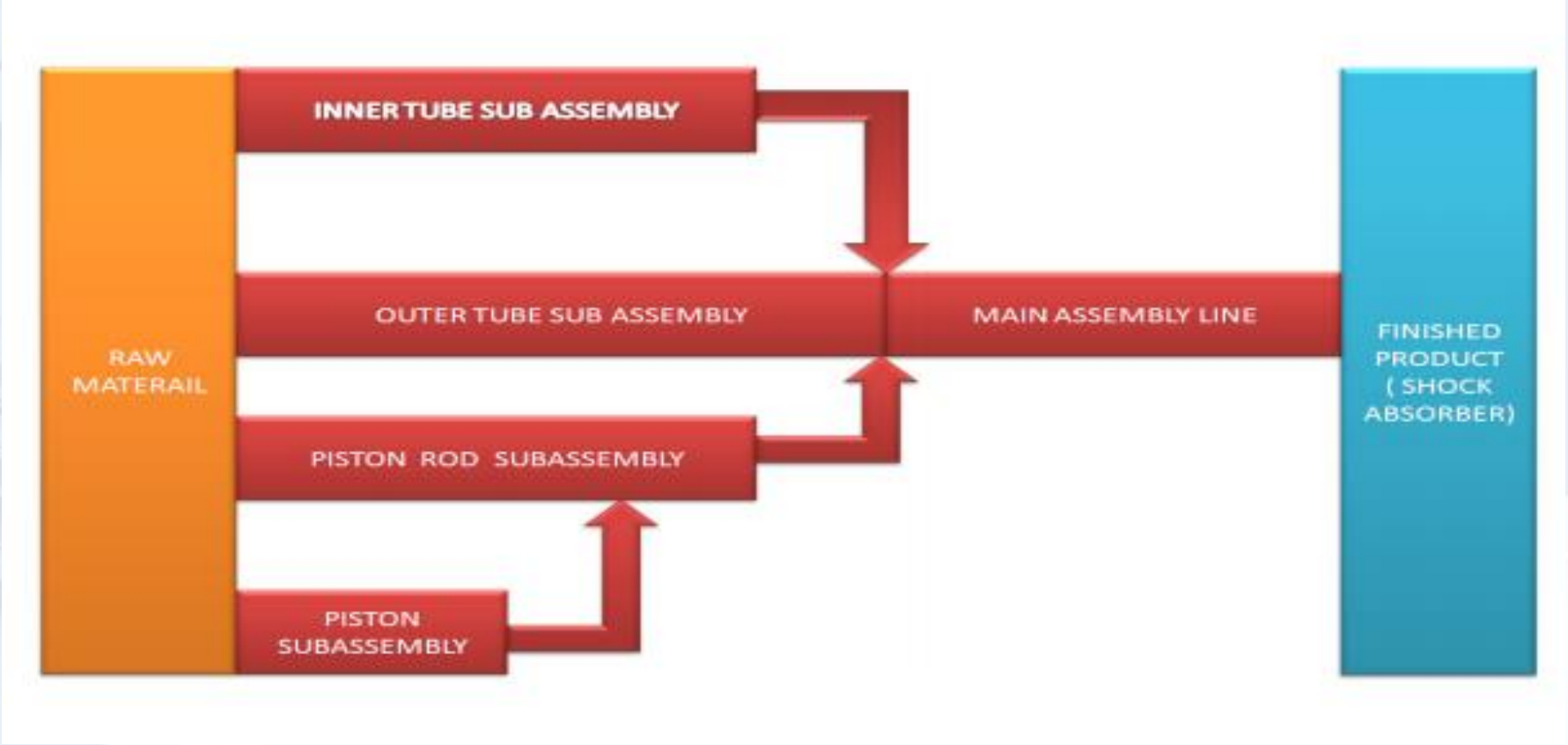
**Mono Tube Type :-** A mono tube shock absorber is constructed using a single tube filled with oil and gas separated by a floating dividing piston. The piston rod assembly pushes the floating piston through hydraulic force of oil to the gas chamber and provide damping force.



# Comparison Between Twin Tube and Mono tube Suspension

Mono tube Suspension	Twin Tube Suspension
Improved control & Handling without compromise on ride comfort	Either Handling & control or ride comfort, you have to compromise
More comfort mainly due to Larger cylinder diameter and using gas chamber	Relatively rough ride and more body movement
Extended Life due to unique internal design with no wear and tear	Limited life due to internal components with high wear rate
Constant performance over the entire life cycle	Loses performance over Life cycle gradually, beginning at very early stages
No foaming, No Heat buildup there for no losing of performance. A monotube works Cooler	Lose of performance due to foaming and heat buildup. The twin tube construction keeps the heat inside
The excellent performance saves the suspension components and also tires and lowers you maintenance costs	Slowly lose performance there for causing excessive tire and suspension component wear resulting in higher maintenance costs
No limitation on installation, It can be installed at any position	Limitation of installation, It must be installing led up right or slightly tilted

# MANUFACTURING FLOW



# Working Principle of Rear Shocker Assembly – Twin Tube

## Bump stroke

When the piston rod is pushed in, oil flows without resistance from below the piston through the orifices and the non-return valve to the enlarged volume above the piston. Simultaneously, a quantity of oil is displaced by the volume of the rod entering the cylinder. This volume of oil is forced to flow through the bottom valve into the reservoir tube (filled with air (1 bar) or nitrogen gas (4-8 bar)). The resistance, encountered by the oil on passing through the foot valve, generates the bump damping.

## Rebound stroke

When the piston rod is pulled out, the oil above the piston is pressurized and forced to flow through the piston. The resistance, encountered by the oil on passing through the piston, generates the rebound damping. Simultaneously, some oil flows back, without resistance, from the reservoir tube (6) through the foot valve to the lower part of the cylinder to compensate for the volume of the piston rod emerging from the cylinder.

# Working Principle of Rear Shocker Assembly – Mono Tube

## Bump stroke

Unlike the bi-tube damper, the mono-tube shock has no reservoir tube. Still, a possibility is needed to store the oil that is displaced by the rod when entering the cylinder. This is achieved by making the oil capacity of the cylinder adaptable. Therefore the cylinder is not completely filled with oil; the lower part contains (nitrogen) gas under 20 -30 bar. Gas and oil are separated by the floating piston .

When the piston rod is pushed in, the floating piston is also forced down by the displacement of the piston rod, thus slightly increasing pressure in both gas and oil section. Also, the oil below the piston is forced to flow through the piston. The resistance encountered in this manner generates the bump damping.

## Rebound stroke

When the piston rod is pulled out, the oil between piston and guide is forced to flow through the piston. The resistance encountered in this manner generates the rebound damping. At the same time, part of the piston rod will emerge from the cylinder and the free (floating) piston will move upwards.





# THANK YOU

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## Are there any Questions?

