







Air Springs provide the optimum ride quality and comfort for all types of passenger vehicles. An Air Spring suspension system keeps the transmission of vibrations to a minimum and maintains the vehicle body at a constant height at all times regardless of the whether the vehicle is full or empty.

The Prag-TMT air spring suspension system engages with an altitude valve that regulates internal air pressure to maintain constant height. The system is designed to transmit vertical load while absorbing vertical and lateral vibrations and includes an integrated rubber-metal emergency spring assembly.

The system has been successfully adopted and is in use on the Indian Railways since 2008. Advantages of air spring suspension include:



- > Increase in ride comfort, thanks to pneumatic suspension, irrespective of the load conditions
- > Reduction in structure-borne noise transmission from the bogie to the car body
- > Adjustment of the vehicle height at different loads
- Stabilization of running dynamics



CK-509

VERTICAL LOAD (kN)

	50	140
Inside Pressure(bar)	1.95±5%	5.35±5%
Vertical Stiffness (N/mm) amplitude dz = ± 20 mm Additional Vol. 20 Lit.	550±50	1000±100
Vertical Stiffness (N/mm) amplitude dz = \pm 20mm Additional Vol. 40 Lit.	400±50	700 <u>+</u> 100
Lateral Stiffness (N/mm) amplitude dy = ± 20 mm	150±25	200±25
Max.Horizontal Deflection (mm)	±'	60
Max.Vertical Deflection (mm)	±	30



CK-406

VERTICAL LOAD (kN)

	50	150	180	
Inside Pressure(bar)	1.63 <u>+</u> 5%	4.71 <u>+</u> 5%	5.65 <u>+</u> 5%	
Vertical Stiffness (N/mm) amplitude dz = ± 20 mm Additional Vol. 20 Lit.	600 <u>+</u> 100	1000 <u>+</u> 100	1350 <u>+</u> 200	
Vertical Stiffness (N/mm) amplitude dz = ± 20mm Additional Vol. 40 Lit.	550±100	800 <u>+</u> 200	1150±200	
Lateral Stiffness (N/mm) amplitude dy = ± 20mm	250±50	400±100	500±100	
Max.Horizontal Deflection (mm)		±60		
Max.Vertical Deflection (mm)	±30			







ELASTA-FLEX[®] drum clutch elements are manufactured by Prag in Technical Collaboration with M/s Oil States Industries, USA. These products are designed for a multitude of severe clutch and brake applications in oilfield, mining, paper- logging and marine industries, as well as other industrial applications.

The elements are designed around the basic principle of an expanding tube which, when inflated, forces a friction producing member into radial engagement with a rotatable drum. The friction member is comprised of a friction material of known frictional coefficient and a load transfer mounting that is called the Friction Shoe Assembly (FSA).



Size	Torque Rating (T)(1) (LBS-IN) at 75 PSI	Max Speed RPM
4CB	1000	2000
6CB	2,040	1800
8CB	4,290	1800
10CB	8,150	1800
12CB	13,300	1800
14CB	19,700	1800
16CB	35,200	1550
18CB	44,000	1400
20CB	53,600	1300
22CB	52,300	1250
24CB	75,000	1200
26CB	92,400	1100
28CB	106,000	1000
30CB	121,000	950
32CB	137,000	900
36CB	172,000	800
40CB	211,000	750
45CB	260,000	670





A range of high performance elastomeric buffer and draft gear springs are designed and manufactured including high capacity buffer springs for Indian Railway passenger cars, RF-8 and RF-9 rubber-metal draft gear springs used on Miner SL-76 and RF-361 draft gears as per AAR M-901 E specification and PAC/MAC draft gear spring packs for EMD locomotives. These spring packs are designed to continuously absorb and dissipate huge amounts of inter-vehicle energy generated and transferred particularly during rapid acceleration and braking of railcars.



		MAC	PAC	HCRBS	RF-8
Vertical Load	kN	4450	3000	680	1350
Vertical Deflection	mm	38	42	27	13
Vertical Stiffness	kN/mm	117	71.5	25	104.00
Dimensions (X * Y * Z)	mm	516*282*204	316*225*204	Ф178*112	180*285*62
Unit Mass	kg	55.5	22.5	6.75	4.3

Shear & Compression Mounts

Shear and Compression mounts used on primary and secondary suspension applications are designed to withstand high compression loads with high shear stiffness. These mounts are made from high-grade natural rubber vulcanized on metal plates. Over the years, Prag's design and engineering team has designed, improved, optimized and standardized a variety of shear and compression mounts for their customers and our current product range consist of proven products that cater to a range of shear and compression spring rate, size, weight and space requirements.













	X THRUST PAD (LTP)	Z		X C-PEP	
		MEP	SWM	LTP	
Vertical Load	kN	196	73.5	137	
Vertical Deflection	mm	3.4	19	5	
Vertical Stiffness	kN/mm	57.6	3.86	27.40	
Dimensions (X * Y * Z)	mm	208*178*46	382*102*185	175*165*56	
Unit Mass	kg	6.75	12.0	2.7	









Side Bearer Springs

Prag rubber-metal side bearer springs provide damping between the carbody and bolster and are used in the secondary suspension applications in a wide range of applications on EMD & ALCO Locomotives including, passenger and freight vehicles.

Prag offers standard as well as custom designed springs with a wide range of lateral flexibility and vertical compression. These springs are designed to support the vehicle body in their compression mode while allowing horizontal, lateral and rotational bogie movements by virtue of the more flexible shear mode.

		GM-SPA	GM-SPB	AL-RBS
Vertical Load	kN	100	100	176
Vertical Deflection	mm	12.8	12.8	21.0
Vertical Stiffness	kN/mm	7.8	7.8	8.4
Longitudinal Deflection	mm	65	82	50
Lateral Deflection	mm	65	68	50
Dimensions (X * Y * Z)	mm	444*394*213	434*394*213	460*222*180
Unit Mass	kg	61.0	51.0	31.5





High quality rubber bellows and assemblies such as the Traction Motor Air Duct Assembly for EMD Locomotives are produced using high-grade rubber compounds that are compounded to meet customer specifications and to resist environmental conditions such as oil, low and high temperatures, water, dust, dirt, and ozone.





		TM-AD1
Dimensions (X * Y * Z)	mm	603*402*238
Unit Mass	Kg	4.5



Hollow springs are made from high quality vulcanized natural rubber and are designed to absorb shocks and insulate vibrations. These products are used in applications that require compression along the vertical axis. They offer a progressive spring rate and high load capacity and can withstand exceptional vertical deformations.

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	HF	RS-01
ID (ФХ)	mm	50
OD (ΦY)	mm	135
Height (Z)	mm	235
Force at 20mm Displacement	kN	3
Force at 40 mm Displacement	kN	6
Force at 60mm Displacement	kN	8
Unit Mass	kg	2.8





These are heavy-duty flexible bearings with an inner spherical ball that is firmly connected to outer metal by way of a vulcanized elastomeric layer. Spherical bearings combine high-load bearing capacity with the ability to accommodate radial, axial, torsional and conical movements and are therefore ideal for applications with multi-directional loading. Advantages over all-metal bearings include elimination of metal-to-metal wear and the need for lubrication.

BJ-RL-01 D1 φ115 mm L1 mm 196 **Radial Stiffness** kN/mm 52 **Axial Stiffness** kN/mm 5.0 **Torsional Stiffness** kN-m/deg 56 Unit Mass kg 6.3

ylindrical Bushes

Cylindrical bushes comprise of two concentric metal tubes vulcanized together with a layer of high quality natural rubber. They are effective absorbers of radial, axial, torsional and conical forces and are used as coupling elements in a range of applications. Typical applications include center pivot bushes, vertical link bushes, and axle guides.

		AXLE-BPB	BUSH-NL	BUSH-IR
D1	mm	ф 190	ቀ 109	ф150
L1	mm	270	281	133
Radial Stiffness	kN/mm	40	12.4	12.3
Axial Stiffness	kN/mm	4.0		
Torsional Stiffness	kN-m/deg	0.35	0.06	0.2
Cocking Stiffness	kN-m/deg		0.20	0.3
Unit Mass	kg	25.5	8.8	9.3







BALL JOINT ROLL LINK (BJ-RL-01)





(BUSH TR)



NOSE LINK BUSHING FOR EMD LOCO (BUSH NL)

TRACTION ROD BUSHING



TGHV high-grade silicone insulators provide an alternative to widely used ceramic insulators. These insulators consist of an inner tube made of glass fiber reinforced plastics (FRP) and a silicone elastomer housing covering the FRP rod. This design offers improved mechanical properties (determined by the FRP component) and electrical performance (determined largely by the silicone rubber sheath). As a result, TGHV insulators exhibit outstanding mechanical and electrical characteristics that meet and exceed all overhead line and switchgear engineering requirements.

Composite line post insulators are applied to high voltage power lines. They have good hydrophobicity and anti-pollution properties, high mechanical strength, are lightweight and occupy lesser space as compared to ceramic insulators. TGHV high-grade silicone insulators are easily interchangeable with all types of ceramic insulators.

Insulator Type	Specified Voltage(kV)	Rated Tension Load(kN)	Section Height (m)	Min Arcing Distance (mm)	Min Nominal Creepage Distance (mm)	Lightning Impulse Withstand Voltage (PeakValue>kV)	P.F. Withstand Voltage min.wet (RMS)(kV)
TGHV-10/70	10	70	365±15	180	500	165	50
TGHV-15/70	15	70	390±15	190	450	160	50
TGHV-24/70	24	70	485 <u>+</u> 10	280	660	180	72
TGHV-33/70	33	70	530 <u>+</u> 15	330	820	210	85
TGHV-35/70	35	70	630 <u>+</u> 15	450	1230	230	95
TGHV-35/70	35	70	680 <u>+</u> 10	495	1440	230	95
TGHV-35/100	35	70	680 <u>+</u> 10	495	1440	230	95
TGHV-36/100	36	100	580 <u>+</u> 15	380	900	230	95
TGHV-66/100	66	100	1180 <u>+</u> 15	980	3100	530	196
TGHV-110/100	110	100	1240 <u>+</u> 15	1000	3150	550	230
TGHV-110/100	110	100	1320 <u>+</u> 15	1050	3150	550	230
TGHV-110/100	110	100	1390 <u>+</u> 15	1150	3150	550	230
TGHV-110/100	110	100	1400 <u>+</u> 15	1150	3650	550	230
TGHV-110/100	110	100	1440 <u>+</u> 15	1210	3150	550	230
TGHV-132/120	132	120	1650 <u>+</u> 15	1415	5800	575	370
TGHV-132/160	132	160	1650 <u>+</u> 15	1350	58000	575	370











In 1983, Mr. Rakesh Jain, a B.Com. (Honors) graduate, from Sri Ram College of Commerce, set up a workshop for the manufacture of Diesel Locomotive spares. He was guided by his father, Mr. S. P. Jain, an acclaimed Tool Room engineer of his time.

This workshop, with a staff of 15 employees and covered area of 6,000 Sq. Ft., marked the humble beginning of a group whose foundation was laid on relentless hard-work, uncompromising quality, and a vision of constant improvement, innovation, and continual forward movement.

Today, the group has nine manufacturing facilities located in India in the cities of Lucknow & Dehradun with a workforce of over 350 people, a covered manufacturing area of over 200,000 Sq. Ft. offering one of the most diversified product portfolios in the industry.

Prag continues its journey of producing innovative and technically challenging products and providing outstanding quality and value to its customers under the sustained leadership of its founder, Mr. Rakesh Jain, now strengthened by the induction of his two sons, Gokul and Sarthak.







Fully committed to innovation and continual improvement, our highly skilled and experienced team of engineers is constantly pushing the envelope to engineer new improved products for its customers.

Prag's innovative approach to engineering enables us to provide customers with effective, flexible and affordable engineered solutions. Continual adoption of new technologies, choice of improved materials, and optimization has over the years resulted in several breakthrough product designs.

Some of our innovations at work today include filtration products that provide significantly higher efficiencies and up to eight times the life as compared to incumbent filters, rubber products that have successfully demonstrated significantly higher performance, better life and damping properties, and polyurethane products that have successfully eliminated erstwhile problems of swelling, leakage, and permanent set.





At Prag, development of any new product begins with extensive analysis and simulations on 3D models including FEA, Fatigue, Impact, and CFD analysis on linear as well as non-linear materials. This enables us to generate the most optimum designs that have gone extensive virtual testing well before full development and manufacturing of the products.

For example, using CFD analysis, required filtering efficiencies and pressure drops are factored into the design at the product conceptualization stage itself. This helps us not only design high-performance products but also drastically cuts down the time required for new product development.



In- house Tooling & Prototyping

Our Integrated in-house CNC Machine Shop has the capability to generate high-quality tools and dies directly from mold pattern design generated by our CAD/CAM software.

Rubber and polymer mold flow analysis is done using Mold Flow software before freezing mold design to ensure optimum material flow in mold cavities.

Extensive in-house testing facilities, including purpose built shear, compression, torsional and vibration testing machines and multi-axis dynamic test equipment provide accurate results in real-time for analysis and validation of product prototypes.

Our endurance and weathering test lab can simulate real-life product loading and environment conditions and helps us assess and predict prototype product service life.



CNC Machine Shop

Manufacturing Facilities

Prag's state-of-the-art manufacturing facilities give us an edge when it comes to providing our customers with world-class engineering products.

Machinery and equipment used at Prag come from some of the world's most reputed machinery manufacturers such as Klockner-Desma, State Mix, Baulé, Tung Yu, L&T, Windsor Machines Limited, and Haas Automation.

Our automated assembly lines are equipped with fully computerized conveyor systems with poka-yoke and bar code sensors at each work-station, ensuring compliance of operating procedures and complete product traceability.



Metal Processing



Phosphating Line



Shot Blasting



Rubber Mixing



Quality and reliability of products is accurately tested by our in-line computerized electronic test benches and test rigs duly approved by the Research, Designs and Standardization Organisation of the Indian Railways.



Rubber Injection Molding



Rubber Injection Molding





Multi-Axis Dynamic Endurance Testing



CNC Vibration Test Machine



Ozone & Environment Testing



Low Temperature Testing



Rheometer for Rubber Test



Universal Testing Machine

Repeatedly exceeding customer expectations with products that provide exceptional performance & unfaltering reliability has always been the driving force of Prag Group. To achieve this, we have setup manufacturing and quality control systems that churn out premium quality products successively and consistently.

At Prag, quality is built into the manufacturing process. From incoming raw material to the final product, standard quality checks are laid down at every step to ensure the highest level of quality and product traceability.

All of Prag's manufacturing facilities are ISO 9001:2008 certified and our quality labs are equipped with latest test equipment including:

- Vibration Testing Machine
- Shear, Compression & Torsional Testing
- Rheometers to Test Rubber Mix
- Computerized Universal Testing Machines
- Fire Retardancy Test Lab
- Environmental & Ozone Test Lab
- Functional & Leakage Test Equipment
- Multi-Axis Dynamic Endurance Test Equipment



Our Technology Partners





Rubber & Polyurethane Products | Air Springs | CCSBs | Draft Gears | Polspa Polymer Springs Railroad Air Brake Systems | Pneumatic Clutches & Brakes | Air Dryers | Heat Exchangers Air, Oil & Fuel Filters | Inertial Filtration Systems | Composite Electrical Insulators

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