

Global Rail Capabilities

For more information on Timken rail solutions for your application, contact your local Timken representative or visit www.timken.com/rail.

TIMKEN
Where You Turn

Bearings • Steel •
Power Transmission Systems •
Precision Components • Seals •
Lubrication • Industrial Services •
Remanufacture and Repair •

www.timken.com

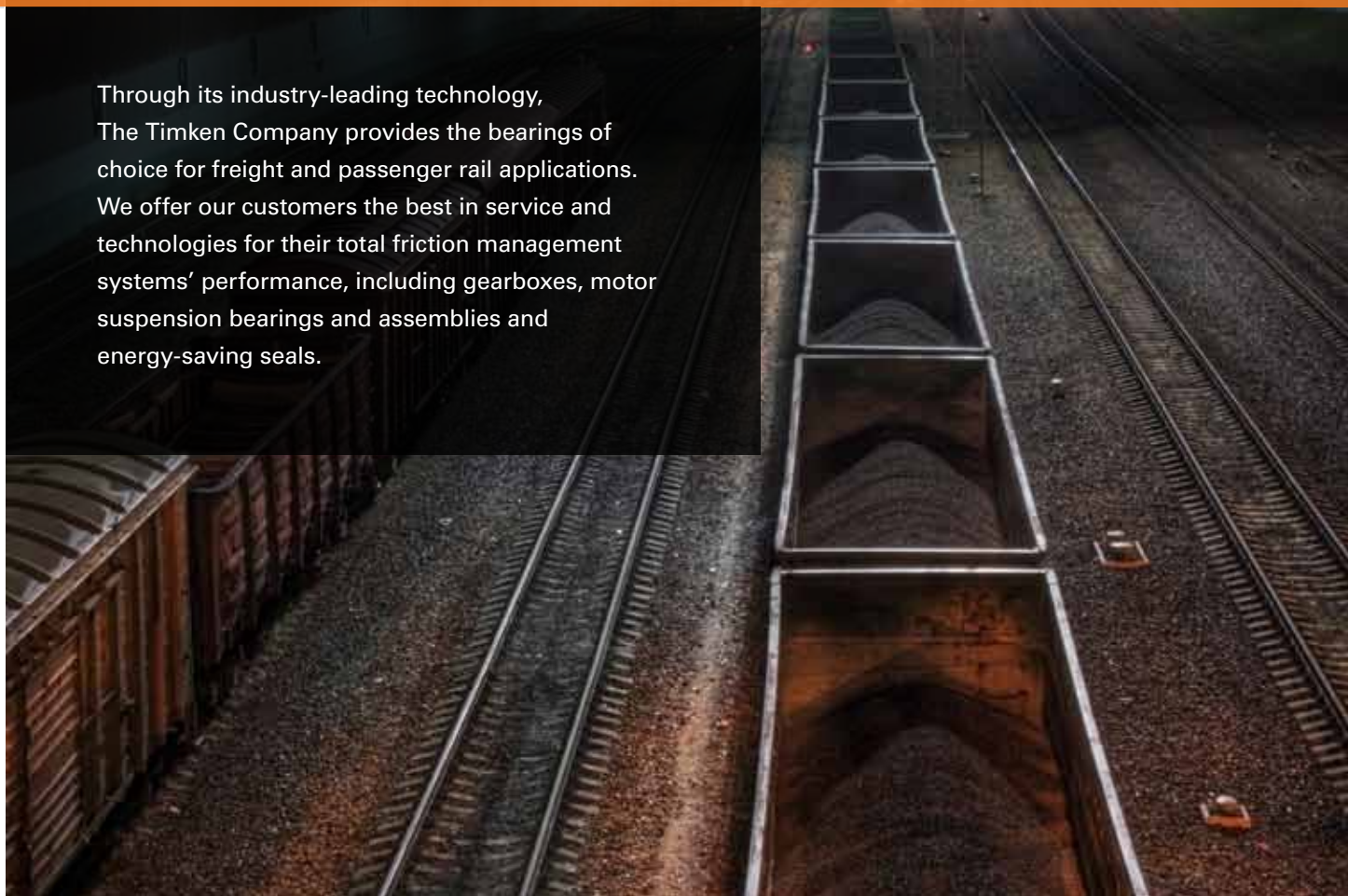
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Through its industry-leading technology, The Timken Company provides the bearings of choice for freight and passenger rail applications. We offer our customers the best in service and technologies for their total friction management systems' performance, including gearboxes, motor suspension bearings and assemblies and energy-saving seals.





Timken has been a leader in the rail industry since the 1920s. Our focus on innovation, product development and process improvement uniquely positions the company to serve the needs of railroads, car builders and rail operators globally.

You'll find Timken products helping to ensure smooth operation for freight, locomotive, passenger, tram and high-speed customers in Europe, Asia, South America, North America, Africa and Australia.

Our global footprint is supported by technology centers that employ skilled technicians, engineers and scientists to study all aspects of rail operations. This leads to continued innovation and improvements for increasingly demanding applications.

When you consider our history, an unbeatable product line and industry-leading technical support, Timken is where the rail industry turns for quality products and services to help optimize performance.

Timken Innovation at Work

Industry-Leading Rail Solutions

In 1929, to demonstrate that tapered roller bearings could be successfully used on locomotive axles, Timken commissioned the "Four Aces" – the first steam locomotive equipped with Timken® tapered roller bearings.

Since those early years, significant advancements have been made in bearings, steel, seals and lubrication technology. Timken has been at the forefront of the industry developing products that are designed to reduce friction and improve operation.

TIMKEN® BEARINGS AND STEEL



AP-2™ Bearing

- An industry standard.
- Carries heavier loads with reduced width and bearing weight.
- Shorter journal reduces axle flexure.
- Less fretting wear between bearing components.
- Traditional AP bearing design also still available.



Performance Plus™ Reconditioned Timken AP™ Bearing

- Increases bearing life and reliability.
- Designed to decrease axle grooving, false set-outs and loose backing rings.
- A reconditioned bearing assembly with exceptional value.



Alloy Steel

- Used in numerous rail applications – steel bars forged into wheels, high-performing grades for piston pins and cylinder liners.
- Rail industry relies on special grades of Timken Parapremium™ steel for axle applications.
- Other steel produced for bearings into rail, cushioning units, axles, rail car wheels, piston pins and cylinder liners in locomotives.

TIMKEN® SEALS AND BACKING RINGS



ECOTURN® Labyrinth Seal

- Essentially zero torque design can save thousands of gallons of fuel annually.
- Can reduce emissions by several tons per year.
- Provides lower and more consistent bearing operating temperatures.



HDL SEAL™

- Provides lower torque, lower temperatures and better fuel efficiency than Timken's NT™ Seal.
- Fewer set-outs and higher service speeds.
- Lower operating costs.
- A lower-cost alternative, the Axle-Saver Seal Wear Ring™, is available.



SureFit® Universal Backing Ring

- Provides the benefit of a fitted backing ring for all axle dust guard diameters.
- Increases performance and improves safety and reliability.
- Reduces wheelset removals and enhances journal axle fillet protection.

TIMKEN SYSTEM SOLUTION



TracGlide® Top-of-Rail Friction Management System

- On-board system applies an innovative and environmentally friendly friction modifier to the top of the rail.
- Acts as a lubricant under rolling conditions and a friction agent when braking.
- Lubricates more completely, provides greater savings and improves performance.
- Governed by on-board lubrication control computer.

TIMKEN SERVICES AND SUPPORT



Rail Bearing Services

- Rail bearing reconditioning.
- Rail component part remanufacture
- On-site vehicle maintenance.
- Locomotive Journal Box conversion.
- Traction Motor Suspension Unit (MSU) reconditioning.
- Axle box overhaul.



Mobile Reconditioning Unit

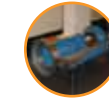
- Self-contained repair facility.
- On-site bearing reconditioning performed by Timken associates or your in-house team.
- Rail component part remanufacture.

TIMKEN UPTIME SOLUTIONS



Premium Rail Grease

- Lasts longer and provides better protection compared to conventional greases.
- Increases protection against water etching and other damage.
- Increases anti-corrosion properties, especially in humid environments.



Motor Suspension Unit (MSU) Tubes

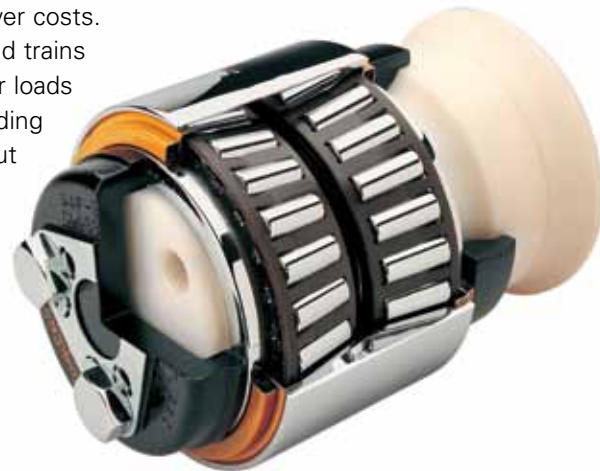
- Increases reliability of MSU operation.
- Reduced radial clearance and maintenance costs.
- Low starting torque.
- Grease lubrication, so no oil levels to maintain.

Timken® AP-2™ Bearing

The Timken® AP™ bearing was introduced in 1954 as a replacement for the widely used friction journal bearings. This self-contained, pre-lubricated bearing package quickly became the design of choice for the industry.

Over time, rail operations evolved. The industry was challenged to improve efficiency and productivity and to lower costs. To achieve this, freight-car weights increased, and trains were operated at higher running speeds. Heavier loads caused more wear and tear on equipment, including fretting wear. These factors raised concerns about bearing reliability.

To meet these growing challenges of increased loads, speeds and longer wheel life, Timken developed the AP-2 bearing for freight cars. Today, almost a million Timken AP-2 bearings are in service.



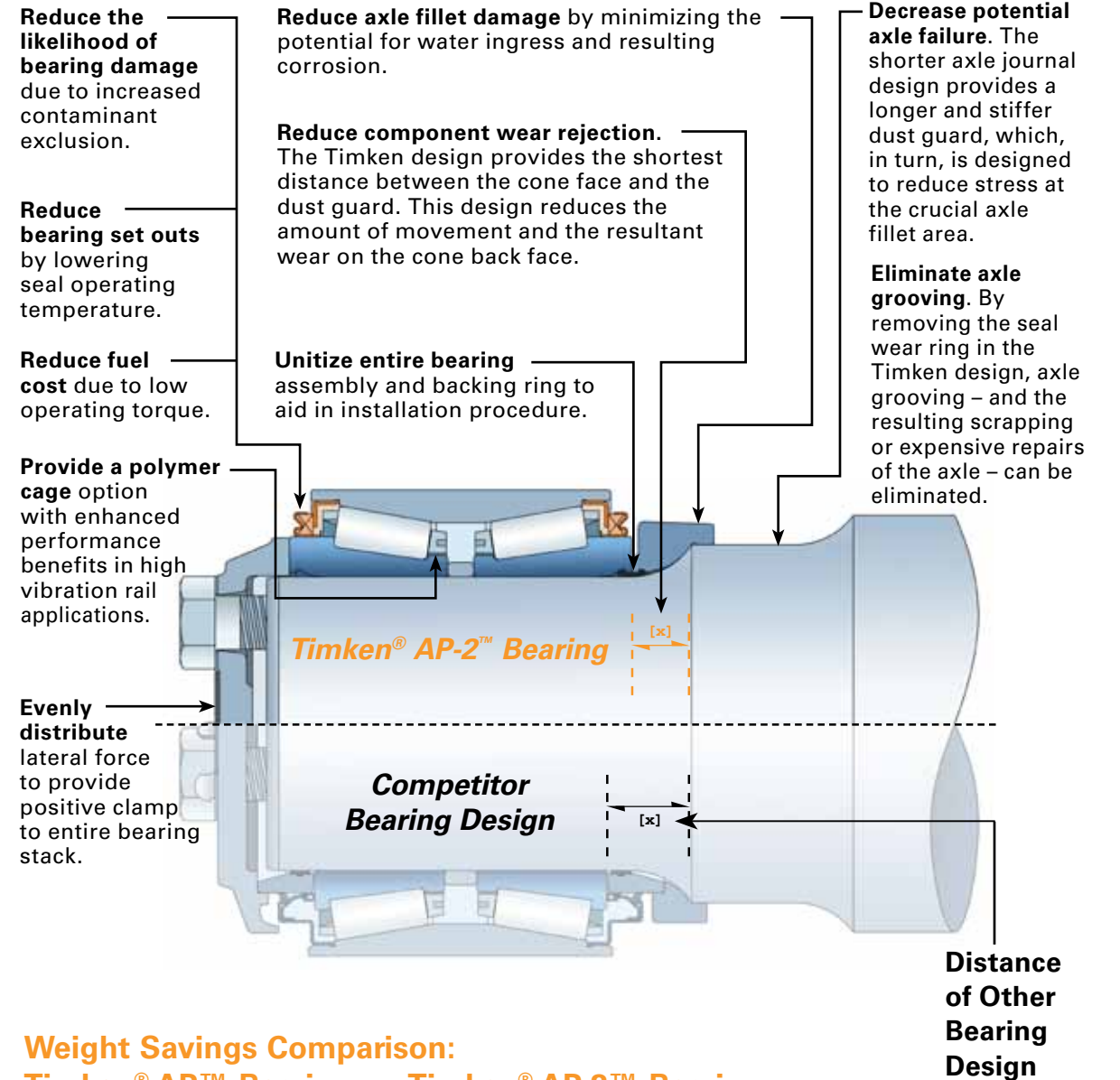
A Better Design

The patented Timken AP-2 design provides for reduced journal axle flexure and less fretting wear. Its compact design incorporates fewer components and reduces bearing weight. In fact, the weight savings per car using AP-2 bearings in place of an AP bearing can reduce the weight of a railcar by several hundred pounds. The AP-2 bearing also offers improved safety and reliability and runs at lower operating temperatures and lower torque than an AP bearing.

When integrated with innovative Timken seal designs and polymer cages, Timken's AP-2 bearing can offer significant energy efficient benefits while providing railroad operators with unparalleled performance.



The Bearing Of Choice: The AP-2™ Bearing is Designed To...



Weight Savings Comparison: Timken® AP™ Bearing vs. Timken® AP-2™ Bearing

AP-2 Class K – 6½ x 9 in. (165.1 mm x 228.6 mm) for 286,000 lbs. (130,000 kg) Gross Rail Load Cars				
	Bearings (2)	Adapters (2)	Axle	Total
Class F Shrouded	223.5 lbs. (101.4 kg)	70.5 lbs. (32.0 kg)	1175.0 lbs. (533.0 kg)	1469.0 lbs. (666.3 kg)
Class K	178.0 lbs. (80.7 kg)	64.0 lbs. (29.0 kg)	1168.0 lbs. (529.8 kg)	1410.0 lbs. (40.0 kg)
Savings Per Wheelset				59.0 lbs. (26.8 kg)
Savings Per Car				236.0 lbs. (101.7 kg)

Timken® ECOTURN® Labyrinth Seal



Analyzing seal performance and developing innovative sealing solutions has been a Timken core competency for decades. In an integrated bearing assembly, the seal is one of the most critical and differentiating components impacting overall bearing and system performance.

In addition to traditional lip-style seals and our HDL SEAL™ hybrid design bearing, Timken offers the only true non-contacting labyrinth seal - ECOTURN®, a revolutionary, patent-pending design that significantly reduces seal torque. The result is less frictional forces in the bearing, which, in turn, can directly reduce the operating temperature, the amount of fuel consumed and emissions released into the atmosphere.

R&D Magazine selected ECOTURN® Labyrinth Seal as one of the 100 most technologically significant products introduced during 2008.

ECOTURN® Benefits:

- Can save thousands of gallons of fuel annually by reducing emissions by several tons per year.*
- Provides lower and more consistent bearing operating temperatures.
- Reduces water ingress.

**Based on a hundred-car-unit train traveling 100,000 miles annually. Visit Timken.com/railsavings for more details.*

Timken® SureFit™ Universal Backing Ring



Timken's SureFit™ Universal Backing Ring offers a solution to loose backing rings, a problem that has plagued the rail industry for more than 30 years. In particular, the SureFit™ Universal Backing Ring design significantly reduces loose backing ring problems on "untoleranced" axles.

Approved by the Association of American Railroads (AAR), SureFit provides an interference fit between the axle dust guard diameter section and the backing ring, regardless of the axle dust guard diameter (.050" range). This reduces the potential for the backing ring to loosen in service. The impact for the rail industry is great as loose backing rings currently cause premature wheel set removals.

SureFit™ Universal Backing Ring Benefits:

- Reduced wheel set removals.
- Enhanced journal axle fillet protection.
- Maintain premium wheel set investment.
- Increased axle life and reduced axle scrap rate.

Timken® TracGlide® Top-of-Rail Friction Management System

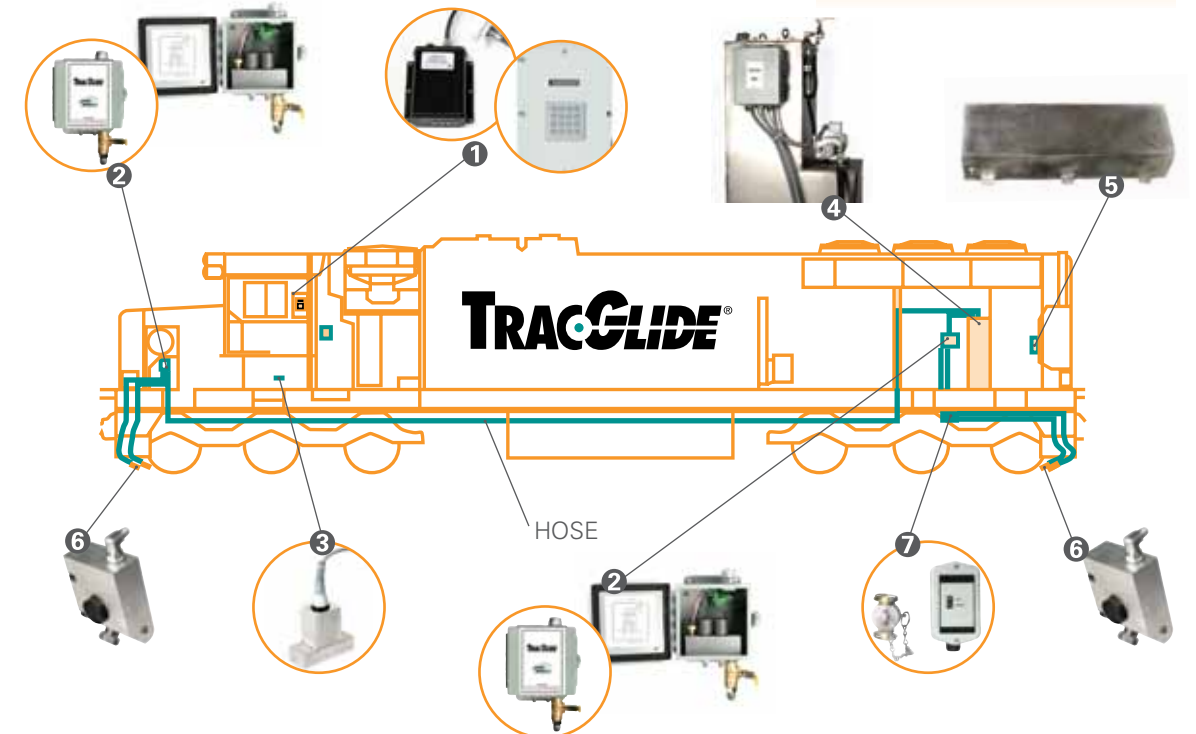
Timken's TracGlide® system is an intelligent, on-board friction management solution that applies an innovative and environmentally friendly modifier to the top of rails once the last axle on a locomotive has passed. The friction modifier contains no solids and dissipates as the train passes with no buildup left behind.

By decreasing rail lateral forces, our TracGlide system reduces the associated wear on the wheels and rails. Other benefits include increased train productivity, fuel and energy savings and reduced tread defects and rail head defects.

TracGlide systems have performed successfully in the rail industry for years on Class I and regional railways around the world.

TracGlide System Benefits:

- Energy savings up to 7 percent.
- Reduces lateral curving force up to 40 percent.
- Increases overall train productivity up to 5 percent.
- Rail maintenance cost reductions up to 5 percent.



① CONTROLLER AND GPS ② SOLENOID BOX ③ BP PRESSURE SENSOR ④ MAIN TANK
⑤ AUXILIARY TANK ⑥ NOZZLE ⑦ GROUND FILL PORTS (BOTH SIDES OF THE LOCOMOTIVE)

Timken Rail: At Work Around the World

Timken has developed thousands of bearings specifically for top rail customers including...



Timken Rail Bearing Services

Timken is the leader in bearing reconditioning for the rail industry. Through our global rail bearing services footprint, Timken breathes new life into used bearings by replacing worn and damaged parts. All Timken facilities are ISO Certified, and our North American operations

are approved by the Association of American Railroads and certified under the AAR M-1003 Quality Assurance Program.

For freight cars, locomotives, passenger vehicles or high-speed trains, you can depend on Timken for remanufacturing

and reconditioning. Reconditioning programs are easily integrated with existing maintenance programs. Along with significant cost savings, reconditioned bearings include the equivalent of a new bearing warranty. Ask your Timken sales representative for more details.

Services include:

Rail Bearing Reconditioning

- Bearings assemblies are cleaned and inspected and fitted with new components, if needed.
- Refurbished bearings are then requalified and reassembled.
- Completely inspect many types of bearings to meet appropriate reconditioning specifications.

On-site Rail Vehicle Maintenance

- Timken repair specialists travel to customer locations to repair and lubricate axle boxes and perform other maintenance tasks on rail vehicles.

Locomotive Journal Box Conversion

- Hyatt™ journal box housing is modified to accept a Timken Class GG bearing.
- GG bearing has fewer parts – seven versus 20 – easing assembly and reducing maintenance costs.

Hyatt™ Locomotive Journal Bearing Reconditioning

- Hyatt cylindrical bearing locomotive journal boxes are requalified or exchanged for reconditioned units.

Traction Motor Suspension Unit (MSU) Reconditioning

- Many MSUs operate on Timken bearings.
- Comprehensive reconditioning solution offers higher reliability, reduced radial clearance, low starting torque and reduced maintenance costs.

Axle Box Overhaul

- Reconditioning and remanufacturing of axle boxes includes bearings and other components.

Timken® Rail Bearing Portfolio

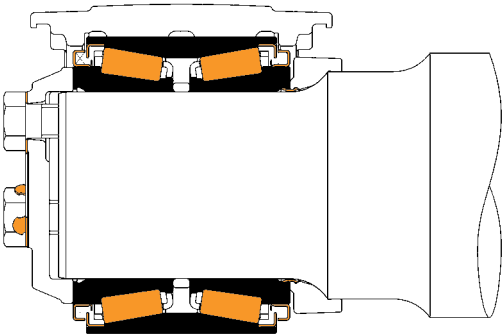
Size and Class		Dimension			Load Ratings		Cone Part Number
Size	Class	cone bore	cup O.D.	cup width	C90(2)	C90(2)	
metric		mm	mm	mm	lbf	kN	
SP100	B	100.00	165.10	114.3	26,900	120	HM120846
SP120	C	120.00	195.00	131.4	38,600	172	HM124649
SP130	D	130.00	210.00	132.0	41,800	186	HM127442
130		130.00	230.00	160.0	53,300	237	H127746
SP140	E	140.00	220.00	140.0	43,800	195	HM129843
SP150	F	150.00	250.00	160.0	59,700	266	HM133436
SP160		160.00	250.00	160.0	59,700	266	HM133448
	G	177.79	276.23	185.7	68,600	305	HM136948
	GG	165.09	301.70	196.85	87,300	388	H337840
		174.61	301.70	196.85	87,300	388	H337844
130		130.00	240.00	160.0	59,100	263	NP426306
130		130.00	250.00	160.0	59,100	263	NP546565
	L	144.45	219.81	140.0	43,800	195	NP891226
150		150.00	250.00	160.0	59,700	266	NP596043
	K	157.15	249.87	160.0	59,700	266	NP633994
	M	165.09	263.53	166.7	67,200	299	NP239427



Class and Size		Dimension			Load Ratings		Cone Part Number
Class	Size	cone bore	cup O.D.	cup width	C90(2)	C90(2)	
		in.	in.	in.	lbf	kN	
B	4 1/4 x 8	4.0000	6.5000	4.5000	26,900	120	HM120848
C	5 x 9	4.6875	7.6875	5.6250	38,600	172	HM124646
D	5 1/2 x 10	5.1870	8.1875	6.0000	41,800	186	HM127446
E	6 x 11	5.6870	8.6875	6.4374	43,800	195	HM129848
F	6 1/2 x 12	6.1870	9.9375	7.2500	59,700	266	HM133444
G	7 x 12	6.9995	10.8750	7.3120	68,600	305	HM136948
GG	7	6.4995	11.8780	7.7500	87,300	388	H337840
L	6 x 8	5.6870	8.6564	5.5118	43,800	195	NP891226
K	6 1/2 x 9	6.1870	9.8375	6.2992	59,700	266	NP633994
M	7 x 9	6.4995	10.3750	6.5620	67,200	299	NP239427



Global Rail Applications

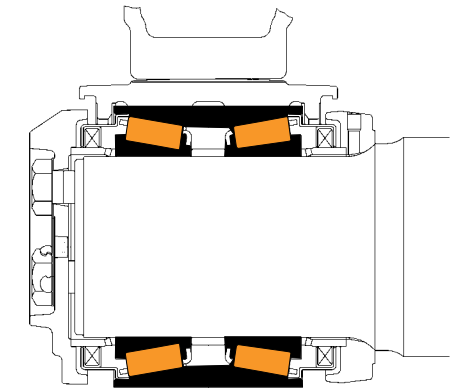


Class K

Customer/Application:

- Heavy-haul freight cars throughout North America.
- Commonly found on tanker, hopper and gondola cars.

Gross Rail Load: 286,000 lbs (129.7 kg)



Class G

Customer/Application:

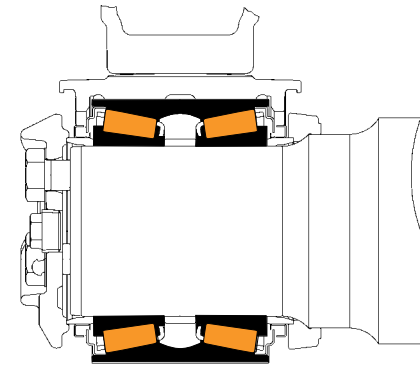
- Heavy haul freight cars in Australia and Colombia.
- Intermodal freight and passenger cars in North America.
- Freight locomotives throughout the world.

Axle: 6½ to 7 in. diameter (165.1 to 177.8 mm)

Freight Car Designations*			
CLASS	Nominal Journal Size	Car Capacity	Gross Rail Load
	in. (mm)	tons (metric tons)	lbs. (metric tons)
B	4¼ x 8 (108.0 x 203.2)	30 (27.2)	103,000 (46.7)
C	5 x 9 (127.0 x 228.6)	40 (36.3)	142,000 (64.4)
D	5½ x 10 (139.7 x 254.0)	50 (45.4)	177,000 (80.3)
E	6 x 11 (152.4 x 279.4)	70 (63.5)	220,000 (99.8)
L	6 x 8 (152.4 x 203.2)	70 (63.5)	220,000 (99.8)
F	6½ x 12 (165.1 x 304.8)	100 (90.7)	263,000 (119.3)
K	6½ x 9 (165.1 x 228.6)	100-120 (90.7-108.9)	286,000 (129.7)
G	7 x 12 (177.8 x 304.8)	125 (113.4)	315,000 (142.9)
M	7 x 9 (177.8 x 228.6)	125 (113.4)	315,000 (142.9)

*From the Association of American Railroads (AAR).

Global Rail Applications continued

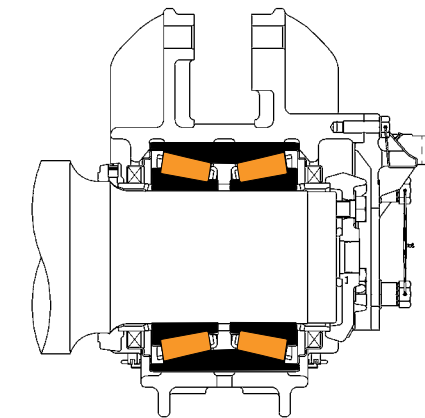


Short G

Customer/Application:

- Heavy haul freight cars in Australia and Colombia.
- Intermodal freight and passenger cars in North America.
- Freight locomotives throughout the world.

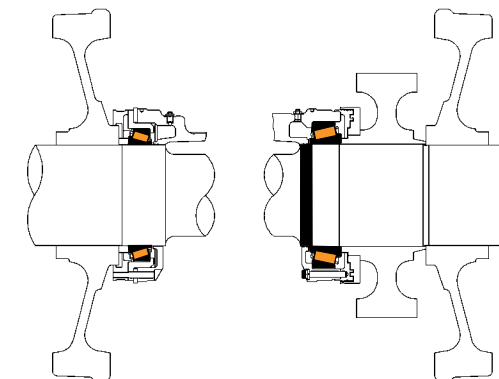
Axle: 6½ to 7 in. diameter (165.1 to 177.8 mm)



Class GG

Customer/Application: Locomotives

Axle: 6½ to 6¾ in. diameter (165.1 to 174.6 mm)



MSU

Customer/Application: Locomotives throughout the world

Popular series: M249700, M349500, LM742700, M244200, M246900 grease lubricated

Comments: Product is case carburized, which enhances bearing performance and durability

Timeline

Highlights of The Timken Company's innovations and achievements in the rail industry:



1929 Timken commissions the "Four Aces" – the first steam locomotive equipped with Timken® tapered roller bearings.



1954 Timken pioneers the AP™ bearing, replacing friction journal bearings.

1958 The Timken AP bearing receives American Association of Railroads (AAR) conditional approval Certificate No. 1.



1967 The company's patented three-step seal case is introduced.

1970 The Timken AP bearing receives AAR unconditional approval Certificate No. 1-A. A patented lanced-tab locking plate design to improve cap screw retention is introduced.



1973 The Timken® XP™ bearing is introduced. It is the forerunner of the AAR standard that was put into practice four years later.



1976 The Timken fitted backing ring becomes AAR mandatory on new Class F bearings. The No Field Lubrication (NFL) bearing concept, a spin-off from the Timken XP bearing, is adopted by AAR.

Early 1980s Test lab capabilities expand to include "hot box" and "why made code 04" analysis.



1981 Timken bearings are selected for SNCF TGV locomotive that breaks the world speed record (350km/hour).



1982 Proprietary ultrasonic macro-inclusion detection method results in improvements to quality of Timken bearing steel.

1988 Timken pioneers HDL SEAL™ technology.



1994 Timken® AP-2™ compact bearing placed into service, becoming the new industry standard for the rail industry.



1995 Timken acquires Rail Bearing Service, the authorized remanufacturer of Timken AP bearings.

Timken bearings are selected for the JR West 500 Series, the first high-speed train in Japan equipped with tapered roller bearings.



1997 New railroad bearing reconditioning facility opens in Great Britain. AAR grants unconditional approval for Timken HDL Seal and Sleeve axle salvage and repair procedure.

1999 Timken celebrates its 100th anniversary.



2001 TracGlide® top-of-rail friction management system demonstrates significant fuel savings.



2002 Timken bearings are selected for Talgo 350 power cars and coaches in Spain that set a constant-speed world record (non-magnetic) of 350 km/hour.



2003 Timken acquires The Torrington Company and expands its line of products and services for rail.

2004 Introduction of SureFit™ Universal Backing Ring, which is designed to significantly reduce the potential for the backing ring to loosen while in service.



2005 Timken creates a new company, Timken Bearing Services South Africa (Pty) Ltd., to enhance South African economic empowerment.



2006 Timken reconditions the first bearings for China's Daqin Coal Line. Timken journal bearings are selected for locomotives that operate on the highest railway in the world, through the Himalayan mountain region.



2008 Timken introduces its EcoTurn® labyrinth seal, a quantum leap in low torque sealing technology for Class K AP-2™ bearings.