

Setting Preload in Heavy-Duty Wheel Bearings

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- 1. Scope**—This SAE Recommended Practice applies to the four primary, large volume applications in the class 7-8 heavy-duty market place, as specified in SAE J1842:
- a. "N" trailer axle
 - b. "R" powered rear axle
 - c. "FF / FG" nonpowered front axle
 - d. "P" trailer axle

This document applies to on-highway, disc wheel / outboard drum brake applications. It is not applicable to those applications that exceed the GAWR ratings or the load line restrictions listed in columns "A," "B," and "C" of Table 1. Load lines are measured from the inboard bearing cup backface as shown in 3.4.

This document establishes preload force values only. The methodology to obtain these force values must be determined by the fastener supplier and/or axle assembler.

This document reviews the bearing system. It is NOT intended to prescribe (new or existing) axle and/or hub manufacturers' ratings and/or specifications.

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- 1.1 Purpose**—The purpose of this document is to list acceptable axial bearing preload force values for conventional wheel-end components used in heavy-duty tractors and trailers.

The audience of this document is intended to be the axle and/or component engineers. The user should be aware of both the benefits and the risks of this practice.

- a. **Benefits**—Bearing and seal life can be maximized when the bearings are adjusted to a light, controlled preload setting.
- b. **Risks**—The benefits of a light and controlled preload bearing setting are negated if bearing preload force is excessive. Care must be taken to ensure that preload force does not exceed the recommended amounts. Excessive preload can cause high operating temperatures, reduced lubricant life, reduced seal life, and premature bearing damage. Bearing lock-up and/or wheel-end assembly separation may occur if the preload force is excessive. A light preload bearing setting should only be attempted if the entire bearing setting process is accurate and repeatable.

For adjustment recommendations where bearing end-play is desired, refer to The Maintenance Council (TMC) Recommended Practice #RP-618.

- 1.2 Rationale**—This document has been reaffirmed to comply with the SAE 5-Year Review policy.

2. References

- 2.1 Applicable Publications**—The following publications form a part of this specification to the extent specified herein. Unless otherwise indicated, the latest version of SAE publications shall apply.

- 2.1.1 **SAE PUBLICATION**—Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or 724-776-4970 (outside USA), www.sae.org.

SAE J1842—Axle End Standardization

- 2.1.2 **TMC PUBLICATION**—Available from the Technology and Maintenance Council, American Trucking Associations, 2200 Mill Road, Alexandria, VA 22314-5388, Tel: 703-838-1700, www.truckline.com.

TMC RP-618—Adjustment of Wheel Bearings

3. Definitions

- 3.1 End-play**—An axial clearance between the bearing's rolling elements and the races producing a measurable axial wheel-end movement when a force is applied, first in one axial direction and then in the opposite direction, after oscillating the wheel-end.
- 3.2 Preload**—A load resulting from an axial interference between the bearing's rolling elements and races resulting in no discernible axial wheel-end movement when a force is applied, first in one axial direction and then in the opposite direction, after oscillating the wheel-end.
- 3.3 Conventional Wheel-end**—A wheel-end assembly that consists of a hub, an inboard seal, two single row tapered roller bearings, and fastening hardware (Figure 1). Conventional wheel-ends use the fastener to establish bearing setting; they do not have a bearing spacer between the bearings.
- 3.4 Load Line**—The distance from the inboard bearing cup backface to the center of the tire(s) contact (Figures 2 and 3) which directly influences the relative wheel bearing load distribution.

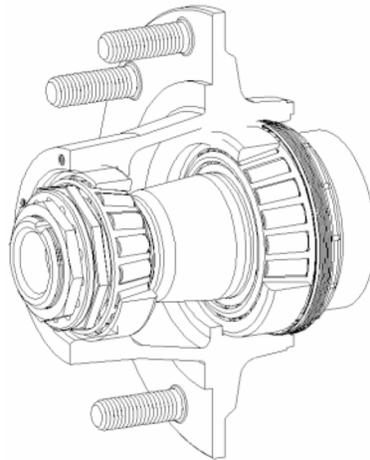


FIGURE 1—CONVENTIONAL WHEEL END

4. **Preload Settings**—Target (which is the optimum preload force value) and maximum preload force values can be found in columns “D” and “E” in Table 1. Suppliers and/or axle assemblers developing a preload methodology should take care to ensure that their fastener adjustment methodology never results in a final setting that exceeds the maximum value listed in column “E”.

TABLE 1—PRELOAD SETTINGS

SAE Configuration	“A”	“B”	“C”	“D”	“E”
	Maximum GAWR (Gross Axle Weight Rating)				
	N (lbs)	mm (in)	mm (in)	N (lbf)	N (lbf)
“N” trailer axle	111 220 (25 000)	23.1 (0.91)	52.3 (2.06)	2 220 (500)	4 450 (1 000)
“R” powered rear axle	133 470 (30 000)	46.2 (1.82)	75.2 (2.96)	2 220 (500)	4 450 (1 000)
“FF / FG” nonpowered front axle	65 390 (14 700)	−24.9 (−0.98)	42.9 (1.69)	1 110 (250)	2 220 (500)
“P” trailer axle	113 450 (25 500)	48.8 (1.92)	78.0 (3.07)	2 220 (500)	4 450 (1 000)

1. Load line position is measured from the inboard bearing cup backface, the sign convention is explained in Figures 2 and 3.

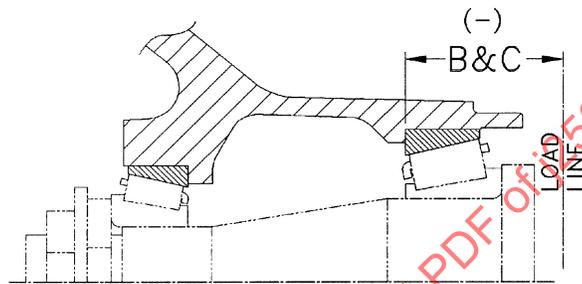
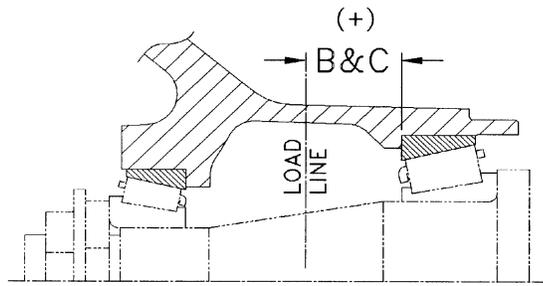


FIGURE 2—NONPOWERED FRONT

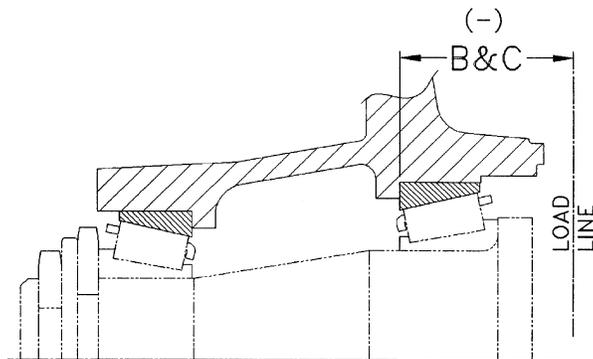
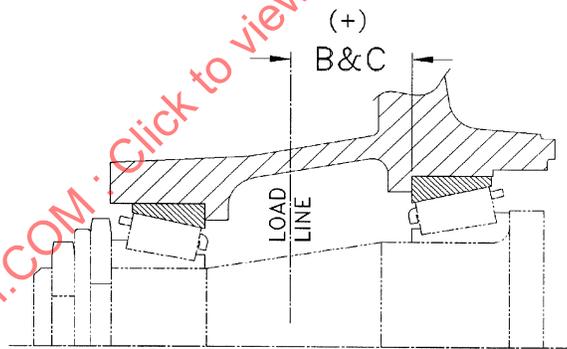


FIGURE 3—TRAILER OR POWERED REAR

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