



## INFORMATION SERVICE BULLETIN

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### INSPECTION PROCEDURES TO IDENTIFY POTENTIAL SIDEWALL “ZIPPER RUPTURES” IN STEEL CORD RADIAL TRUCK, BUS AND LIGHT TRUCK TIRES

#### PURPOSE

The purpose of this bulletin is to describe the inspection procedures for identifying potential sidewall circumferential ruptures (also known as “zipper ruptures”) on truck/bus tires and light truck tires of steel cord radial construction<sup>1</sup>.

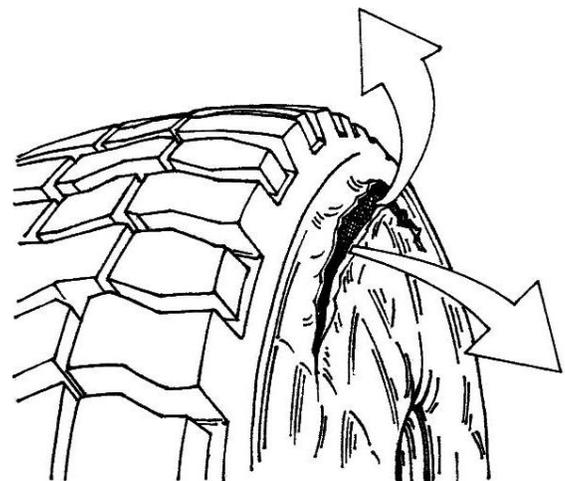
The photo in **FIGURE 1** is an example of an actual zipper rupture in a truck tire casing. Note the characteristic “zipper-like” seam running along the sidewall where the rupture occurred.



#### **! WARNING**

Any tire suspected of operating underinflated and/or overloaded must be approached with caution. Permanent damage due to operating a tire underinflated and/or overloaded cannot always be detected. Any tire known or suspected of being operated at 80 percent or less of normal operating inflation pressure and/or overloaded could possibly have permanent sidewall structural damage (steel cord fatigue).

Ply cords weakened by underinflation and/or overloading may break one after another, until a rupture occurs in the upper sidewall with accompanying instantaneous air loss and explosive force. This can result in serious injury or death.



#### **! WARNING**

TIRE AND RIM SERVICING CAN BE DANGEROUS AND MUST ONLY BE PERFORMED BY TRAINED PERSONNEL USING PROPER PROCEDURES AND TOOLS.

FAILURE TO FOLLOW THESE PROCEDURES<sup>2</sup> MAY RESULT IN SERIOUS INJURY OR DEATH.

# Step 1 – Inspect Tire

## “SUSPECT” TIRES

When a vehicle equipped with steel cord radial truck/bus tires or light truck tires returns to its service facility and it is suspected of operating with one or more tires underinflated and/or overloaded, the service personnel should approach such tires with caution. A trained tire technician **must remove the valve core** and completely deflate the tire before removing the tire/rim/wheel assembly from the vehicle. After it is removed from the vehicle, the technician should demount the tire from the rim/wheel and conduct a complete visual and hands-on inspection of the tire.

For tires that have already been demounted and are being prepared to be repaired/retreaded, the same inspection procedure applies. If available, the technician could also utilize non-destructive inspection equipment, such as shearography, x-ray, or other non-destructive testing, to look for any anomalies present in the casing. For all tires returning to service, a trained tire technician should conduct a complete visual and hands-on inspection of the tire in a well-lighted area and with a hand-held grazing light (see FIGURES 2, 3, 4).

### LOOK FOR:

- Punctures or other injuries
- Distortions or undulations (ripples and/or bulges) in the sidewall
- Cuts, snags, or chips that expose any body (ply) cords or steel wire



### FEEL FOR:

- Soft spots in the sidewall flex area
- Distortions or undulations (ripples and/or bulges)
- Protruding filaments (wire) indicating broken cords



### LISTEN FOR:

- Any snapping, popping or crackling sounds



FIGURE 2



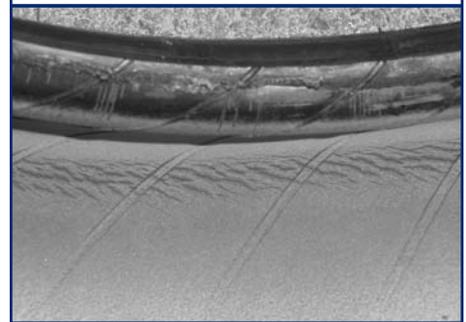
Using a grazing light or other indirect light source will produce shadows left by any sidewall irregularities – signs of a possible “zipper rupture”.

FIGURE 3



Note the exposed body (ply) cord on the tire innerliner. This condition is the result of the tire being operated underinflated and/or overloaded.

FIGURE 4



Wrinkled and discolored innerliner in the tire’s flex area is another sign of being operated underinflated and/or overloaded.

IF TIRE CONTAINS PUNCTURES, CUTS, SNAGS, OR CHIPS EXPOSING BODY (PLY) CORDS OR STEEL WIRE, BUT **DOES NOT** EXHIBIT ANY OTHER POTENTIAL ZIPPER CHARACTERISTICS, IT SHOULD BE REFERRED TO A FULL-SERVICE REPAIR FACILITY FOR FURTHER INSPECTION TO DETERMINE IF IT IS A REPAIRABLE CONDITION AND NOT A SOURCE OF A POTENTIAL 'ZIPPER RUPTURE'.

IF TIRE **DOES** EXHIBIT POTENTIAL ZIPPER CHARACTERISTICS — IT MUST BE MARKED APPROPRIATELY, MADE UNSERVICEABLE AND NON-REPAIRABLE AND THEN SCRAPPED!

IF **NONE** OF THESE CONDITIONS ARE PRESENT, WITH THE VALVE CORE STILL REMOVED, CONTINUE TO STEP 2.

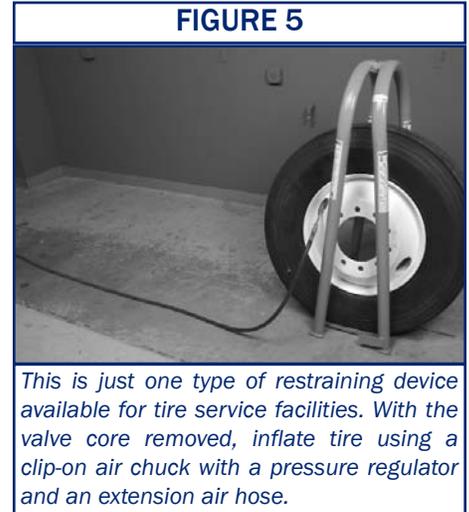
# Step 2 - Inflate Tire to 20 PSI

## PROPER INITIAL INFLATION

If none of the “zipper rupture” conditions are present during the initial inspection of the tire (Step 1), mount the tire on its rim/wheel assembly and inflate to approximately 5 psi to seal the beads<sup>2</sup>. Place the assembly in an OSHA-approved restraining device, such as a tire safety cage<sup>3</sup>. See FIGURE 5 and the **WARNING** below.

# ⚠ WARNING

DO NOT place hands or head in or near the restraining device while inspecting and inflating the tire. Even in a restraining device, close proximity to the force of air and/or exploded remnants from a tire rupture could cause serious personal injury or death. ALWAYS remain outside of the tire’s trajectory as in the illustrated examples above. NOTE: Under some circumstances, the trajectory may deviate from its expected path.



Inflate the tire, **with the valve core removed**, using a clip-on air chuck with a pressure regulator and an extension air hose.

- ▶▶ For light truck and medium truck tires inflate the tire up to 20 psi (see FIGURE 6);
- ▶▶ For tires designed for bus and refuse applications, inflate the tire up to 40 psi<sup>4</sup>.

## THROUGHOUT INITIAL INFLATION IN STEP 2, ALWAYS —

### LISTEN FOR:

- Any snapping, popping or crackling sounds



### LOOK FOR:

- Distortions or undulations (ripples and/or bulges) in the sidewall



IF **ANY** OF THESE CONDITIONS ARE PRESENT DURING INFLATION — **STOP!**  
DO NOT APPROACH TIRE. BEFORE REMOVING FROM RESTRAINING DEVICE COMPLETELY DEFLATE TIRE REMOTELY. REMOVE CLIP-ON AIR CHUCK. TIRE MUST BE MARKED APPROPRIATELY, MADE UNSERVICEABLE AND NON-REPAIRABLE AND THEN SCRAPPED!

IF **NONE** OF THESE CONDITIONS ARE PRESENT, WITH THE VALVE CORE STILL REMOVED, CONTINUE TO STEP 3.

# Step 3 - Inflate Tire to 20 PSI OVER Maximum Inflation Pressure on Sidewall

## CONTINUE INFLATION

If none of the 'zipper rupture' conditions are present during Step 2 (*initial inflation 20 psi for LT and truck tires; 40 psi for bus and refuse tires*), then continue the inflation process in the restraining device, **with the valve core still removed**, using a clip-on air chuck with a pressure regulator and an extension air hose.

- ▶▶ For light truck and medium truck tires, continue inflating the tire to **20 psi OVER** the maximum inflation pressure molded on the tire sidewall — **but do not exceed 120 psi.**
- ▶▶ For tires designed for bus and refuse applications, continue inflating the tire to **20 psi OVER** the maximum inflation pressure molded on the tire sidewall — **but do not exceed 140 psi.**

ALWAYS remain outside the tire’s trajectory. See **WARNING** on previous page.

Below are some examples of visible sidewall conditions that are indicative of a pending “zipper rupture”. In FIGURE 7, note the bulge in the sidewall; in FIGURE 8, note the undulating rippled sidewall.

## THROUGHOUT INFLATION PROCESS IN STEP 3, ALWAYS —

### LISTEN FOR:

- Any snapping, popping or crackling sounds



### LOOK FOR:

- Distortions or undulations (ripples and/or bulges) in the sidewall



FIGURE 7



FIGURE 8



IF **ANY** OF THESE CONDITIONS ARE PRESENT DURING INFLATION OF THE TIRE — **STOP!**

DO NOT APPROACH TIRE. BEFORE REMOVING FROM RESTRAINING DEVICE COMPLETELY DEFLATE TIRE REMOTELY. REMOVE CLIP-ON AIR CHUCK. TIRE MUST BE MARKED APPROPRIATELY, MADE UNSERVICEABLE AND NON-REPAIRABLE AND THEN SCRAPPED.



IF **NONE** OF THESE CONDITIONS ARE PRESENT, REMOVE CLIP-ON AIR CHUCK, INSTALL THE VALVE CORE, AND ADJUST THE INFLATION PRESSURE TO THE RECOMMENDED OPERATING INFLATION PRESSURE.

###

## ENDNOTES

- 1 Truck/Bus Tires are load range “F” and higher; Light Truck Tires are load ranges “E” or lower. For construction determination please refer to the tire sidewall markings.
- 2 Refer to the RMA “Demounting and Mounting Procedures for Truck/Bus Tires” and “Demounting and Mounting Procedures for Passenger and Light Truck Tires” wall charts for details.
- 3 Occupational Safety and Health Administration Standard Title 29 CFR Ch. XVII §1910.177 requires all tubeless and tube-type tires on commercial vehicles to be inflated using an approved restraining device (e.g., safety cage), or barrier, and using a clip-on air chuck with a pressure regulator and an extension air hose. While the OSHA standard pertains to medium/heavy truck tires, RMA also strongly recommends the use of a safety cage for all steel cord radial light truck tires.
- 4 Due to heavier sidewall construction, bus and refuse\* tires typically present sidewall distortions and other visual and audible characteristics of “zipper ruptures” at 40 psi, whereas light truck and medium truck tires typically present these characteristics at 20 psi. \* Refuse tires are designed for high level of scrub, high load capacity, sidewall damage resistance and multiple retread capability.

## OTHER REFERENCE MATERIAL

- 👉 Tire Industry Association (TIA) - Training Video *“Detecting Potential Zipper Ruptures in Steel Cord Radial Tires in Tire Service Operations”*  
Available to order online: [www.tireindustry.org](http://www.tireindustry.org) - Click on “Shop” link
- 👉 Demounting and Mounting Procedures wall charts  
Available to order online: [www.rma.org/publications](http://www.rma.org/publications)
- 👉 Technology and Maintenance Council of the American Trucking Associations, Inc., *Recommended Maintenance Practices Manual*  
Available to order online: [www.truckline.com/store](http://www.truckline.com/store)
- 👉 U.S. Department of Labor Occupational Safety and Health Administration Title 29 Code of Federal Regulations Ch. XVII Section 1910.177 *Servicing multipiece and single piece rim/wheels*  
Available to view/download Online: [www.gpoaccess.gov/cfr/index.html](http://www.gpoaccess.gov/cfr/index.html)

## ACKNOWLEDGEMENTS

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