Any tire suspected of operating underinflated and/or overloaded must be approached 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. Once removed from the vehicle, the tire should be identified as suspect and be carefully inspected by the technician to determine the cause of underinflation or any other tire damage resulting from underinflation and/or overloading.

The purpose of this wall chart is to describe the inspection procedures for identifying potential sidewall circumferential ruptures — also known as “zipper ruptures” — on truck, bus and light truck tires of steel cord radial construction.¹
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.

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 may result in serious injury or death.

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 below. NOTE: Under some circumstances, the trajectory may deviate from its expected path.
“ZIPPER RUPTURE”

FOR MORE DETAILS, PLEASE REFER TO THE RMA TISB VOL. 33 “INSPECTION PROCEDURES TO IDENTIFY POTENTIAL SIDEWALL ‘ZIPPER RUPTURES’ IN STEEL CORD RADIAL TRUCK/BUS AND LIGHT TRUCK TIRES”.

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.
INTRODUCTION

THIS WALL CHART IS A SUPPLEMENT TO THE RUBBER MANUFACTURERS ASSOCIATION’S TIRE INFORMATION SERVICE BULLETIN VOLUME 33 OF THE SAME TITLE. BE SURE TO READ AND UNDERSTAND BOTH DOCUMENTS AND PAY ATTENTION TO ALL WARNINGS. ONLY TRAINED TIRE TECHNICIANS SHOULD SERVICE TIRE/RIM/WHEEL ASSEMBLIES. FOLLOW THESE INSPECTION PROCEDURES FOR IDENTIFYING POTENTIAL SIDEWALL “ZIPPER RUPTURES” AS WELL AS ANY RELATED TIRE/RIM/WHEEL SERVICING PROCEDURES FOR DEMOUNTING/MOUNTING 2,3.

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. See WARNINGS.

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.
DURING STEP 1

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) in the sidewall
- PROTRUDING FILAMENTs (WIRE) INDICATING BROKEN CORDs

LISTEN FOR:

- ANY SNAPPING, POPPING OR CRACKLING SOUNDS

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.
“ZIPPER RUPTURE”

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 in Step 1, mount the tire on its rim/wheel assembly and inflate to approximately 5 psi to seal the beads. Place the assembly in an OSHA-approved restraining device, such as a tire safety cage (example, right). See WARNINGS.

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.
FOR TIRES DESIGNED FOR BUS AND REFUSE APPLICATIONS, INFLATE THE TIRE UP TO 40 PSI.

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 DEFLECT 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. ALWAYS remain outside the tire’s trajectory. See WARNINGS.

The photo (right) is an example of a tire being inflated in a restraining device. The distorted sidewall indicates a potential “zipper rupture”.

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.
“ZIPPER RUPTURE”

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

IF ANY OF THESE CONDITIONS ARE PRESENT DURING INFLATION OF THE TIRE — STOP! DO NOT APPROACH TIRE. BEFORE REMOVING FROM RESTRAINING DEVICE COMPLETELY DEFATE 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.