Split Rim Safety Procedures

A 20-inch tire inflated to 100 psi can contain up to 40,000 lbs. of explosive force. That’s enough force to throw a small car 15 feet in the air, and enough to cause a very serious injury or fatality. Locking rings or other components may be propelled at speeds up to 130 miles per hour. Split rim wheel assemblies pose significant “blow-off” risks when inadequate precautions and improper procedures are applied.

Most incidents occur during tire inflation, usually because of over-inflation or improper procedure, or because of improperly seated, mismatched or damaged tire/wheel components. Below are tips and resources that you can apply to avoid those dangers.

**Before You Get Started**

- Ensure employees are trained and equipped to work on the tire / rim assembly.
- Access, understand and apply required inspection and servicing specifications. Some tire manufacturers offer servicing manuals and videos. Keep these resources handy and available.
- Have the right Personal Protective Equipment – approved safety eyewear, footwear, hearing protection, gloves (and head protection as appropriate to the work location).
- Have the right tools for the job – improper or insufficient tools increase risks.
- Get the help you need. Light truck tires can be a one-person job; heavier truck tires deserve assistance from another person, and loader and skidder tires will require mechanical lifting and moving devices.
- Follow manufacturers' assembly and disassembly procedures.
- Know and respect the *Trajectory Danger Zone.*

- Let others around you know you are working on a split rim, and evacuate the trajectory zone. Develop barriers that prevent from entering the trajectory zone.
Removing / Dis-mounting / Disassembly Procedure

- Before beginning any work on a split rim, inspect the tire and wheel assembly for hazards – bulging sidewalls, cracked or bent wheel, heavily corroded or damaged ring, unseated lock ring, etc. If it looks damaged, it may be necessary to pre-cage the assembly.

- Minimize your exposure to the trajectory zone, especially until the tire is deflated. Stand to the side, out of the way of flying wheel parts in case the unit disassembles explosively.

- Always deflate the tire before removing wheel nuts.

- Deflate tires (both tires in a dual assembly) by first removing the valve core. Insert a wire in the valve stem to ensure that the stem is not blocked and that the tire is completely deflated before removing the rim/wheel from the axle.

- Remove the split rim assembly from the axle, and place it on the shop floor.

Two-Piece Solid Rim; Split Ring - LW, FL

1. Make sure the top bead is unseated and below the side ring before attempting to remove it. Insert the tapered end of the lock ring tool into the notch and pry the side ring out of the rim gutter. Lift wheel from assembly.

2. Continue to remove the side ring by progressively prying around the rim. Use small bites to prevent distorting the side ring.

3. Place a tire stand on the rim. Turn the assembly over. Unseat the bottom bead. Remove the tire from the rim. Remove the tube and flap from the tire.

(see photos on next page)
Three-Piece Solid Rim; Split Lock Ring; Solid Flange-M, CR, 5 Degree

1. Make sure the top bead is unseated and the flange is below the lock ring before attempting to remove the lock ring. Insert the tapered end of the lock ring tool into the notch and pry the lock ring out of the rim gutter. Lift wheel from assembly.

2. Insert the lock ring tool between the lock ring and the flange. Remove the lock ring by progressively prying around the rim. Use small bites to prevent distorting the lock ring. Remove solid flange.

3. Place a tire stand on the rim. Turn the assembly over. Unseat the bottom bead. Remove the tire from the rim. Remove the tube and flap from the tire.

Inspecting the Disassembled Split Rim

Always conduct a visual and tactile inspection of the tire, rim/wheel and its components. Look and feel for any damage or evidence that the tire has been operated overloaded and/or in a run-flat condition (80% or less of its recommended operating inflation pressure).

- Check that the tire size and construction matches the manufacturer's rim or wheel rating and size. The tire size must match the rim size. Rims or wheels may accommodate tires of various widths; check with the manufacturer's specifications.
- Check rim parts against multi-piece rim/wheel matching chart (see Appendix One for an example).
- Check all metal surfaces for rust, corrosion, cracks, bent flanges, sprung rings, and deep tool marks on rings or in gutter areas.
- Clean and repaint lightly rusted rims. Remove all dirt and other foreign material from metal surfaces.
- Use parts that are in good condition: destroy and dispose of parts that are corroded, bent, out-of-round, cracked or otherwise damaged.
Re-assembly / Inflation / Re-mounting Procedure

- Conduct necessary repairs to the tire / tube, and re-install the tube and liner (flap) around the dis-assembled split rim.
- Lubricate the bead and rim surfaces with a suitable tire lubricant that will not promote the corrosion of the metal rims.

Two-Piece Solid Rim; Split Ring - LW, FL

1. Lay the rim on the floor and align the valve stem with the slot in the rim. Lift the tire at the valve stem to work it onto the rim. For rims with bead humps, make sure the top bead is below the bead hump before attempting to install the side ring.
2. Insert one end of the side ring into the rim gutter and use a rubber mallet or dead-blow hammer to progressively seat the remainder of the side ring in the rim gutter.

Three-Piece Solid Rim; Split Lock Ring; Solid Flange-M, CR, 5 Degree

1. Lay the rim on the floor and align the valve stem with the slot in the rim. Lift the tire at the valve stem to work it onto the rim. For rims with bead humps, make sure the top bead is below the bead hump before attempting to install the side ring. Install the flange making sure it is below the rim gutter.
2. Insert the end of the lock ring in the rim gutter and use a rubber mallet or dead-blow hammer to progressively seat the remainder of the lock ring in the rim gutter.
3. Ensure the lock ring is completely seated in the rim gutter by using the rubber mallet or dead-blow hammer before attempting to inflate the tire.

- Ensure that removable rings are properly seated before inflating.
- Place the tire in a **safety cage** large enough for tire expansion before inflating tire.

![Safety Cage]

- Inflate the tire (valve core removed) using a clip-on air chuck and hose extension with an in-line pressure gauge and valve.
  
  **Clip-on or air chuck (connector)**

![Clip-on Air Chuck]

Other types of inflation devices require the worker to hold them against the tire’s valve stem, requiring the worker to stand immediately next to the wheel. These devices are unacceptable because they place the worker at risk of serious injury in the event of a blow-off or other tire failure.

When using a clip-on air connector, the inflation hose attached to which must

a. **permit the use of an in-line pressure gauge** – this eliminates the need for the worker to approach the tire to take a pressure reading with a pencil-type pressure gauge. The pressure gauge can be built directly into the inflation control or the control may have a check valve that permits pressures to be taken using a pencil-type pressure gauge. The worker must be able to monitor tire pressure remotely - a safe distance away from the tire being inflated, and

b. **be under positive pressure control by the worker filling the tire** – air can only be delivered to the tire while the worker squeezes or depresses a control. The flow of air must stop immediately upon the worker releasing the control.

In-line valve and gauge

![In-line Valve and Gauge]

- Stand clear of the tire during inflation and ensure that no other person enters the trajectory path during inflation.
• Inflate in incremental stages in steps of 70 kPa (10psi). Check the rim after each stage to ensure correct seating.

• If sidewall undulations or bulges appear, or if any snapping, cracking or popping noises occur, STOP. The tire probably has a “zipper rupture” or other defect. Do not approach the tire. Completely deflate the tire before removing from the restraining cage. Mark tire as damaged or unserviceable.

• Never inflate beyond 40 psi to seat any tire beads. Inflating beyond 40 psi when trying to seat the bead is a DANGEROUS PRACTICE that may break a bead or the rim/wheel with explosive force.

• Once inflated to operating pressure, re-inspect the tire, rim, and ring for proper seating. If the tire is not well seated, deflate the tire, inspect all parts, follow proper re-assembly and inflation procedures.

• Remove the properly inflated tire from the restraining device.

• Install the wheel of the vehicle correctly ensuring that the correct parts are used, that the nuts are tightened in the proper order, and that the recommended torque is applied.

Other Tips to Know
• It is OK to inflate a tire while the rim/wheel is on the vehicle, provided the tire is under-inflated but has more than 80 percent of the recommended pressure.

• Do not re-inflate a tire that has been driven at 80 percent or less of its recommended pressure, or there is damage to the tire or wheel components. Such tires should be deflated completely, removed from the vehicle, disassembled, and inspected. If the tire is in a dual assembly, check the air pressure in both tires: an under-inflated tire may not otherwise be detected when the other tire is supporting the weight of the vehicle or trailer.

• Do not attempt to seat rings while tire is partially or totally inflated.

• Do not use an assembly with excessive side ring play, wide gaps between ring ends or butting ring ends unless specified by manufacturer.

• Do not weld, braze or apply heat to rim components of inflated or partially inflated tires. Do not mount tires to rim components that have not cooled to ambient temperature.

• Do not hammer on components of an inflated or partially inflated assembly.

• Ensure mobile and road side repair trucks are equipped with all safety devices such as tire cages and a clip-on chuck with at least 24” of hose.

Information and Resources

WorkSafeBC video describing 3 serious tire incidents http://www.youtube.com/watch?v=uQbKCD3ezrA

Ring Master installation tool http://www.youtube.com/watch?v=jJLY8LF8TM4

APPENDIX A – Using Multi-Piece Rim Matching Charts

HOW TO MATCH RIM PARTS

1. Find the stamped identification on the rim base and ring(s). Refer to photos below to help find the locations of the stamps. Identify the parts based on the stamps themselves. Do not identify the parts based only on the way they look.

2. If you cannot find the identification stamp, stop. Never use a rim part that you cannot identify from the stamp.

3. Match the markings found on the rim base with those shown in the “Rim Base Identification Stamping” column in the tables below.

4. Continue reading the same line across the table to find the proper markings for the matching side ring (or lock ring and flange).

5. NEVER assemble mismatched rim parts. If the identification stamps on the parts do not match, stop. Obtain serviceable replacement parts from stock or a supplier.

6. If you are working on a rim/wheel assembly of discontinued parts that are cracked, bent, worn, pitted by corrosion, or unserviceable in any way, for whatever reason —STOP! You must replace the entire discontinued assembly with one that is in current production.

HOW TO READ THESE TABLES

Example A – Two-Piece Rim/Side Ring Assembly

1. The rim base and side ring to be assembled have identification stamps like the ones to the right.

2. Find 20 x 7.5 rim size in the “Rim Size” column in the tables below. Locate 20 x 7.5 FL in the “Rim Base Identification Stamping” column.

3. Continue reading the same line across the table. Find the matching side ring markings in the “Side Ring Identification Stamping” column.

4. One of the proper markings is: 20 x 7.5 FL. This matches the stamp of the side ring shown in the photo. These parts are matched and will make a proper assembly.

Example B – Three-Piece Rim/Side Ring Assembly

1. Follow Steps 1 and 2 in Example A – Two-Piece Assembly.

2. Read across the table in the same row to find the proper match in the “Lock Ring Identification Stamping” and “Flange Identification Stamping” columns.
Example Multi-Piece Rim Matching Chart

<table>
<thead>
<tr>
<th>2-PIECE Rim Size</th>
<th>Rim Base Identification Stamping</th>
<th>Side Ring Identification Stamping</th>
</tr>
</thead>
<tbody>
<tr>
<td>15 X 6.5</td>
<td>15 X 6.5 LW</td>
<td>R15 X 6.5-7.0 LB-LW</td>
</tr>
<tr>
<td>15 X 7.5</td>
<td>15 X 7.5 LW</td>
<td>R15 X 7.5-8.0 LB-LW</td>
</tr>
<tr>
<td>20 X 6.5</td>
<td>20 X 6.5 LW</td>
<td>R20 X 6.5-7.0 LB-LW</td>
</tr>
<tr>
<td>20 X 7.5</td>
<td>20 X 7.5 FL 20 X 7.5 LW</td>
<td>R20 X 7.5 FL R20 X 7.5-8.0-9.0 LB-LW</td>
</tr>
<tr>
<td>20 X 8.0</td>
<td>20 X 8.0 LW</td>
<td>R20 X 7.5-8.0-9.0 LB-LW</td>
</tr>
<tr>
<td>20 X 9.0</td>
<td>20 X 9.0 LW</td>
<td>R20 X 7.5-8.0-9.0 LB-LW</td>
</tr>
<tr>
<td>24 X 8.0</td>
<td>24 X 8.0 LW</td>
<td>R24 X 7.5-8.0-9.0 LB-LW</td>
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<tr>
<td>24 X 9.0</td>
<td>24 X 9.0 LW</td>
<td>R24 X 7.5-8.0-9.0 LB-LW</td>
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</table>

<table>
<thead>
<tr>
<th>3-PIECE Rim Size</th>
<th>Rim Base Identification Stamping</th>
<th>Lock Ring Identification Stamping</th>
<th>Flange Identification Stamping</th>
</tr>
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<tr>
<td>20 X 7.5</td>
<td>20 X 7.5 M 20 X 7.5-5°</td>
<td>LR 20 X 7.5-8.5-10.0 M 20 X 7.0-7.5-8.0-5°</td>
<td>F 20 X 7.5-8.5 M 20 X 7.5-8.05°-7.5 FL</td>
</tr>
<tr>
<td>20 X 8.0</td>
<td>20 X 8.0-5°</td>
<td>20 X 7.0-7.5-8.0-5°</td>
<td>20 X 7.5-8.05°-7.5 FL</td>
</tr>
<tr>
<td>20 X 8.5</td>
<td>20 X 8.5 M</td>
<td>LR 20 X 7.5-8.5-10.0 M</td>
<td>F 20 X 7.5-8.5 M</td>
</tr>
<tr>
<td>20 X 10.0</td>
<td>20 X 10.0 M</td>
<td>LR 20 X 7.5-8.5-10.0 M</td>
<td>F 20 X 10.0 M</td>
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<td>22 X 8.0</td>
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<td>22 X 7.0-7.5-8.0-5°</td>
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<td>24 X 7.5</td>
<td>24 X 7.5 M</td>
<td>LR 24 X 7.5-8.5-10.0 M</td>
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<tr>
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<td>24 X 10.0 M</td>
<td>LR 24 X 7.5-8.5-10.0 M</td>
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