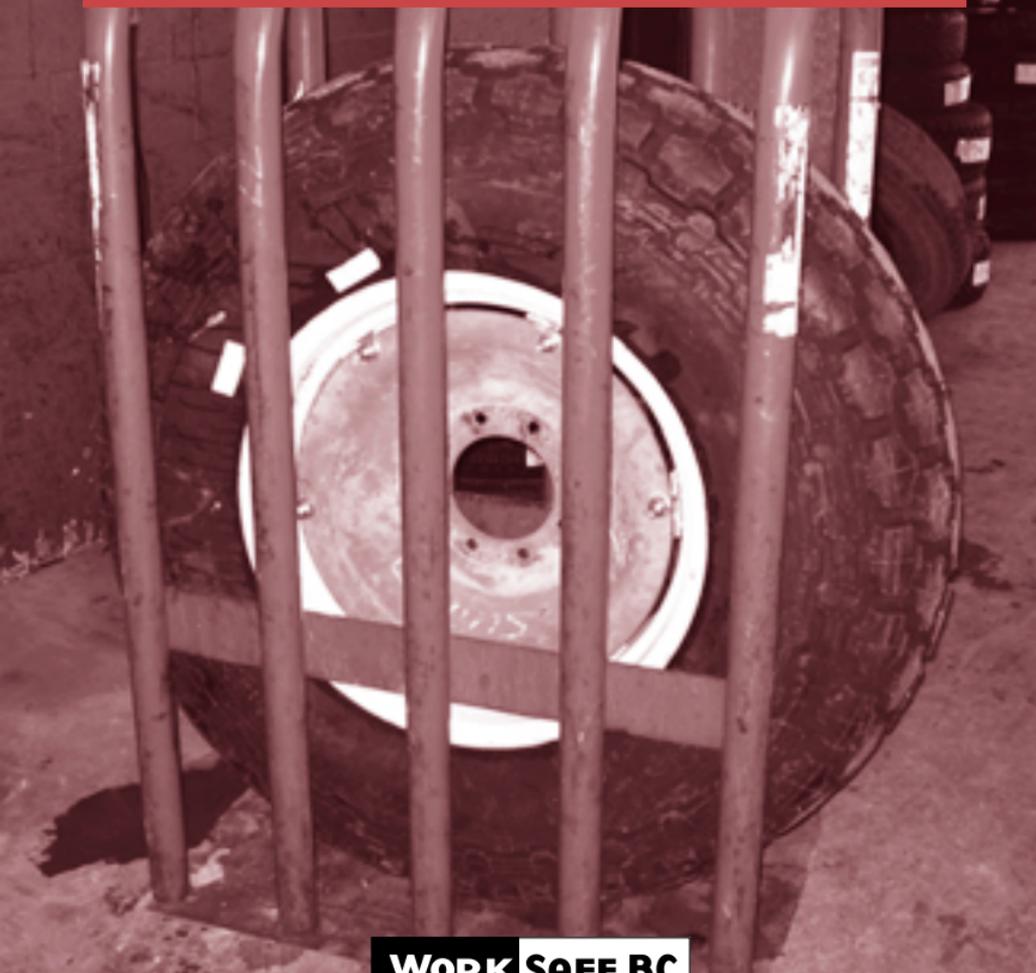


Safe work practices for
**Large Vehicle
Tire Servicing**



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Workers' Compensation Board of B.C.

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Introduction

The job of tire servicing can be extremely hazardous. An inflated large vehicle tire contains tremendous stored energy. Improper handling and assembly of the tire or rim/wheel can cause the components to explode. The result may be costly damage, serious injury or death.

This manual describes acceptable servicing practices. However, it does not replace service and safety manuals which are supplied by all manufacturers and distributors of large vehicle tires and wheels.

It must be emphasized that the manufacturer's instructions must be followed when working with rims and tires.

Explanation of Terms

| | |
|-----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Demounting</i> | Deflation and removal of tire from wheel assembly. |
| <i>Disc Wheel</i> | A combination of a rim and a disc permanently attached to the rim. |
| <i>Installing a Tire Assembly</i> | Transferring and attaching a tire assembly onto a vehicle axle hub. |
| <i>Large Vehicle</i> | A truck, trailer, bus or an off-road machine. It does not apply to automobiles, pick-up trucks or vans using automobile tires or truck tires designated "LT". |
| <i>Mounting a Tire</i> | Assembling or putting together the tire and wheel components, including inflation. |
| <i>Rim</i> | The part that supports the tire. There are two main types of rims: single-piece rim (usually tubeless) and multi-piece rim (usually tube type but some are tubeless). The single-piece rim is a continuous one-piece assembly. The multi-piece rim is an assembly consisting of a base and a side ring or both a side and lock ring. |

| | |
|----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Tire Assembly</i> | An assembly of tire, tube (where appropriate) and wheel components. |
| <i>Trajectory</i> | Any potential path or route that a rim/wheel component may travel during an explosive separation, or the sudden release of pressurized air. |
| <i>Wheel</i> | The part or group of parts that provides the method of attachment of the assembly to the axle of a vehicle and the means to contain the tire and/or tube. |

Training of Workers

The Workers' Compensation Board regulations require the employer to provide adequate instruction and training to workers who operate various machinery and equipment. In terms of tire servicing, this training must include the following:

1. How to properly demount tires, including proper deflation.
2. How to inspect rim/wheel components for mismatch and damage. Damage includes corrosion and rust buildup, metal cracks, deformed flanges, sprung side and/or lock rings, broken or cracked discs, damaged rim bases, worn tubes or flaps, bent or broken beads in the tires.
3. How to mount tires properly to rims/wheels. This means the proper procedure to follow, the proper tools and safety equipment to use, the assembly inspections to make and the inflation steps to take.
4. How to use restraining devices properly.
5. How to handle tire assemblies and rims/wheels properly. This may include the use of mechanical aids in the handling of heavy tire assemblies.
6. How to install and remove tire assemblies.

7. How to inflate tires mounted on the vehicle.

The employer must ensure each worker demonstrates the abilities to perform these tasks safely.

In addition, the appropriate personal protective equipment must be used when servicing tires, e.g., safety shoes must be worn at all times, eye protection must be worn in operations where there is a hazard of eye injury.

Demounting and Mounting “Multi-Piece Rim” Wheels



Multi-piece rim (disc wheel type)

Demounting

1. **Before loosening wheel nuts or studs:**
 - a. Remove the valve core and fully deflate the tire.
 - b. Run a wire through the valve stem to be sure it is not blocked.
 - c. On dual wheels, completely deflate both tires before removing the nuts on the outside wheel. If there is obvious or suspected damage to the inside tire or rim components, completely deflate both tires.

- d. For demountable dual wheels (Dayton wheels), loosen the nuts from the studs but do not remove them completely off the studs until pressure is released between the rims and the cast spoke wheel. Releasing of pressure is achieved by tapping or prying the tire rim assembly until it is loose on the wheel.
2. Remove the wheel nuts and take the wheel assembly off the vehicle.
3. Use only the tools specified by the manufacturer when breaking the bead. **Never hammer on the rim or the lock ring** as nicks in the metal may lead to cracks and failures.



Tubeless tire iron



Lock rim tool



Duplex "C" tool



Swan neck bead tool



Driving iron



Rim mallet



Duck bill hammer



Self-locking pliers

4. Disassemble the tire assembly.

Mounting

5. Clean and examine all wheel and tire parts carefully. Look for signs of cracking, wear, corrosion, deformation, broken beads and confirm proper match of rim and side/lock rings by referring to rim matching chart.

Check size and load capacity of tire and wheel.

Paint rim with a metal primer where necessary to protect against corrosion.

Bent, cracked, worn or badly corroded parts must never be re-used. They can be deadly for you or the next person handling the wheel. Do not attempt to weld or braze wheel assemblies or components unless permitted by the manufacturer. Never weld on a rim with a mounted tire.

6. Reassembly

- a. Lubricate tire beads and mating rim parts with an approved rubber lubricant.
- b. Put the rim parts into place.

Lever or “walk” the locking rings into their grooves and check the fit of the metal parts. The end gap should be correct and the parts should not be loose.

- c. **Under no circumstances should you “air-up” a wheel of which you are not sure.**

If you have any doubts at this point, disassemble and **recheck** all parts for:

- WEAR OR CORROSION
- DEFORMATION
- SIZE AND TYPE MATCH

7. **Restraining Devices**

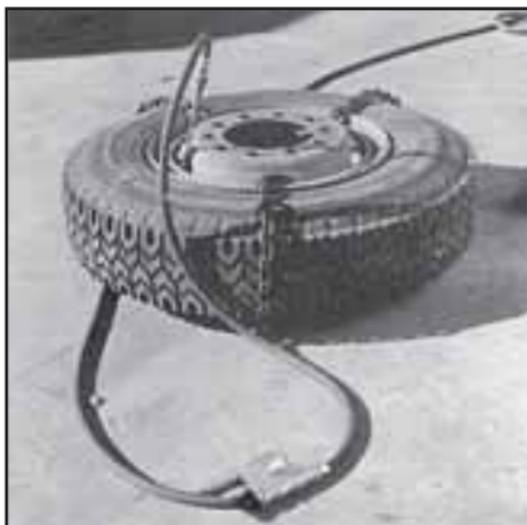
Before inflating the tire assembly, place it in a suitable restraining device. Acceptable devices include cages, T-bars and safety chains. Restraining devices must be able to absorb the explosive forces and be properly sized to restrain tire/wheel parts in the event of failures.



Safety cage



Safety T-bar



Safety chains

8. Inflate tire using a clip-on air chuck with an in-line valve and gauge while standing outside the trajectory.



Clip-on air chuck with in-line gauge

- a. With the tire in the restraining device, inflate to 10 psi (69 kPa), and check that the parts fit.

DANGER SIGNALS INCLUDE:

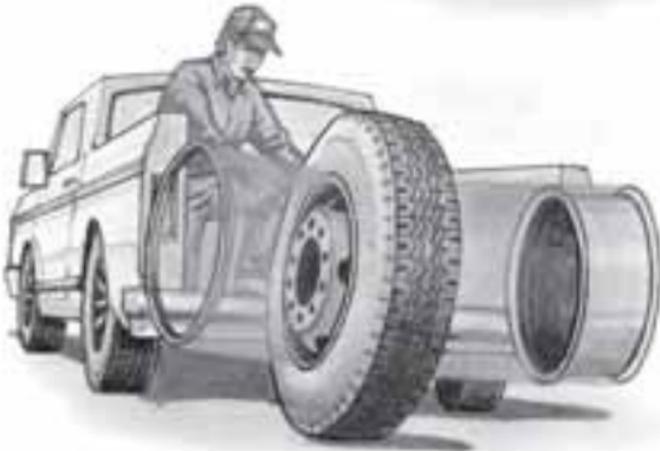
- Excessive play
 - Ring end gap too wide or too narrow (see manufacturer's instructions)
 - Any apparent misalignment
- b. Inflate to the recommended pressure.

- c. If working with tube-type tires, deflate completely to avoid localized overstretching of the tube.
- d. Reinflate to the manufacturer's recommended pressure and recheck the tire assembly before removing it from the restraining device.

NOTE: When a tire has been driven flat or at 80% or less of its recommended pressure, do not reinflate it without first removing and disassembling the tire assembly to check for damage in the tire and wheel components.

9. Stay out of the trajectory when handling multi-piece rim tire assemblies.

NOTE: There are operations where presence in the trajectory is unavoidable; e.g., application of wheel nuts. In this case, the newly inflated tire assembly must first be inspected for proper seating of side/lock rings.



Trajectory

10. Do not apply heat to a multi-piece wheel or wheel component.
11. Never pour or spray any flammable substance such as gasoline or ethyl ether into a tire and ignite it so that the resulting explosion seats the beads of a tubeless tire.

Demounting and Mounting “Single-Piece Rim” Wheels



Single-piece rim (disc wheel type)

Demounting

1. **Before loosening wheel nuts or studs:**
 - a. Remove the valve core and fully deflate the tire.
 - b. Run a wire through the valve stem to be sure it is not blocked.
 - c. On dual wheels, always inspect the inside tire assembly prior to removing the cap nuts on the outside wheel. If there is obvious or suspected damage to the inside tire or rim, completely deflate both tires.

- d. For demountable dual wheels (Dayton wheels), loosen the nuts from the studs but do not remove them completely off the studs until pressure is released between the rims and the cast spoke wheel. Releasing of pressure is achieved by tapping or prying the tire rim assembly until it is loose on the wheel.

Remove the wheel nuts and take the wheel assembly off the vehicle.

2. Use only the tools specified by the manufacturer when breaking the bead. Demount the tire from the narrow ledge side of the wheel. **Never hammer on the rim** as nicks in the metal produce stress concentrations and may lead to cracks and failures.

Mounting

3. Clean and examine wheel and tire carefully. Look for signs of cracking, wear, corrosion, deformation, bent and broken beads and confirm proper match between tire and rim for size and load capacity. Paint the rim with a metal primer where necessary to protect against corrosion. Inspect the inside of the tire to make sure it is clean, dry and free of foreign material.

Bent, cracked, worn or badly corroded parts must never be re-used. They can be deadly for you or the next person handling the wheel. Do not attempt to weld or braze wheel assemblies.

4. **Reassembly**

- a. Lubricate the tire beads and the mating rim surfaces with an approved rubber lubricant.
- b. Work the tire beads one at a time over the rim flange from the narrow ledge side into the well of the rim using the proper tire tools.

5. **Restraining Devices**

WorkSafeBC recommends that before the tire assembly is inflated, it be placed in a suitable restraining device. Acceptable devices include cages, T-bars and safety chains. Restraining devices must be able to absorb the explosive forces and be properly sized to restrain tire/wheel parts in the event of failures.

6. WorkSafeBC recommends inflating the tire to the recommended pressure using a clip-on air chuck with an in-line valve and gauge while standing outside the trajectory. Inspect the tire and rim for proper seating before removing the tire assembly from the restraining device. If the tire bead is not fully seated, deflate the tire completely and repeat the mounting procedure.

NOTE 1: If a bead expander is used, it must be removed before the valve core is installed and as soon as the tire assembly becomes airtight.

NOTE 2: When a tire has been driven flat or at 80% or less of its recommended pressure, inspect for damage. Inflate cautiously, as it may be subject to sidewall failure.

7. Stay out of the trajectory when inflating a tire.
8. Do not apply heat to a wheel or wheel component.
9. Never pour or spray any flammable substance such as gasoline or ethyl ether into a tire and ignite it so that the resulting explosion seats the beads of a tubeless tire.

Installing a Tire Assembly

Disc Wheels

1. Check wheel studs for damage. Replace any damaged or distorted studs. For tire assemblies mounted to dual wheel axles, also check to ensure the maximum difference between the diameters of the tires does not exceed $\frac{1}{4}$ " or a circumferential difference of $\frac{3}{4}$ ". Any difference in the diameter of dual wheels leads to excessive wear.
2. Check that the mounting surfaces on the wheels, studs, nuts and hubs are clean and smooth. Remove any grease, dirt, rust or burrs.
3. Use the proper cap nuts. Disc wheels can be stud or hub located and the cap nuts used with each type varies. Incorrect cap nuts may lead to loss of torque, broken studs and cracked wheels. Follow the manufacturer's specifications.
4. Use the proper tightening sequence and torque levels. The tightening sequence and torque levels required will depend on the make and model of disc wheel. Always follow the manufacturer's instructions.
5. After the first 80 to 160 kms of operation, recheck and retighten cap nuts to the recommended torque level using the proper tightening sequence.

Demountable Tire Assemblies

1. Check all studs, clamps and spacer bands for damage. Replace any damaged or distorted parts. For duals, also check to ensure the maximum difference between the diameters of the tires does not exceed $\frac{1}{4}$ " or a circumferential difference of $\frac{3}{4}$ ". Any difference in the diameter of dual wheels leads to excessive wear. In addition, it is important not to mix radials and bias ply tires on the same axle due to different load/deflection characteristics of these two types of tires.
2. Check that the mounting surfaces on the rims, cast spoke wheels, studs, nuts, clamps and spacer bands are clean and smooth. Remove any grease, dirt, rust or burrs.
3. Place the inflated tire assembly on cast spoke wheel.

For dual wheels, place the inside tire assembly on the cast spoke wheel as far as possible, then the spacer band and the outer tire assembly. Guard against misalignment.

4. Install the proper rim clamps and nuts.
5. Use the proper tightening sequence and torque levels. The tightening sequence and torque levels required will depend on the make and model of rim/wheel. Always follow the manufacturer's instructions.

6. After the first 80 to 160 kms of operation, recheck and retighten clamp nuts to the recommended torque level using the proper tightening sequence.



Demountable rim



Demountable rim mounted on cast spoke wheel

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