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Tire Servicing Program

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BCMSA

Tire Servicing

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**REFERENCE**

* WorkSafeBC OHS Regulation Part 16.47 and 16.48

# PURPOSE

This program is designed to minimize or eliminate the risk of injury to workers performing tire servicing.

# POLICY

[Organization] will maintain a Tire Servicing Program for all workers who are required to perform tire servicing of large vehicles and other mobile equipment.

# SCOPE

This program applies to all workers who perform tire servicing of large vehicles and other mobile equipment.

# DEFINITIONS

|  |  |
| --- | --- |
| **De-mounting**  | Deflation and removal of tire from wheel assembly. |
| **Disc Wheel** | A combination of a rim and a disc permanently attached to the rim. |
| **Installing a Tire Assembly** | Transferring and attaching a tire assembly onto a vehicle axle hub. |
| **Large Vehicle** | A truck, trailer, bus or off-road machine. It does not apply to automobiles, pick-up trucks or vans using automobile tires or truck tires designated “LT” (Light Truck). |
| **Mounting a Tire** | Assembling or putting together the tire and wheel components, including inflation. |
| **Multi-Piece Wheel** | A vehicle wheel consisting of two or more parts, one of which is a side or locking ring (sometimes called a split rim) designed to hold the tire on the wheel by interlocking components when the tire is inflated. |
| **Restraining Device****(Also known as a Barrier)**  | A device such as a fence, wall or other structure or object placed between a single or multi piece rim wheel and an employee during tire inflation, to contain the rim wheel components in the event of sudden release of the contained air of the single/multi piece rim wheel. This may include cages, T-bars and safety chains. |
| **Rim** | The component of the wheel 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 an assembly consisting of a base and a side ring or both a side and lock ring. |
| **Rim Manual** | A publication containing instructions from the manufacturer or other qualified organization for correcting mounting, de-mounting, maintenance, and safety precautions specific to the type of wheel being serviced. |
| **Service or Servicing** | The mounting and de-mounting of rim wheels, and related activities such as inflating, deflating, installing, removing and handling. |
| **Service Area** | The part of the employer’s premises used for the servicing of rim wheels, or any other place where an employee services rim wheels. |
| **Tire Assembly** | An assembly of tire, tube (where appropriate) and wheel components. |
| **Trajectory** | Any potential path or route that a rim / wheel component may travel during an explosive separation, or the sudden release of pressurized air. |
| **Wheel** | 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. |

# RESPONSIBILITIES

## Employer

* Establish and implement safe work procedures for servicing mobile equipment tires, rims and wheels
* Ensure proper tools and charts are available for tire servicing
* Maintain records of worker instruction and training

## Supervisors

* Ensure affected workers are trained in the safe work procedures for servicing tires, rims and wheels
* Conduct periodic checks to ensure that workers are following work procedures outlined in this Tire Servicing Program and procedures written in the manufacturer’s instructions

## Workers

* Follow safe work procedures for servicing mobile equipment tires, rims and wheels.

## JHS Committee or Worker Health and Safety Representative

* Advise [Organization] on recommendations to improve the Tire Servicing Program.

# PROGRAM DETAILS

## Program Overview

This program provides workers with safe work procedures to be followed when performing tire servicing duties. Rims are the most heavily stressed part of a vehicle.

A typical 1400 x 25 truck tire has the explosive power of a bomb. This program must be used in conjunction with the service and safety manuals that are supplied by the manufacturers and/or distributors of large vehicle tires and wheels.

## Tools and Equipment

### Personal Protective Equipment

The appropriate personal protective equipment will be used when servicing tires. Safety shoes will be worn at all times and eye protection will be worn in operations where there is a hazard of eye injury i.e. during inspection, installation/removal of tire assemblies. Refer to the manufacturers’ and/or distributors’ instruction manuals for specific guidelines on appropriate PPE to be worn.

### Tools and Charts

[Organization] will:

* Ensure that current charts or rim manuals containing instructions for the types of wheels being serviced are available in the service area.
* Ensure that only tools recommended in the rim manual for the type of wheel being serviced are used to service rim wheels.

### Restraining Devices and Barriers

Where restraining devices or barriers are being used during tire-servicing procedures, [Organization] will:

* Provide a restraining device for inflating tires on multi-piece rim wheels.
* Each restraining device or barrier will have the capacity to withstand the maximum force that would be transferred to it during a rim wheel separation occurring at 150% of the maximum tire specification pressure for the type of rim wheel being serviced.
* Restraining devices and barriers will be capable of preventing the rim wheel components from being thrown outside or beyond the device.
* Restraining devices and barriers will be visually inspected prior to each day’s use and after any separation of the rim wheel components or sudden release of contained air. Any restraining device or barrier exhibiting one or more of the following defects will be immediately removed from service:
* Cracks at welds
* Cracked or broken components
* Bent or sprung components caused by mishandling, abuse, tire explosion or rim wheel separation
* Pitting of components due to corrosion
* Other structural damage that may decrease its effectiveness
* Restraining devices or barriers that are removed from service will not be returned to service until they are repaired and re-inspected.
* Restraining devices or barriers requiring structural repair, such as component replacement or re-welding, will not be returned to service until they are certified by either the manufacturer or a Registered Professional Engineer.

## De-mounting Tires and Rims

### De-mounting Single-Piece Rim Wheels

Worker will use the following guidelines in conjunction with manufacturers’ and/or distributors’ instructions when de-mounting single-piece rim wheels.

Before loosening wheel nuts or studs, workers will:

* Inspect the work area for any potential hazards.
* Ensure the vehicle or piece of equipment is positioned on a level surface.
* Follow vehicle lock-out procedures, e.g. chalk both front and rear wheels, remove key from ignition and/or disconnect the battery, and place “Do Not Operate” tags on the steering wheel.
* Jack up the vehicle to remove the wheel assembly.
* Remove the valve core and fully deflate the tire in an area where ignition sources are controlled or removed.
* Run a wire through the valve stem to be sure it is not blocked
* On dual wheels, 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.
* For de-mountable dual 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
* Use only the tools and procedures specified by the manufacturer when breaking the bead. De-mount 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.

## De-mounting Multi-Piece Rim Wheels

[Organization] will use the following procedures in conjunction with the service and safety manuals that are supplied by the manufacturers:

1. Before loosening the wheel nuts or studs:
	1. Inspect the work area for any potential hazards.
	2. Ensure the vehicle or piece of equipment is positioned on a level surface.
	3. Follow vehicle lock-out procedures, e.g. chalk both front and rear wheels, remove key from ignition and or disconnect the battery, and place “Do Not Operate” tags on the steering wheel
	4. Jack up the vehicle to remove the wheel assembly.
	5. Remove the valve core and fully deflate the tire in an area where ignition sources are controlled or removed (For large tires this can take some time.)
	6. Run a wire through the valve stem to be sure it is not blocked
	7. 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.
	8. For demountable dual 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.

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

**Note: I**f a tire is separated (and is noticeable) jack the vehicle up and remove all air pressure before removing the wheel nuts. The tire could explode at any time.

## Assembly

### Wheel Component Acceptability

The following procedures will be followed when determining wheel component acceptability:

* Ensure that wheel components are not interchanged, except as provided in the charts or in the applicable rim manual.
* Inspect multi-piece wheel components and single piece wheels prior to assembly. Any wheel or wheel component that is bent out of shape, pitted from corrosion, broken or cracked will not be used.
* Mark or tag damaged components and remove them from the service area.
* Rim flanges, rim gutters, rings, bead seating surfaces and the bead areas of tires will be free of any dirt, surface rust, scale or loose or flaked rubber buildup prior to mounting and inflation.
* The size (bead diameter and tire/wheel widths) and type of both the tire and wheel will be checked for compatibility prior to assembly of the rim wheel.

### Procedures for Using Restraining Devices

Before inflating a tire assembly, it must be placed in a suitable restraining device. Acceptable devices include cages, T-bars and safety chains that must be able to absorb the explosive forces and be properly sized to restrain tire / wheel parts in the event of failures. The following guidelines will be followed when using a restraining device:

* Whenever a rim wheel is in a restraining device, workers will not rest or lean any part of their body or equipment on or against the restraining device.
* After tire inflation, the tire and wheel components will be inspected while still within the restraining device to make sure that they are properly seated and locked. If further adjustment to the tire or a wheel component is necessary, the tire will be deflated by removal of the valve core before the adjustment is made.
* Tires may be inflated outside a restraining device only to a pressure sufficient to force the tire bead onto the rim ledge and create an airtight seal with the tire and bead (in accordance with manufacturers specifications).

### Inspection and Reassembly of Single-Piece Rim Wheels

#### Inspection

When inspecting single-piece rim wheels, workers will use the following guidelines in conjunction with manufacturers’ and/or distributors’ instructions:

* Clean and examine wheel, valve stems 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. Cracked, broken, bent or otherwise damaged parts will be replaced.
* Paint the rim with a metal primer where necessary to protect against corrosion. Primer should be selected according to manufacturer’s instructions. (Paint flaking at the bead may create a hazard if rim is not properly cleaned and primed.) Inspect the inside of the tire to make sure it is clean, dry and free of foreign material.

#### Reassembly

* Rubber valve stems or rubber grommets should be replaced before tire is assembled.
* Lubricate the tire beads and the mating rim surfaces with an approved rubber lubricant unless the tire or wheel manufacturer recommends against the use of any rubber lubricant.
* Replace old O-Rings with new O-Rings on required wheels, i.e. loaders and backhoes.
* 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. If a tire-changing machine is used, the tire may be inflated only to the minimum pressure necessary to force the tire bead onto the rim ledge while on the tire changing machine.
* Do not apply heat to a single-piece wheel or wheel component.
* 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.

Before inflating the tire assembly, place it in a suitable restraining device (see “Procedures for Using a Restraining Device”)

* Ensure tires are not inflated when any flat, solid surface is in the trajectory and within one foot of the side wall.
* Stay out of the trajectory when inflating the tire assembly.
* 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.
* Inflate tire to the recommended pressure using a clip-on air chuck with an in-line valve and gauge while standing outside the trajectory.
* Most dual wheels have a pin to assemble inner and outer wheels properly. Ensure wheels are lined up.

The proper airline assembly consists of the following components:

* Clip-on chuck
* In-line valve with a pressure gauge or an acceptable regulator
* Sufficient length of hose between the clip-on chuck and the in-line valve (if one is being used) to allow workers to stand outside the trajectory. If a tube is used the tire must be inflated to full pressure, deflated and re-inflated to ensure no localized stresses on the tube.

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.

Cracked, broken, bent or otherwise damaged wheels will not be reworked, welded, brazed or otherwise heated.

### Inspection and Reassembly of Multi-Piece Rim Wheels

#### Inspection

When inspecting multi-piece rim wheels, workers will use the following guidelines in conjunction with manufacturers’ and/or distributors’ instructions:

* Look for signs of cracking, wear, corrosion, deformation, broken beads. This may include:
* Sprung side/lock rings
* Cracked rings/rims
* Bent flanges
* Tool marks
* Loss of contour
* Metal thickness of the mating surfaces
* Cracked, broken, bent or otherwise damaged parts will be replaced.
* 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. Primer should be selected according to manufacturer’s instructions.

#### Re-assembly

Reassemble wheel and tire parts using the following guidelines:

* Replace old O-Rings, if they are supplied as part of the components.
* Lubricate tire beads and mating rim parts with an approved rubber lubricant unless the tire or wheel manufacturer recommends against the use of any rubber lubricant.
* Put the rim parts into place, and position 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.
* Never inflate a wheel of which you are unsure. If there are any doubts at this point, disassemble and recheck all parts for wear or corrosion, deformation and size/type match.
* With the tire in the restraining device, inflate to 10 psi (69kPa) and check that parts fit. Danger signals include:
* Excessive play
* Ring end gap too wide or too narrow (see manufacturer’s instructions)
* Any apparent misalignment
* Inflate tire to manufacturer’s specifications using a clip-on air chuck with an in-line valve and gauge while standing outside the trajectory.
* Stay out of the trajectory when inflating the tire assembly (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).
* Do not apply heat to the wheel or wheel component.
* Never pour or spray any flammable substance such as gasoline or ethyl ether into tire and ignite it so that the resulting explosion seats the beads of a tubeless tire.
* Inflate to the recommended pressure.
* Deflate completely to avoid localized over stretching of tube.
* Re-inflate to the manufacturer’s recommended pressure and recheck the tire assembly before removing it from the restraining device.

## Mounting

### Disc Wheels

* 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 ¼” or a circumferential difference of ¾”. Any difference in the diameter of dual wheels leads to excessive wear.
* Check tires for separations i.e. belt shifting.
* Check that the mounting surfaces on the wheels, studs, nuts and hubs are clean and smooth. Remove any grease, dirt, rust or burrs.
* Use the proper cap nuts. Disc wheels can be stud or hub located and the cap nuts used with each type vary. Incorrect cap nuts may lead to loss of torque, broken studs and cracked wheels. Follow the manufacturer’s specifications.
* Use the proper tightening sequence and torque levels. Air wrenches should only be used to spin on the nuts. The tightening sequence and torque levels required will depend on the make and model of disc wheel. Follow the manufacturer’s instructions.
* After the first 80 to 160 kms of operation, it is recommended that torque levels be rechecked.

### De-mountable Tire Assemblies

* 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 ¼” or a circumferential difference of ¾”. 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.
* 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.
* 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.
* Install the proper rim clamps and nuts.
* 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. Follow the manufacturer’s instructions.
* After the first 80kms to 160kms of operation, recheck and retighten clamp nuts to the recommended torque level using the proper tightening sequence.

## Worker Instruction and Training

[Organization] will provide a training program to all workers who service rim wheels, which will include the hazards involved in servicing rim wheels and the safe work procedures. The Manager / Supervisorwill ensure that each worker is able to demonstrate and maintain the ability to perform tire-servicing tasks safely. Training will include the following:

* De-mounting of tires, including deflation
* 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.
* 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.
* How to handle tire assemblies and rims / wheels properly. This may include the use of mechanical aids in the handling of heavy tire assemblies.
* How to install and remove tire assemblies.
* How to inflate tires mounted on the vehicle.
* Use of a restraining device or barrier

The area Managerwill evaluate each worker’s ability to perform these tasks and will provide additional training as necessary to ensure each worker maintains his/her proficiency.

# TRAINING REQUIREMENTS

## Goal

To ensure that affected workers are aware of the Tire-Servicing Program and how to use it.

## Objectives

As a result of instruction and training workers will:

* Understand the Tire-Servicing Program and its components
* Understand the regulatory requirements surrounding de-mounting and mounting single and multi-piece rim wheels
* Understand procedures for de-mounting and mounting tires
* Understand procedures for inspecting rim and wheel components
* Understand procedures for installing and removing tire assemblies
* Understand the requirements for using restraining devices and procedures for their use

## Summary of Training

* Regulations that apply to tire servicing
* Responsibilities of the [Organization], supervisors and workers
* Procedures for tire servicing

# PROGRAM MAINTENANCE

This program requires a process for ensuring that workers receive instruction and training on the work practices relevant to servicing tires.

# DOCUMENTATION

Documentation for this program includes:

* Records of Worker Instruction and Training on Tire-Servicing Procedures

# APPENDICES

Appendix A – Record of Worker Instruction and Training

##  Appendix A – Record of Worker Instruction and Training

This form must be completed for each worker who performs tire-servicing duties. The worker should initial Column 4 to verify that instruction and training has been provided and that it has been understood.

|  |  |  |  |
| --- | --- | --- | --- |
| **Worker Name:** |  | **Job Title:** |  |
|  |  | **Work Location:** |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **1. Content Of Education/Training** | **2. Date Of Completion** | **3. Supervisor’s Signature** | **4. Initials of Worker** |
| **Procedures for de-mounting tires** |  |  |  |
| **Inspection of rim/wheel components** |  |  |  |
| **Procedures for mounting tires** |  |  |  |
| **Procedures for using restraining devices** |  |  |  |
| **Installing and removing tire assemblies** |  |  |  |
| **Procedures for inflating tires mounted on the vehicle** |  |  |  |