



ASPASA
AT WORK

Best Practice Guideline

Tyre Handling in Surface Operations



BEST PRACTICE GUIDELINE – TYRE HANLING IN SURFACE OPERATIONS

Introduction

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

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

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

Explanation of Terms

<i>Demounting</i>	Deflation and removal of tyre from wheel assembly.
<i>Disc Wheel</i>	A combination of a rim and disc permanently attached to the rim.
<i>Installing a Tyre Assembly</i>	Transferring and attaching a tyre 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 tyres or truck tyres designated "LT".
<i>Mounting a Tyre</i>	Assembling or putting together the tyre and wheel components, including inflation.
<i>Rim</i>	The part that supports the tyre. 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>Tyre Assembly</i>	An assembly of tyre, 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 tyre and/or tube.

Training of Workers

The legislation requires the employer to provide adequate instruction and training to workers who operate various machinery and equipment. In terms of tyre servicing, this training must include the following:

1. How to properly demount tyres, 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 tyres.
3. How to mount tyres 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 tyre assemblies and rims/wheels properly. This may include the use of mechanical aids in the handling of heavy tyre assemblies.
6. How to install and remove tyre assemblies.
7. How to inflate tyres 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 tyres, 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

Demounting

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

Mounting

BEST PRACTICE GUIDELINE – TYRE HANLING IN SURFACE OPERATIONS

5. Clean and examine all wheel and tyre 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 tyre 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 manufacture. Never weld on a rim with a mounted tyre.

6. Reassembly

- a. Lubricate tyre 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 if you are not sure that the locking ring or other components are in good condition and are positioned properly.

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

A safety cage is the preferred type of safety restraining device as it provides the best protection for restraining flying projectiles. If other devices (such as T-bars) are used at remote or mobile work locations, additional caution should be exercised – including staying away from the trajectory zone as much as possible and further anchoring the device or wheel assembly, so that it is adequately restrained.

8. Inflate tyre using a clip-on-air chuck with an in-line valve and pressure gauge while standing outside the trajectory. Never leave an air-line unattended while inflating a tyre.
 - a. With the tyre in the restraining device, inflate to 10 psi (69kPa) and check that the parts fit.

BEST PRACTICE GUIDELINE – TYRE HANLING IN SURFACE OPERATIONS

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 tyres, deflate completely to avoid localized overstretching of the tube.
 - d. Reinflate to the manufacturer's recommended pressure and recheck the tyre assembly before removing it from the restraining device.
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Note: When a tyre has been driven flat or at 80% or less of its recommended pressure, do not reinflate it without first removing and disassembling the tyre assembly to check for damage to the tyre and wheel components.

9. Stay out of the trajectory when handling multi-piece rim tyre assemblies.
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Note: There are operations where presence in the trajectory is unavoidable; e.g. application of wheel nuts. In this case, the newly inflated tyre assembly must first be inspected for proper seating of side/lock rings.

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 tyre and ignite it so that the resulting explosion seats the beads of a tubeless tyre.
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Demounting and Mounting “Single-Piece Rim” Wheels

Demounting

1. Before loosening wheel nuts or studs:
 - a. Remove the valve core and fully deflate the tyre.
 - b. Run a wire through the valve stem to be sure it is not blocked.
 - c. On dual wheels, always inspect the inside tyre assembly prior to removing the cap nuts on the outside wheel. If there is obvious or suspected damage to the inside tyre or rim, completely deflate both tyres.
 - 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
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BEST PRACTICE GUIDELINE – TYRE HANLING IN SURFACE OPERATIONS

and the cast spoke wheel. Releasing of pressure is achieved by tapping or prying the tyre 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 tyre 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 tyre carefully. Look for signs of cracking, wear, corrosion, deformation, bent and broken beads and confirm proper match between tyre 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 tyre 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 tyre beads and the mating rim surfaces with an approved rubber lubricant.
 - b. Work the tyre beads one at a time over the rim flange from the narrow ledge side into the well of the rim using the proper tyre tools.

5. Restraining Devices

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

A safety cage is the preferred type of safety restraining device as it provides the best protection for restraining flying projectiles. If other devices (such as T-bars) are used at remote or mobile work locations, additional caution should be exercised – including staying away from the trajectory zone as much as possible and further anchoring the device or wheel assembly, so that it is adequately restrained.

6. Legislation recommends inflating the tyre to the recommended pressure using a clip-on air chuck with an in-line valve and pressure gauge while standing outside the trajectory.

BEST PRACTICE GUIDELINE – TYRE HANLING IN SURFACE OPERATIONS

Inspect the tyre and rim for proper seating before removing the tyre assembly from the restraining device. If the tyre bead is not fully seated, deflate the tyre completely and repeat the mounting procedure. Never leave an airline unattended while inflating a tyre.

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

Note 2: When a tyre 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 tyre.
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 tyre and ignite it so that the resulting explosion seats the beads of a tubeless tyre.

Installing a Tyre Assembly

Disc Wheels

1. Check wheel studs for damage. Replace any damaged or distorted studs. For tyre assemblies mounted to dual wheel axles, also check to ensure the maximum difference between the diameters of the tyres 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 160kms of operation, recheck and retighten cap nuts to the recommended torque level using the proper tightening sequence.

Demountable Tyre 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 tyres 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

BEST PRACTICE GUIDELINE – TYRE HANLING IN SURFACE OPERATIONS

important not to mix radials and bias ply tyres on the same axle due to different load/deflection characteristic of these two types of tyres.

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 tyre assembly on cast spoke wheel.
For dual wheels, place the inside tyre assembly on the cast spoke wheel as far as possible, then the spacer band and the outer tyre 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. 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 160kms of operation, recheck and retighten clamp nuts to the recommended torque level using the proper tightening sequence.

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