Safe Work Procedure 785 - A

Caterpillar 785

All Tire Positions - Vertical Demount and Mount

Scope

This Safe Work Procedure ('A') outlines the steps required to perform a 'Vertical' tire demount and mount on **all positions** of a Caterpillar 785 haul truck.

This procedure includes demounting tires from and mounting tires on:

- 5-Piece assemblies,
- 6-Piece IGLR (Integral Gutter Lock Ring) assemblies,
- 8-Piece DGS (Double Gutter Service) assemblies.

The steps in this Safe Work Procedure must be adhered to by all Kal Tire team members as the minimum acceptable standard and may only be carried out by Team Members who have been properly trained for this task.

Table of Contents **Page #**

1. Responsibilities

Site Supervisor:

- It is the responsibility of the site supervisor to verify the correct implementation and permanent application of this work procedure at their location.
- It will also be their responsibility to ensure that team members have the current version of this procedure available to them as contained within the Kal Tire "Learning Management System" (LMS).

Team Members:

- It is the responsibility of all team members to comply fully with the provisions of this Safe Work Procedure.
- Only Kal Tire personnel who are trained and competent to perform this task may be authorized to do so.
- If you are not trained for this task you MUST work under the direct supervision of a team member who is.
- If any team member detects a risky condition or action that could be potentially hazardous you must stop and control the hazard before proceeding.
- At all times use the appropriate personal protective equipment required for the activity.

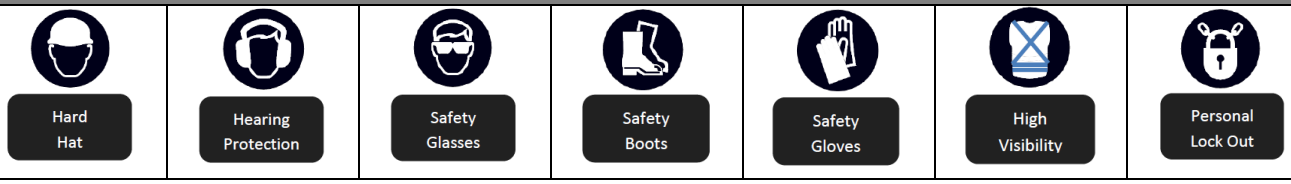
Assess the jobsite for hazards. Implement controls for all hazards identified. No production goal or activity justifies exposing personnel to uncontrolled hazards that could inflict damage to people, property or the environment.

Safe Work Procedure 785 - A

Caterpillar 785

All Tire Positions - Vertical Demount and Mount

2. Personal Protective Equipment

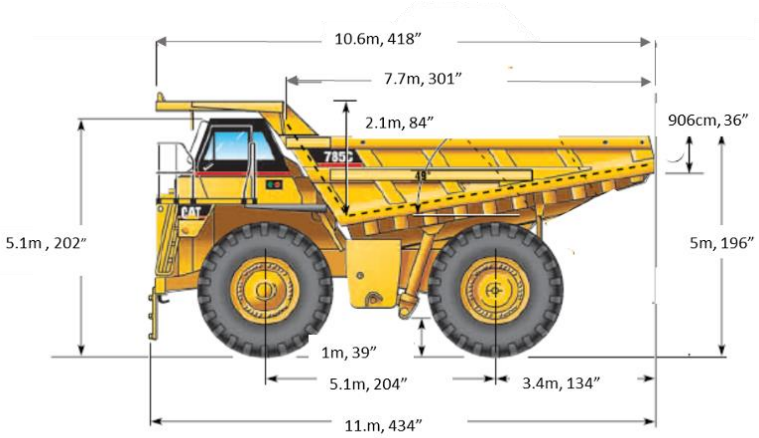


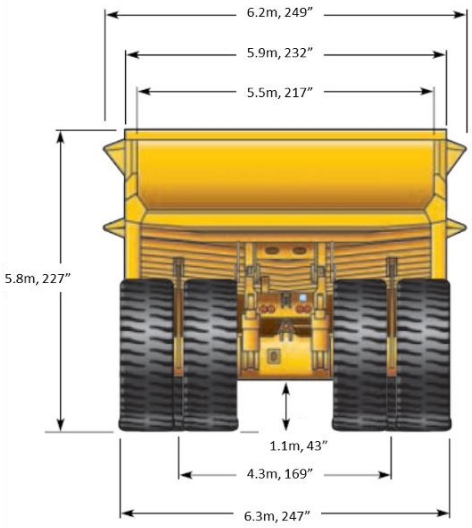
3. Technical Information

Caterpillar 785: Nominal payload - 136 Metric Tonnes **/ 150 Short Tons** (***1 Short ton = 2,000 lbs).***

Weight distribution ***(Approx.)***	**Empty**			**Loaded** at maximum GVW		
	%	Kgs.	**Lbs.**	%	Kgs.	**Lbs.**
Front axle	47	49,411	**108,930**	33	82,328	**181,500**
Rear axle	53	55,718	**122,837**	67	167,152	**368,500**
Total (wet, 50% fuel)		105,129	**231,767**		249,480	**550,000**

Recommended Tire & Wheel Fitment	**3300R51 (51” x 24”)**	
	Kgs.	**Lbs.**
Tire Weight (approx.)	2,200	**4,850**
Wheel Weight (Base Only) EUHS	637	**1,404**
Wheel Weight (Complete Assembly) EUHS	963	**2,123**
Total Weight (Tire & Wheel Assembly) EUHS (approx.)	3,800	**8,377**





Caterpillar 785

All Tire Positions - Vertical Demount and Mount

4. Tooling and Equipment

➔ Team Members operating tooling and equipment MUST be trained and signed off as competent to the Kal Tire standard as contained within the LMS.

➔ Trainees must never use tooling or equipment unless authorized to do so.

➔ All tooling and equipment MUST be inspected before and after use to ensure it is in good working condition.

- Personal Lock Out / Tag Out
- Wheel Chocks
- Calibrated pressure gauge
- Remote inflation tool / muffling device
  - IN-80 / IN-95
- Bead lubricant and brush
- Angle grinder with wire wheel or wire brush (requires face shield)
- Tire manipulator (tire handler)
- Soft face / dead blow hammer
- Heavy gauge wire
- Lock ring bars
- Valve accessories (below)
- Lock ring catcher
- Wrenches (valve hardware)
- Disc grinder (requires face shield)
- Tooling to hold rock ejector
- Hex wrench (for lock ring bolts)
- Tread depth gauge (measuring tool)
- 51” O-rings
- Pliers
- Screwdriver
- Knife or Scissors
- Hydraulic Jack and Support Stand minimum capacities:
  - Front – 43 Tonne (48 Ton)
  - Rear – 50 Tonne (55 Ton)
- Suitable work platform
- Hydraulic power pack
- Hydraulic ram / bead breaker
- Pressure Washer (if available)
- Soap spray (leak testing)
- Wheel, rim and component profile gauges

Valve Accessories

- Haltec Super Large Bore valve assembly

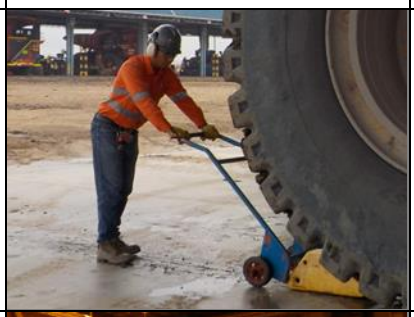
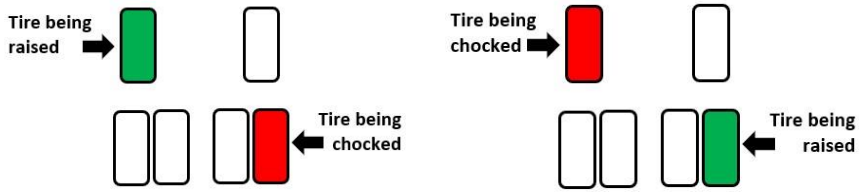
Caterpillar 785

All Tire Positions - Vertical Demount and Mount

5. Task Preparation

1		• Inspect the work area. • Perform the appropriate **Field Level Risk Assessment (FLRA)** or site specific personal risk assessment**.**	
		⚠ Failing to perform an inspection and a FLRA may result in injury or incidents.	✓ Identify and control any hazards. Review your FLRA if conditions change or new hazards are encountered.
2		• Check that you have the appropriate personal protective equipment for the task and location. • Should you see anyone not wearing the appropriate PPE whilst carrying out any task, STOP and inform them immediately, raise this as a safety concern.	
		⚠ Serious injury can occur if the correct PPE is not used for the task.	✓ Check that the correct PPE is used and is in good condition.
3		• Inspect all tools and equipment prior to use. • Check that hand-held pressure gauge is accurate and has been checked against the master pressure gauge.	
		⚠ Using damaged tools can result in injury or damage to equipment.	✓ Replace and remove any damaged tools from service and tag them for repair.
4		• Check that the vehicle is UNLOADED. • Check for water build up inside the box when working on equipment that has been parked for extended periods.	
		⚠ Material or water remaining in the box can cause overloading of jacks and stands, or instability during the lift.	✓ Loads must be dumped and water trucks must be emptied before jacking up the machine.
5		• Position the vehicle on a flat level work area with sufficient space to remove and install wheels. • Instruct the operator to apply the parking brakes and shut down the vehicle.	
		⚠ Potential crush hazard – The vehicle may collide with personnel or equipment in the area.	✓ Check that the work area is clear. Maintain visual contact with the vehicle operator until the vehicle has completely stopped.

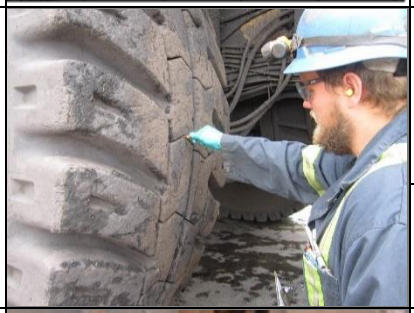
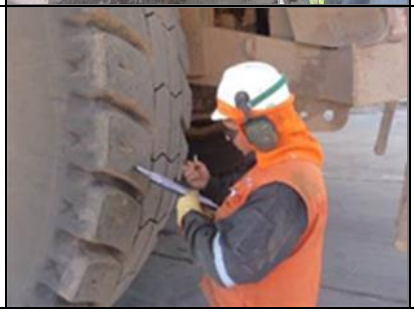
Task Preparation *(continued)*

6		• Turn the Battery Isolation Switch to the 'OFF' position. • Close the Isolation Point cover (if equipped). • Apply a lock-out scissor clamp and personal isolation lock and tag to the Battery Isolation Switch or the Isolation Point cover (shown). ⚠ Working on vehicles that are not isolated correctly may result in fatalities. ✓ Always isolate before working on vehicles. All personnel working on the vehicle <u>MUST</u> apply their own lock.
7		• Perform a test start of the vehicle (cab ignition key) to confirm that the vehicle will not start after the lock has been applied. ***IMPORTANT** – The isolation of the vehicle shall remain in effect until the task is completed. No 'live testing' (e.g., de-isolating the vehicle to operate the TPMS – Tire Pressure Monitoring System) shall occur during the task.* ⚠ Working on vehicles that are not isolated correctly may result in fatalities. ✓ Confirm that the isolation has been successful before commencing any work.
8		• Fit wheel chocks to both sides of the tire located on the <u>opposite</u> side and axle of the tire being raised. 
9		• Cordon off the work area with high visibility traffic cones, caution tape, signage, or other suitable method. ⚠ Personnel not involved with the task may be injured by the tire maintenance activities. ✓ Cordon off the work area to prevent personnel from entering the work area and being exposed to tire maintenance hazards.
10		• Check for overhead hazards of mud or ice build-up under box and wheel wells. ⚠ Ice and mud can dislodge and strike personnel below. ✓ Wash or knock down potential hazard as part of your Field Level Risk Assessment.

Task Preparation *(continued)*

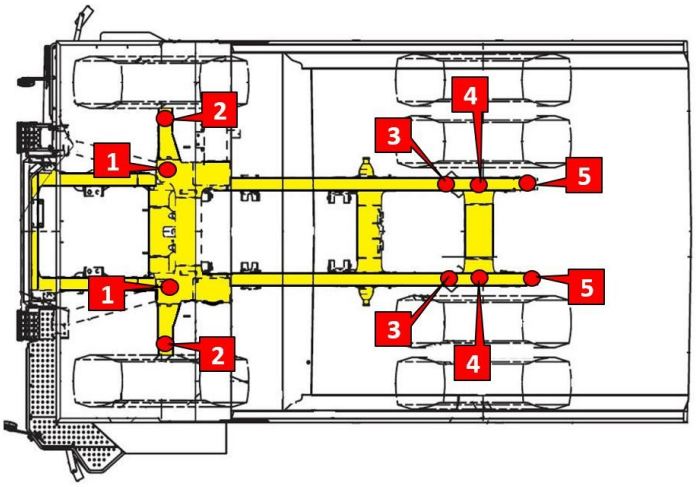
11		• Check around the unit for possible fluid leaks that could present a **slipping hazard**. • Look for any damage to equipment that could be a hazard such as **loose metal** or **sharp edges**. ⚠ Slipping hazards. Cutting or puncture hazards. ✓ Report any significant leaks or damage to the appropriate maintenance personnel.

12		• **Identify the design and configuration of the wheel/ rim assembly that is installed.**
		  ○ Taper Fit / Standard Components
		  ○ 5-Piece / 6 Piece / 8-Piece

13		• Inspect **ALL** tire/wheel positions for any damage or any abnormalities prior to commencing the scheduled job. • Check pressures, tread depths and brand numbers for accuracy. • Note all inspection **findings**, **actions** and **priority codes** for each wheel position as required in the ***TOMS*** process (or applicable tire tracking software).
14		• Check that the tire / wheel that is going to be deflated does not have any damage or abnormalities that may present additional risks to the normal deflation process. • Refer to ***Safe Work Practice P-14 Deflating Tires,*** *if necessary.* ⚠ If additional hazards exist, cordon off the work area to prevent unknowing personnel from entering. ✓ If required, conduct a hazard assessment to determine the safest method to deflate the tire.
15		• Record all tire and wheel data as required. • Brand numbers, serial numbers, tread depths and tire descriptions are typical examples of information required.

6. Jack the Vehicle

1



Approved Jack and Support Stand Locations	
1	Front axle beam, left or right side
2	Front suspension strut – left or right side
3	Rear axle housing support, left or right side
4	Rear axle – left or right side
5	Rear suspension strut, left or right side

a) Jack the Front Tires

1

- Position a minimum 43 Tonne (48 Ton) jack under **Location 2** (front suspension strut) on the side that the wheel/tire is being removed.
- Operate the jack to lift the vehicle until there is sufficient clearance for the front tire to be removed and refitted.

⚠ Using jacks or stands with a capacity less than what is required can result in overloading and failure of equipment.	✓ Never use jacks or stands that are less than the minimum load capacity, as shown in Section 4.

2

- Position a minimum 43 Tonne (48 Ton) support stand under **Location 1** (front axle beam) on the side that the wheel/tire is being removed.

⚠ The jack must not be used to support the unit.	✓ Only use approved engineered safety stands or blocking that is rated for the task.

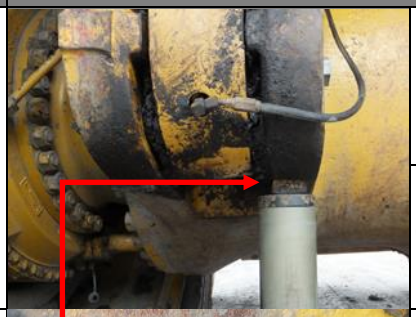
3

- Place a layer of rubber between the stand and the vehicle to reduce slippage.
- Lower the jack so that the stand takes the full weight of the vehicle.
- For added stability, leave the jack in contact with the jacking point.
- Apply the jack load locking device or rings, if available.

⚠ The vehicle may slip on the metal stand during the task.	✓ A layer of rubber can reduce the risk of slipping.

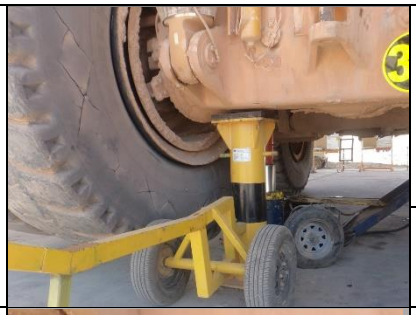
Caterpillar 785

All Tire Positions - Vertical Demount and Mount

b)	**Jack the Rear Tires – Method 1**		
1		• Position a minimum 50 Tonne (55 Ton) jack under **Location 5** (rear axle suspension housing) on the side that the wheel/tire is being removed. • Operate the jack to lift the vehicle until there is sufficient clearance for the tires to be removed and refitted.	
		Using jacks or stands with a capacity less than what is required can result in overloading and failure of equipment.	✓ Never use jacks or stands that are less than the minimum load capacity, as shown in Section 4.
2		• **CAUTION:** Jacking point on the suspension casting must be equipped with a flat surface of sufficient size to securely contact the mating surface of the jack load cap.	
		Placing a jack or stand load cap under an angled surface can cause the jack or stand to be ejected and strike workers.	✓ Check that the lifting surface is flat and level before attempting to lift or support the vehicle.
3		• Position a minimum 50 Tonne (55 Ton) support stand under **Location 4** (rear axle) on the side that the wheel/tire is being removed.	
		The jack must not be used to support the unit.	✓ Only use approved engineered safety stands or blocking that is rated for the task.
4		• Place a layer of rubber between the stand and the vehicle to reduce slippage. • Lower the jack so that the stand takes the full weight of the vehicle. • For added stability, leave the jack in contact with the jacking point. • Apply the jack load locking device or rings, if available.	
		The vehicle may slip on the metal stand during the task.	✓ A layer of rubber can reduce the risk of slipping.
c)	**Jack the Rear Tires – Method 2**		
1		• Position a minimum 50 Tonne (55 Ton) jack under **Location 3** (rear axle housing support) on the side that the wheel/tire is being removed. • Operate the jack to lift the vehicle until there is sufficient clearance for the tires to be removed and refitted.	
		Using jacks or stands with a capacity less than what is required can result in overloading and failure of equipment.	✓ Never use jacks or stands that are less than the minimum load capacity, as shown in Section 4.

Caterpillar 785

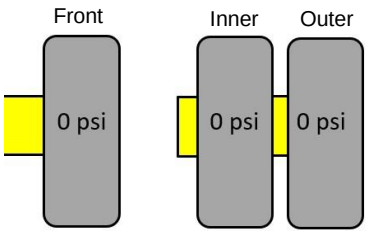
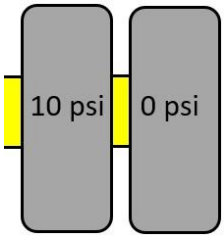
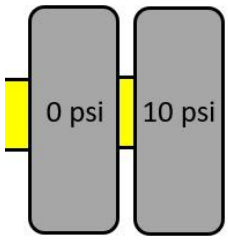
All Tire Positions - Vertical Demount and Mount

2		• Position a minimum 50 Tonne (55 Ton) support stand under **Location 4** (rear axle) on the side that the wheel/tire is being removed.	
		The jack must not be used to support the unit.	Only use approved engineered safety stands or blocking that is rated for the task.
3		• Place a layer of rubber between the stand and the vehicle to reduce slippage. • Lower the jack so that the stand takes the full weight of the vehicle. • For added stability, leave the jack in contact with the jacking point. • Apply the jack load locking device or rings, if available.	
		The vehicle may slip on the metal stand during the task.	A layer of rubber can reduce the risk of slipping.

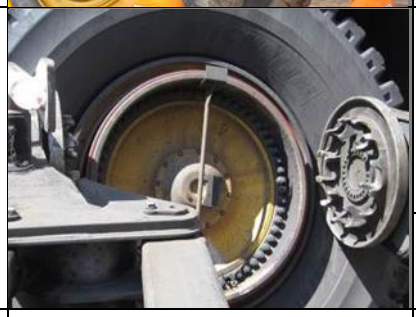
Caterpillar 785

All Tire Positions - Vertical Demount and Mount

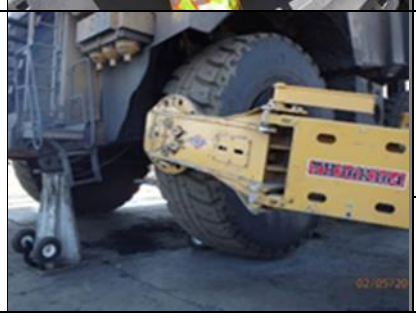
7. Demount a Front, Rear Inner or Outer Tire

1		• Clean the valve assembly threads with a wire brush to enable the deflation tool to be installed correctly. • Install the valve deflation tools (with tag line and muffler system) to the valve assembly (or both valve assemblies). ⚠ Severe injury could occur if the deflation tool blows off the valve stem under pressure. ✓ Clean and check the valve threads prior to attaching the inflation-deflation tool.
2		**If a FRONT or both REAR INNER and OUTER tires are being <u>demounted</u>:** • Deflate the tire (or tires) to zero (0) psi. ⚠ Trajectory zone hazard. Noise hazard – use muffler system and correct PPE. ✓ Ensure that all personnel remain out of the trajectory zone during the deflation process.
3		**If the REAR OUTER tire is being <u>demounted</u> and the REAR INNER tire is <u>remaining in place</u>:** • Deflate the REAR OUTER tire to zero (0) psi. • Deflate the REAR INNER tire to the 10psi Safe Handling Pressure *(or up to 30 psi in cold climates as described in **Safe Work Practice P-14 Deflating Tires and Safe Handling Pressures)**.*
4		**If the REAR OUTER <u>assembly is being removed</u> and the REAR INNER tire is being <u>demounted</u>:** • Deflate the REAR INNER tire to zero (0) psi. • Deflate the REAR OUTER to the 10psi Safe Handling Pressure *(or up to 30 psi in cold climates as described in **Safe Work Practice P-14 Deflating Tires and Safe Handling Pressures)**.* • *Refer to **Safe Work Procedure CAT 785-B (Complete Assembly) Removal and Installation** to remove the OUTER REAR assembly.*
5		• Remove the deflation tool. • Run heavy gauge wire through the valve stem(s) to clear any blockages and ensure complete deflation. ⚠ Never stand in front of a blocked stem. The release of compressed air and debris can cause serious injury. ✓ Wear appropriate PPE to protect against debris being released from the valve stem.

Demount a Front, Rear Inner or Outer Tire *(continued)*

6		**<u>If a REAR INNER tire is being removed</u>**: • Secure the rock ejector out of the way so that it will not interfere with the removal of the inside tire. • **Site Specific Tooling MUST be used. (**Rock ejector stand option shown in the photo). ⚠ Do **NOT** stand on the arm of the manipulator or climb on the tire to secure the rock ejector. ✓ **Always** use the appropriate tooling and work platforms when securing the rock ejector.
7		• Use the manipulator to apply inward pressure on the sidewall of the tire (or the flange) to expose the O-ring and lock ring. • **NEVER** apply forward pressure while clamping the tread as the grip may slip and cause serious pinch point injury. ⚠ The vehicle may be pushed and fall from the stand. ✓ Avoid excessive pushing to prevent displacement or damage to the support stand.
8		****CAUTION – STORED ENERGY**** In some cases, the tire may break free of the hardware while the flange ring <u>remains seated on the bead seat band</u> (TSR or Wedge style components). In such cases, use a soft metal hammer to dislodge the flange ring from the bead seat band <u>before removing the lock ring.</u> Never remove a (loose) bead seat band and flange that is <u>stuck together</u> under stored pressure.
9		• Check that the tire manipulator is secure and will not release the inward pressure on the assembly. • Check that the O-ring and lock ring are easily accessible. ⚠ Severe pinch point hazard if the inward pressure is released when personnel are removing the lock ring and O-ring. ✓ Always apply inward pressure directly on the sidewalls or flange.
10		• **Wheeled Manipulators** - Apply handbrake and chock tires. • **Truck Mounted Cranes** - Apply E-Stop or turn controls to the “OFF” position. ⚠ Severe pinch point hazard if the inward pressure is released when personnel are removing the lock ring and O-ring. ✓ **NEVER** operate the controls of the manipulator or crane when personnel are positioned between the tire and the manipulator.

Demount a Front, Rear Inner or Outer Tire *(continued)*

11		**Remove the lock ring.** • To remove a 1-Piece lock ring refer to Appendix 1 • To remove a 2-Piece lock ring refer to Appendix 2	
		The lock ring can fall during removal and strike workers. Finger pinch injuries can occur when removing lock rings.	✓ Use a lock ring catcher for 51" and larger. Use tire bars to remove lock rings. Use a transporter or Gap Wraps to move them around the workshop.
12		• Use a tire bar, pliers, or screwdriver to remove the O-ring.	
		Fingers may be crushed if the bead seat band moves unexpectedly.	✓ NEVER use your fingers to remove the O-ring.
13		• Cut the O-ring to prevent re-use.	
		O-rings left on the floor area a tripping hazard.	✓ Never re-install used O-rings. Dispose of the O-ring correctly into the rubber bin.
14		**For FRONT and REAR OUTER tires.** • Remove the lock ring catcher (if fitted previously) and place in a safe, suitable location away from the working area.	
15		**For 5-Piece assemblies:** • Reposition the arms of the manipulator from the sidewall to the tread. • Secure the tire firmly in the arms of the manipulator. • Apply slight outward pressure to aid in breaking the back bead.	
		NEVER pull on the tire to dislodge the back bead.	✓ Avoid excessive outward pressure to prevent displacement or damage to the support stand.

Demount a Front, Rear Inner or Outer Tire *(continued)*

16

For IGLR (6-Piece) or DGS (8-Piece) assemblies:

- Secure the tire firmly in the arms of the manipulator and apply slight outward pressure to remove the tire.
- With an IGLR or DGS configuration the tire and wheel components should dislodge from the wheelbase with minimal resistance.

⚠ NEVER pull on the tire to dislodge the back bead.	✓ Avoid excessive outward pressure to prevent displacement or damage to the support stand.

17

For 5-Piece assemblies:

- Unseat the back bead and flange by using the correct hydraulic bead breaker or ram.

*Refer to **SWI-502 Hydraulic Rams or SWI-505 (5-Piece) Bead Breakers,** for further details if necessary.*

⚠ Holding onto a pressurized hydraulic line may result in serious injury if the line bursts.	✓ NEVER hold onto a hydraulic line that is pressurized.

18

****CAUTION – STORED ENERGY****

- With Taper Fit Hardware (Example - TSR), the back flange ring and bead seat band may remain seated when the tire is pulled off the back section.
- In this case, leave the tire part way on the wheel and use a soft metal hammer or hydraulic device to dislodge the flange ring.

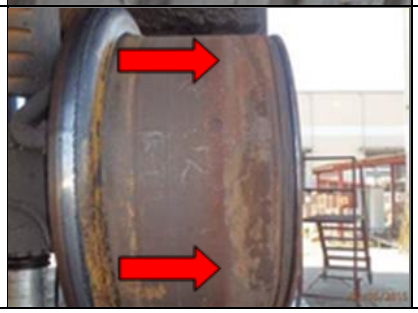
⚠ The TSR flange ring contains stored energy and can fly off with tremendous force without warning.	✓ Check that the TSR back flange is loose before removing the tire from the assembly.

19

- Remove the tire from the wheel and place it horizontally on the ground so that the bead seat band and flange can be removed from the tire.

⚠ The manipulator may strike and injure Technicians in the area.	✓ Remain in full view of the operator and stay clear of the manipulator.

20



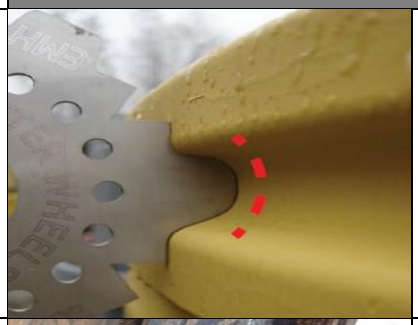
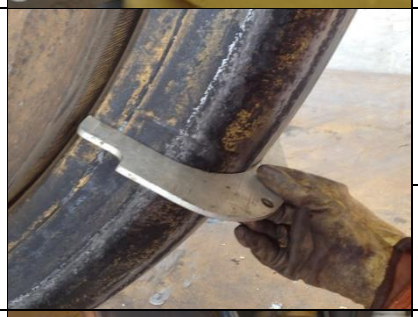
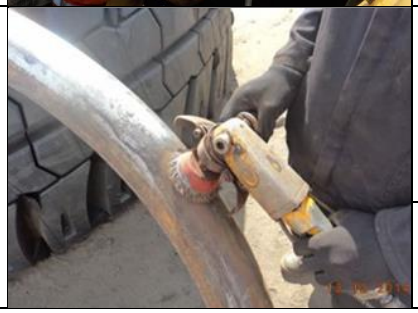
For 5-Piece assemblies:

- Use the tire manipulator to remove the back flange and place it in a safe, suitable location away from the working area.
- This is required so that proper cleaning and inspection of the back section and flange can take place.

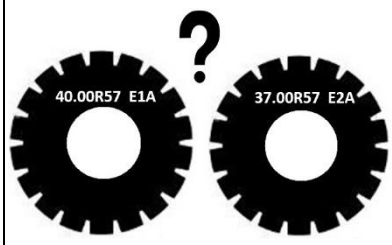
Demount a Front, Rear Inner or Outer Tire *(continued)*

21		**For 5-Piece, IGLR or DGS assemblies:** • Use a hydraulic bead breaker to separate the bead seat band and flange from the tire bead. *Refer to **Safe Work Instruction SWI-505 (5-Piece) Bead Breakers,** for further details if necessary*. ⚠ Bead breakers can fly off unexpectedly and strike personnel. ✓ Stand well back from hydraulic tools during operation, wait until the hydraulic pressure has been released before approaching.
22		**For 5-Piece, IGLR or DGS assemblies:** • Use the tire manipulator to remove the flange and bead seat band from the tire. Place the components out of the way in a safe, suitable location away from the working area. ⚠ Handle with care. Manipulator pads can damage metal surfaces of components. ✓ Inspect for damage, use a grinder to remove any burrs that could damage a tire or wheel components.
23		**IGLR or DGS assemblies.** • Turn the tire over and remove the second flange and bead seat band from the opposite bead. • Use the tire manipulator to remove the flange and bead seat band from the tire. Place components in a safe, suitable location away from the working area.
24		**For IGLR or DGS assemblies.** • Remove the back section O-ring. ⚠ O-rings left on the floor are tripping hazard. ✓ Dispose of the O-ring correctly.
25		**Remove the 2-Piece Lock Ring from a DGS (8-Piece) assembly.** To remove a 2-Piece lock ring refer to Appendix 2.

8. Preparation for Mounting

1		• Best practice throughout the cleaning and inspection of all rim, wheel, and components is to utilize the appropriate profile gauges to ensure proper component matching (and) help to identify any excessively worn, bent or distorted items. • Any component that is excessively worn or out of range of acceptable tolerances must be removed from service. • As such, each location must have clear guidelines in place for all acceptable tolerances and have this clearly communicated to all team members.	
2		• Inspect each component carefully looking for faults (cracks, damage, distortion, wear or oxidation). • Debris in the grooves will lead to improper seating of components.	
		⚠ Faulty components can result in assembly failure, causing injury or death.	✓ Do not use any components that are faulty. Discard them so they cannot be re-used.
3		• Clean all areas of the wheel / rim base with a stiff wire brush, wire wheel or pressure washer. • Inspect the wheel / rim base for cracks, damage, distortion or excessive wear.	
		⚠ The use of cleaning tools can cause dust particles, debris and excessive noise.	✓ Use a face shield and hearing protection when operating a buffing wheel or pressure washer.
4		• Clean the bead seat band (or bands) with a stiff wire brush, wire wheel or pressure washer. • Inspect the bead seat band for faults (cracks, damage, distortion or excessive wear).	
		⚠ Worn or damaged bead seat bands can result in assembly failure, causing injury or death.	✓ Thoroughly clean and inspect the bead seat band. Discard and replace if faulty.
5		• Clean the flanges with a stiff wire brush, wire wheel or pressure washer. • Inspect the flanges for faults (cracks, damage, distortion or excessive wear). • Remove any metal burrs that can damage the tire or adjacent components.	
		⚠ Worn or damaged flanges can result in assembly failure, causing injury or death.	✓ Thoroughly clean and inspect the flanges. Discard and replace if faulty.

Preparation for Mounting *(continued)*

6		• Clean the one and/or two piece lock rings with a stiff wire brush, grinder or pressure washer. • Inspect for faults (cracks, damage, distortion or excessive wear). ⚠ Worn or damaged lock rings can result in assembly failure, causing injury or death. ✓ Thoroughly clean and inspect the lock rings. Discard and replace if faulty.
7		• Inspect the valve hardware to ensure that components are secure and in good working condition. • Inspect the valve, valve extensions, spud and base for correct seating and signs of cracks or wear. • Replace if there any signs of wear or damage. ⚠ A faulty valve or extension can result in extensive damage to the tire. ✓ Clean and tighten or replace if damaged or worn.
8		**Obtain the correct tire size, ply rating and type of tire to be mounted.** • Check that the tire to be mounted is correct for the wheel assembly and vehicle. ⚠ Mounting the incorrect size, ply and type of tire can result in serious injury or equipment failure. ✓ Refer to the site-specific MAP (Maintenance Activity Planner) or TMP (Tire Management Plan) for details, if unsure.
9		**Position the tire for cleaning and inspection.** Always secure the tire or tire assembly first before working on it. Secure the tire or tire assembly using the options provided in Safe Work Practice P-28: • Place the tire in a certified tire inspection stand. • Place the tire horizontally on the ground. • Lean the tire on a horizontal tire or approved blocking. • Lean the tire (20” – 25” only) against a vehicle or structure and secure it with wheel chocks.
10		**WARNING:** **NEVER** clean, inspect or prepare a tire or tire assembly that is held vertically by a manipulator. **The tire could fall from the manipulator or the rim components could fall from the tire and cause fatal injuries.**

Preparation for Mounting *(continued)*

11		• Inspect the inside and outside of the tire being fitted to make sure it is free from foreign objects or damage. • Remove all water and debris.	
		Tire failure could occur if any damage or foreign objects are present.	✓ Inspect for damage and remove all foreign objects, water and debris.
12		• Add tire additive if required to do so, as per manufacturer recommendations.	
		Rim corrosion could result if tire additive is not added.	✓ Add the correct quantity and quality of tire additive to the tire.
13		• Lubricate the tire beads using a non-petroleum-based lubricant.	
		The incorrect type and quantity of bead lubricant can result in damage to the tire bead rubber.	✓ Use the correct type and quantity of lubricant as per site specifications.
14		**For 5-Piece assemblies:** • Use the tire manipulator to place a flange (only) on the back section of the wheel / rim. • Lubricate the back section of the rim where the tire bead will seat.	
		Handle with care. Manipulator pads can damage metal surfaces of components.	✓ Inspect for damage, use a grinder to remove any burrs that could damage a tire or components.
15		**For DGS (8-Piece) assemblies:** **Install the 2-Piece Lock Ring onto an 8-Piece Wheel** • To install a 2-Piece lock ring refer to **Appendix 2**	

Preparation for Mounting *(continued)*

16

For DGS and IGLR assemblies:

- Lubricate the back section O-ring groove **ONLY**.
- Install the back section O-ring **(DRY)** and then lubricate (the O-ring) once it is in place to prevent debris sticking to it while it is being fitted over the wheel / rim.

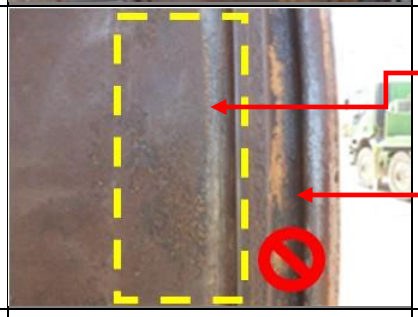
The wheel components may index and cause damage or O-ring leakage during operation.	Do not lubricate the tapered mating surfaces of the components.

17

For DGS and IGLR assemblies:

- Use the tire manipulator to place the bead seat band and flange on the back section of the wheel / rim.
- Lubricate the outside of the bead seat band where the tire bead will seat.

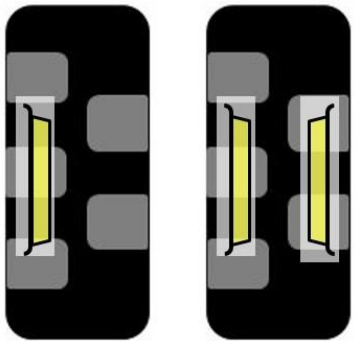
18



For 5-Piece, IGLR or DGS assemblies:

- Lubricate the front gutter section and O-ring groove.
- Keep the lock ring groove free of lubrication.

19



Pre-mounted for 5-Piece wheel/rim

Pre-mounted for 6-Piece or 8-Piece wheel/rim

IMPORTANT: Pre-mounted components in tires

Having the components (bead seat band and flange) already pre-mounted into the tire is considered **'Best Practice'** and can provide the following benefits:

- Reduces equipment downtime by having the tires and components 'ready to go' and install as one unit.
- Reduces the likelihood of components falling from the tire while it is being manipulated.
- Helps to ensure that taper fit components are seated correctly.
- Helps to ensure that beads do not get 'hung' or damaged when mounting and seating components vertically.

To pre-mount components, follow the steps outlined in:

- (OTR-007) Mount Tires on Multi-Piece Assemblies – Horizontal.
- (OTR-006) Demount Tires on Multi-Piece Assemblies – Horizontal.

If components are not pre-mounted in the tire, use Option 1, 2 or 3:

Caterpillar 785

All Tire Positions - Vertical Demount and Mount

Option 1 - Press-fit the tire onto the components using a mounting stand

20 a

- Place the flange and bead seat band on a tire mounting stand.
- Lubricate outside circumference of bead seat band.

Handle with care. Manipulator pads can damage metal surfaces of components.	Use a grinder to remove any burrs that could damage a tire or wheel components.

20 b

- Lower the tire onto the bead seat band and flange and press down on the tire to seat the components.
- If mounting the tire to a 6- or 8-Piece wheel/rim, turn the tire over and repeat the above process to install a second bead seat band and flange.

When lifting the tire, there is the potential for the bead seat band and flange to slip out of the tire bead.	Lift slowly and keep all personnel away from the potential fall hazard.

Option 2 - Press-fit the bead seat band and flange ring into the tire

21

- Lubricate the outside circumference of bead seat band.
- Place the bead seat band and flange into the tire.
- Press fit the bead seat band into the tire.
- If mounting the tire to a 6- or 8-Piece wheel/rim, turn the tire over and repeat the above process to install a second bead seat band and flange.

Option 3 - Lift the components onto the wheel with the manipulator

22 a

For DGS and IGLR assemblies:

- Use the tire manipulator to place the inner bead seat band and flange on the back section of the wheel / rim.
- Lubricate the outside of the bead seat band where the tire bead will seat.

22 b

For 5-Piece, DGS or IGLR assemblies:

- Place the tire onto the wheel / rim.
- Lubricate the outer circumference of the bead seat band.
- Install the outer flange and bead seat band onto the wheel / rim.
- Go to Step 2 in Section 9.

Manipulator pads can damage metal surfaces of components.	Inspect for damage, use a grinder to remove any burrs that could damage a tire or components.

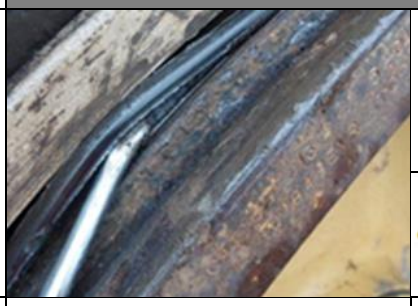
Caterpillar 785

All Tire Positions - Vertical Demount and Mount

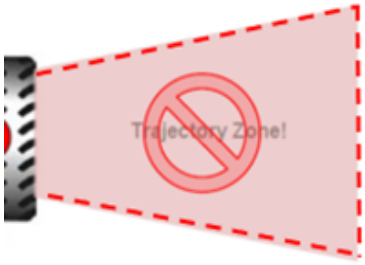
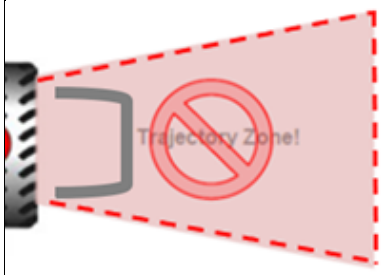
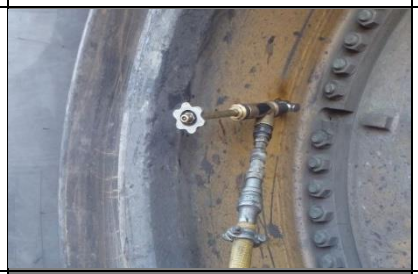
9. Mount a Front, Rear Inner or Outer Tire

1		• Mount the tire (with pre-mounted components) onto the wheel / rim.	
		The bead seat band and flange can dislodge from the tire unexpectedly.	✓ Do <u>NOT</u> stand between the tire and manipulator while the tire is being positioned on the wheel / rim.
2		• <u>Reposition the manipulator pads</u> and apply inward pressure on the sidewall of the tire or the flange to expose the O-ring and lock ring grooves. • **NEVER** apply forward pressure while grasping the tread as the grip may slip and cause serious pinch point injury.	
		The vehicle may be pushed and fall from the stand.	✓ Avoid excessive inward pressure to prevent displacement or damage to the support stand.
3		• Check that the tire manipulator is secure and will not release the inward pressure on the assembly. • Check that the O-ring and lock ring are easily accessible.	
		Fingers can be crushed if the inward pressure is released when personnel are installing the lock ring and O-ring.	✓ Always apply inward pressure directly on the sidewalls or flange.
4		• **Wheeled Manipulators** - Apply handbrake and chock tires. • **Truck Mounted Cranes** - Apply E-Stop or turn controls to the “OFF” position.	
		Fingers can be crushed if the inward pressure is released when personnel are installing the lock ring and O-ring.	✓ **NEVER** operate the controls of the manipulator or crane when personnel are positioned between the tire and the manipulator.
5		• Obtain the correct size O-ring from stock. • Always use a NEW O-ring. • Lubricate O-ring with a non-petroleum-based lubricant. ***NOTE**: The O-ring can be also placed into position after the lock ring is installed, either method is acceptable.*	

Mount a Front, Rear Inner or Outer Tire *(continued)*

6		• Place the O-ring into O-ring groove. • Use a tire bar or screwdriver to assist with O-ring placement.	
		Fingers can be crushed if the inward pressure is released when personnel are installing the lock ring and O-ring.	✓ Keep your fingers outside of the bead seat band pinch point area at all times. Use a tire bar or screwdriver to install the o-ring.
7		**Install the lock ring.** • To install a 1-Piece lock ring refer to **Appendix 1** • To install a 2-Piece lock ring refer to **Appendix 2**	
		The lock ring can fall and strike workers. Finger pinch injuries can occur when installing lock rings.	✓ Use a lock ring catcher for 51" and larger. Use tire bars to install lock rings. Use a transporter or Gap Wraps to move them around the workshop.
8		• Check that all personnel are clear of the manipulator and tire assembly. • Remove the tire manipulator to release the inward pressure on the assembly.	
		The tire and/or manipulator arms may move suddenly when inward pressure is released.	✓ Keep all personnel clear of the area when releasing inward pressure on the tire.
9		**<u>If a REAR INNER tire has been mounted</u>**: • Return the rock ejector to its resting position. • Place the site specific tooling (rock ejector stand) in the appropriate location.	
		Do **NOT** stand on the arm of the manipulator or climb on the tire to release the rock ejector.	✓ **Always** use the appropriate tooling and work platforms when releasing the rock ejector.
10		**<u>If a FRONT or REAR OUTER tire was mounted, go to Section 10.</u>** **<u>If a REAR INNER tire was mounted</u>**: • The INNER tire must first be inflated to a maximum of 10 psi before an OUTER tire can be mounted or before an OUTER complete assembly can be installed. • Refer to Section 10 to safely inflate the INNER tire to 10 psi. • Once the REAR INNER tire has been inflated to 10psi, mount the REAR OUTER tire as per Steps 1-8 or refer to ***SWP Cat 785-B*** to install a complete assembly.	

10. Inflate the Tire

1		• **STOP** - Perform a visual inspection of all components to ensure correct matching and fitment prior to inflation. • For additional information refer to ***P-15 Inflating and Re-Inflating Tires***. ⚠ The tire assembly may disassemble and strike personnel causing fatal injuries. ✓ Do NOT inflate a tire with any concerns of component matching, fitment or seating.
2		• Check the work area is secure prior to beginning the inflation process. • Identify and cordon off the tire's inflation trajectory zone. • For additional information on the Trajectory Zone refer to ***P-15 Inflating and Re-Inflating Tires.*** ⚠ The tire assembly may disassemble and strike personnel causing fatal injuries. ✓ NEVER stand or allow others to stand in the trajectory zone during the inflation process.
3		• Place the tire manipulator in front of the tires trajectory zone to function as an inflation barrier. • Be sure to leave enough room for a Technician to safely access the lock ring assembly for a pre- and post-inspection of the components. ⚠ Failure to restrain a tire during inflation can result in serious injury and possible death. ✓ NEVER inflate a tire and wheel/rim assembly that is not restrained by one of the methods described in **P-15 Inflating and Re-Inflating Tires.**
4		• Select the correct inflator device for the type of valve assembly. • Install the inflator device securely onto the valve assembly and remove the valve core or core housing (as applicable).
5		• The extension hose must be of sufficient length to allow you to remain outside of the trajectory zone during inflation. • The remote inflation device must allow you to control the air flow, check the pressure, and expel air pressure from outside of the trajectory zone. ⚠ The tire assembly may disassemble and strike personnel causing fatal injuries. ✓ Personnel shall not enter the trajectory zone while the tire is being inflated (after the components have been seated).

Caterpillar 785

All Tire Positions - Vertical Demount and Mount

Inflate the Tire *(continued)*

6		• Inflate the tire to a **maximum of 10 psi** while tapping the lock ring using a soft metal or dead blow hammer to seat the wheel components correctly. • Turn off the supply of air to the tire. ⚠ **10 PSI - Maximum** pressure for verifying the correct seating of wheel components within the trajectory zone. ✓ Stop if you detect anything abnormal. Deflate the tire remotely and re-assess.
7		**<u>If inflating a DGS assembly:</u>** • Inspect the 2-piece lock ring and wheel components on the other side of the tire (between the duals) to ensure the wheel components are seating correctly. • Tap the 2-piece lock ring to assist with seating. ⚠ The tire assembly may disassemble if the other lock ring is not inspected. ✓ Inspect the other lock ring to confirm that components are seating correctly.
8		**IMPORTANT**: • <u>If the tire is not sealing</u>, you may need to squeeze or manipulate the tire slightly in different directions for the beads to seal and the tire to take air. • Release the tire immediately once an air seal has been achieved. • Place the manipulator in front of the tire to act as an inflation barrier. ⚠ Structural failure of the manipulator could occur if the tire is not released while the tire is inflating. ✓ Release the tire immediately once an air seal has been achieved.
9		**STOP and check all components.** • Inspect lock rings, bead seat bands, flanges and driver lock key for proper seating. • Ensure “Taper Fit” flanges are seated properly on the bead seat band and back section. ⚠ The tire assembly may disassemble if components are not seated correctly. ✓ Stop if you detect anything abnormal. Deflate the tire remotely and re-assess.
10		**<u>If a REAR INNER tire has been mounted:</u>** Do not inflate the INNER TIRE to **operational pressure** until: a) the OUTER TIRE has been mounted and inflated to 10psi. b) the OUTER ASSEMBLY has been installed and inflated to 10psi. Once the OUTER ASSEMBLY has been installed and the inflation barrier has been positioned, continue to Step 11 for inflation of both rear tires.

Inflate the Tire *(continued)*

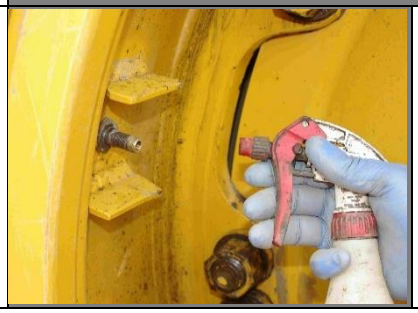
11		• Inflate the tire (or tires) to **20% above** the recommended cold inflation pressure to seat the beads correctly (as per ***P-15 Inflating and Re-Inflating Tires)***. **Note**: There is no requirement to over-inflate above 120 psi (8.3 Bar)	
		The tire assembly may disassemble and strike personnel causing fatal injuries.	✓ Remain outside of the trajectory zone during the inflation process.

12		**IMPORTANT**
		• During the inflation of the tire:
		  ○ Listen for abnormal sounds such as popping, snapping or escaping air, indicating a possible structural failure.
		  ○ Look for any bulges or deformations on the tire.
		• If there are any unusual noises, escaping air, or deformations, remotely <u>deflate</u> the tire immediately and re-assess the situation.	

13		When the tire has reached **20% above** the recommended cold inflation pressure: • Turn off the air supply and disconnect the air line. • Deflate the tire back down to the recommended cold inflation pressure. • Keep out of the trajectory zone during deflation.	
		Noise hazard during deflation.	✓ Be sure to use the remote muffler system to reduce noise levels whenever possible.
14		• Inspect the distance between the flange edge and the molded guide ribs 360° on both sides of the tire's sidewall to ensure the beads are consistently seated. • If abnormal, deflate and reseat the beads and components.	
		Incorrectly seated beads can result in tire failure during the operation of the vehicle.	✓ Do not release the vehicle for operation if the beads are not seated correctly.
15		• Replace the core housing. • Disconnect the remote inflation device. • It is now acceptable to remove the inflation barrier.	
		Severe injury could occur if the inflator assembly blows off the valve stem under pressure.	✓ Remain out of the line of fire from the stem when installing the core housing.

Caterpillar 785

All Tire Positions - Vertical Demount and Mount

	Inflate the Tire *(continued)*	
16		• Check for air leaks using a spray of soapy water on the valve assembly. • If any air leaks are discovered, they MUST be rectified. • Install the valve cap after leak testing.

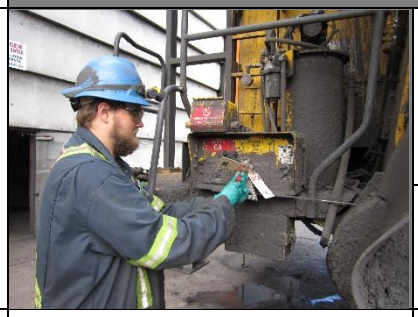
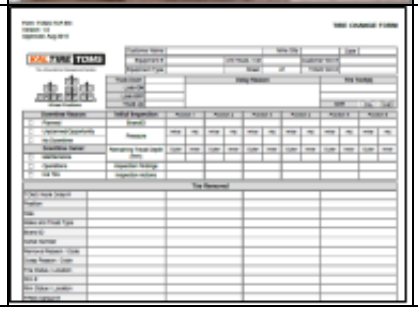
11. Completing the Task

1		**Install the lock ring retainer plate.** • Install the lock ring retainer plate on the outside lock ring position. • Tighten the bolts to the required torque value.	
		If a retainer is not installed, the tire may come off the wheel (if the tire goes flat in operation) and strike personnel or equipment.	✓ Check that the lock ring retainer plate is securely installed. **Do Not** let the vehicle operate with a missing retainer plate on an outer rear position.
2		• Perform a walk-around check of the vehicle.	
		Check there are no items under the unit that could be damaged during the lowering process.	✓ Check everyone is clear and communicate your intentions to lower the unit to anyone who could be affected.
3		• Operate the jack to raise the vehicle off the stand. • If required, remove spacers or load holding rings from the jack and place in the correct storage location.	
		Hand crush hazard.	✓ Never place hands on the top of a safety stand when it is under a suspended load.
4		• Remove the stand and place in the correct storage location. • Lower the jack and place in the correct storage location.	
		Back strain hazard.	✓ Use lifting aids and proper body positioning when moving stands.
5		• **STOP** • Perform a walk-around check on the vehicle being serviced. • Check all tooling and equipment has been removed and placed in a safe location. • **Confirm that all tires on the unit are at the correct air pressure and that the vehicle is fit for service.** • Report any potential concerns immediately to the relevant department.	

Caterpillar 785

All Tire Positions - Vertical Demount and Mount

Completing the Task *(continued)*

6		• Remove all personal safety locks and hasps. • Keep the isolation switch in the “OFF” position and wheel chocks in place until the equipment operator arrives to move the vehicle.	
		Failing to remove your lock or removing someone else’s will result in a breach of isolation regulations.	All Team Members present must remove their own lock. Do not remove any unidentified locks. Notify your manager.
7		• Provided it is safe to do so, release the vehicle being serviced back to the client. • If you are in doubt, STOP and ask you Supervisor or client representative for further assistance.	
		Injury to personnel or equipment damage may occur if the vehicle has any other faults.	Never release any vehicle with a potential concern, report all concerns immediately.
8		• Clean and inspect all tools and equipment and return them to their correct storage location.	
		Faulty or damaged tooling could result in injury to personnel.	Report any defects or concerns to your Supervisor immediately. Tag OUT OF SERVICE any defective tooling or equipment.
9		• Report to the Manager / Supervisor that the task is complete. • Record and Inform Management of any potential concerns. • Ensure all tire change data required is correct and handed in.	

Caterpillar 785

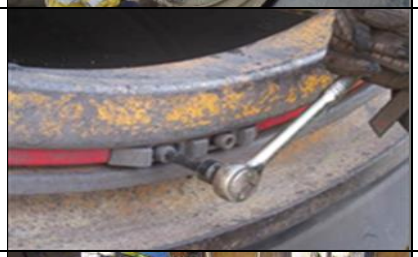
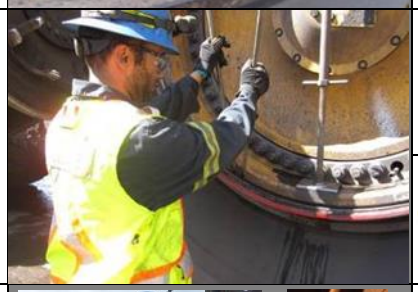
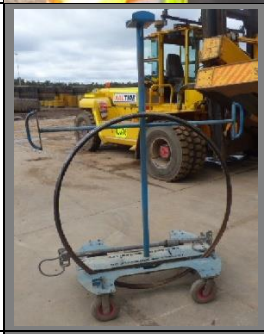
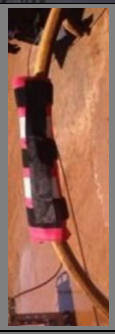
All Tire Positions - Vertical Demount and Mount

Appendix 1 - Remove and Install a 1-Piece Lock ring

If removing or installing a 1-Piece lock ring on a FRONT or OUTER REAR assembly, refer to Section 1.1 or 1.2

If removing or installing a 1-Piece lock ring on a REAR INNER assembly, refer to Section 2.1 or 2.2

1.1 - Remove a 1-Piece lock ring from a FRONT or OUTER REAR assembly

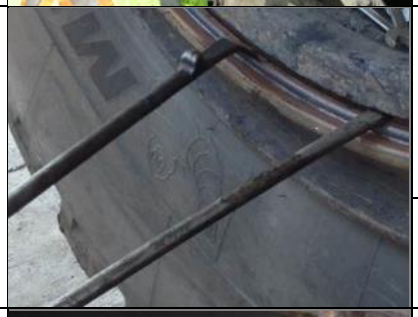
1		**Install the lock ring catcher (for 1-Piece lock rings 51" and larger).** • Install and secure the appropriate lock ring catcher to the wheel assembly. ⚠ The lock ring may fall and strike workers during removal. ✓ Always use a lock ring catcher to prevent the lock ring from falling.
2		• Remove the lock ring retainer plate (if fitted). • Place in a safe, suitable location away from the working area.
3		• Use lock ring bars to dislodge the lock ring from the groove and into the catcher. • Lower the lock ring to the ground. ⚠ Pinch Points – NEVER place hands near the lock ring split when lowering or moving the lock ring. ✓ If you cannot lower the lock ring safely on your own, acquire assistance from a second team member.
4	 	• Transport the lock ring from the working area to a safe location for cleaning and inspection. • If a transporter is not available, use a Gap Wrap to cover the two ends when handling it. ⚠ The manual handling (including rolling them) of lock rings can result in serious finger injuries. ✓ Use a lock ring transporter, whenever possible. Use Gap Wraps to cover the ends if a transporter is not available.
5		• Remove the lock ring catcher (if fitted previously) and place in a safe, suitable location away from the working area.

Safe Work Procedure 785 - A

Caterpillar 785

All Tire Positions - Vertical Demount and Mount

1.2 - Install a 1-Piece lock ring on a FRONT or OUTER REAR assembly

1		**Install the lock ring catcher.** • Install and secure the appropriate lock ring catcher to the wheel / rim assembly.	
		The lock ring may fall and strike workers during removal.	Always use a lock ring catcher to prevent the lock ring from falling.
2		• Transport the lock ring to the vehicle. • If a transporter is not available, use a Gap Wrap to cover the two ends when handling it.	
		The manual handling (including rolling them) of lock rings can result in serious finger injuries.	Use a lock ring transporter, whenever possible. Use Gap Wraps to cover the ends if a transporter is not available.
3		• Raise the lock ring and place it securely onto the lock ring catcher. • Place the lock ring split into the lock ring groove with the lock ring split at either the 11:00 or 1:00 position.	
		Pinch Points – <u>NEVER</u> wrap your fingers around the lock ring.	Always use <u>open</u> palms to hold and apply inward pressure to the lock ring.
4		• Use lock ring bars to pry the lock ring over the wheel edge and into the lock ring groove. • Tap the lock ring with a soft metal or dead blow hammer to ensure proper seating.	
		Finger injuries can occur when installing the lock ring.	Never use your fingers to install the lock ring, always use tire bars.
5		• Install the lock ring retainer plate (if applicable). **IMPORTANT –** a retainer plate **<u>must</u>** always be fitted to the outward facing lock ring on a REAR OUTER 6- or 8-Piece assembly.	
		If a retainer is not installed, the tire may come off the wheel (if the tire goes flat in operation) and strike personnel or equipment.	Check that the lock ring retainer plate is securely installed. **<u>Do Not</u>** let the vehicle operate with a missing retainer plate on an outer rear position.

Caterpillar 785

All Tire Positions - Vertical Demount and Mount

2.1 - Remove a 1-Piece lock ring from an INNER REAR assembly

IMPORTANT

Removing (or installing) a 1-Piece lock ring (from or to the REAR INNER assembly) over the REAR OUTER 6- or 8-Piece assembly can result in serious finger crush injuries. Therefore, it is Best Practice to use 2-Piece lock ring for the REAR INNER assembly.

If a 2-Piece lock ring is not available and 1-Piece has to be used, use devices such as lock ring spreader tools and lifter trollies to handle 1-Piece lock rings to reduce the risk of injury.

1

- Remove the lock ring retainer plate (if fitted).
- Place in a suitable location for cleaning and inspection.

2

- Use lock ring bars to dislodge the lock ring from the groove and onto the hub of the vehicle.

Finger crush injuries can occur during lock ring removal.	✓ Never hold onto the lock ring or place between the lock ring and the hub while it is being removed.

3

If the REAR OUTER assembly has been removed:

- Use a lock ring lifter/catcher trolley (such as a Kal Tire Lock Ring Lifter - Model 008-04 or similar device, if available) or two persons to lift and remove the lock ring from the hub.

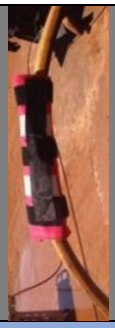
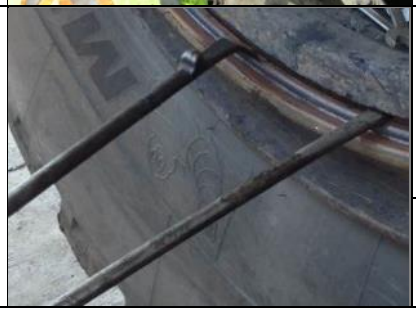
Back strain injuries may occur when lifting lock rings.	✓ Use a mechanical device or two persons to lift the lock ring.

4

If a 6- or 8-Piece OUTER assembly is fitted:

- Use a lock ring spreader tool (such as the Kal Tire Lock Ring Spreader - Model 028-01, or similar device) to expand the lock ring to enable it to be removed safely over the OUTER assembly.
- Use a lock ring lifter trolley or two persons to remove the lock ring over the outer assembly.

Finger crush injuries can occur during lock ring removal.	✓ Use a spreader to expand and secure the lock ring to prevent it from crushing fingers during removal.

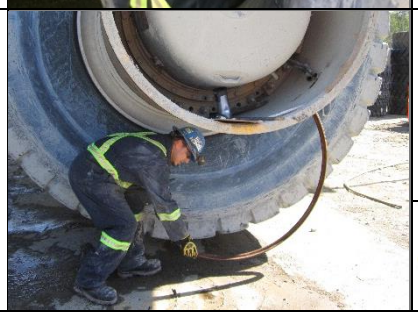
5	 	• Use a transporter to move the lock ring from the working area to a safe location for cleaning and inspection. • If a transporter is not available, use a Gap Wrap to cover the two ends when handling it. ⚠ The manual handling (including rolling them) of lock rings can result in serious finger injuries. ✓ Use a lock ring transporter, whenever possible. Use Gap Wraps to cover the ends if a transporter is not available.
	2.2 - Install a 1-Piece lock ring on an INNER REAR assembly	
1		**If the REAR OUTER assembly has been removed:** • Use a lock ring lifter/catcher trolley (such as a Kal Tire Lock Ring Lifter - Model 008-04 or similar device, if available) or two persons to lift and install the lock ring onto the hub. ⚠ Back strain injuries may occur when lifting lock rings. ✓ Use a mechanical device or two persons to lift the lock ring.
2		**If a 6- or 8-Piece OUTER assembly is fitted:** • Use a lock ring spreader tool (such as the Kal Tire Lock Ring Spreader - Model 028-01, or similar device) to expand the lock ring to enable it to be installed safely over the OUTER assembly. • Use a lock ring lifter trolley or two persons to install the lock ring over the outer assembly. ⚠ Finger crush injuries can occur during lock ring installation. ✓ Use a spreader to expand and secure the lock ring to prevent it from crushing fingers during installation.
3		• Place the lock ring split into the lock ring groove with the lock ring split at either the 11:00 or 1:00 position. ⚠ Pinch Points – <u>NEVER</u> wrap your fingers around the lock ring. ✓ Always use <u>open</u> palms to hold and apply inward pressure to the lock ring.
4		• Use lock ring bars to pry the lock ring over the wheel edge and into the lock ring groove. • Tap the lock ring with a soft metal or dead blow hammer to ensure proper seating. ⚠ Finger injuries can occur when installing the lock ring. ✓ Never use your fingers to install the lock ring, always use tire bars.

5		• Install the lock ring retainer plate (if applicable).

Appendix 2 – Remove and Install a 2-Piece Lock Ring

		<u>One Team Member</u> • Must remove the lock ring in 2 separate pieces - *Option 1*. <u>Two Team Members</u> • May remove the lock ring using either *Option 1* or *Option 2*.

1a - Option 1 - Removal of the lock ring in 2 separate pieces

1		• Loosen, <u>but do not completely remove</u> the bolts that hold the 2 retainer plates in position.	
		The lock ring may drop and strike personnel if the bolts are removed completely.	Only loosen the bolts, do not remove them completely.
2		• Carefully rotate the 2-piece lock ring within the lock ring groove so that the retainer plates are located **<u>near</u>** the 3:00 and 9:00 position. • Keep hands and fingers on the outside of the lock ring at all times. **Never** place fingers between the lock ring and the lock ring groove.	
		Hands may be pinched and injured when moving the lock ring.	Keep hands away from the lock ring split. Wear the appropriate personal protective equipment.
3		• Remove the bolts that hold one retainer plate in place and gently lower one side of the lock ring piece to rest on the ground. • Be sure to support the **BOTTOM** half of the lock ring as you remove the retaining plate to prevent (the lock ring) from falling.	
		The lock ring may fall and strike personnel.	Support the lock ring while the bolts are being removed.

Caterpillar 785

All Tire Positions - Vertical Demount and Mount

4		• Remove the bolts that hold the second retainer plate in place. • Carefully lower the **BOTTOM** half of the lock ring to the ground and place in a safe suitable location. • Keep all removed retainer bolts in a safe place for inspection.	
		The TOP piece of the lock ring may fall and strike personnel.	Always maintain the split of the lock ring at the 3:00 and 9:00 positions.
5		• Position a suitable work platform to ensure that you have stable footing and are able to work on the **TOP** half of the lock ring (access work area) at chest level or lower. • Do not reach over your head when handling the remaining **TOP** half of the lock ring.	
		Poor body positioning can cause injury.	Use a work platform that provides stability while working at the required height.
6		• Use **TWO** lock ring bars to pry the **TOP** piece of the lock ring out of the lock ring groove.	
		Fingers may be pinched between the lock ring and the lock ring groove.	**NEVER** place your fingers between the lock ring and the lock ring groove when prying. Always use lock ring bars.
7		• Carefully lower the **TOP** piece of the lock ring to the ground and place in a safe suitable location.	
		The lock ring may fall and strike personnel.	If you cannot lower the lock ring safely on your own, acquire assistance from a second team member.

Safe Work Procedure 785 - A

Caterpillar 785

All Tire Positions - Vertical Demount and Mount

1b - Remove a 2-Piece lock ring – (Option 2 – Two Team Members only)

1		***Removal of the lock ring <u>in one piece</u>*** • Loosen, <u>but do not completely remove</u> the bolts that hold the 2 retainer plates in position.	
		The lock ring may drop and strike personnel if the bolts are removed completely.	Only loosen the bolts, do not remove them completely.
2		• Carefully rotate the 2-piece lock ring within the lock ring groove so that the retainer plates are located **<u>near</u>** the 6:00 and 12:00 position. • Keep hands and fingers on the outside of the lock ring at all times. • **Never** place fingers between the lock ring and the lock ring groove.	
		Hands may be pinched and injured when moving the lock ring.	Keep hands away from the lock ring split. Wear the appropriate personal protective equipment.
3		• Fully remove the bolts that hold the retainer plate located at the 6:00 position. • Remove the (6:00) retaining plate completely. • Keep all removed retainer bolts in a safe place for inspection.	
		Pinch points - Lock ring piece shifting or falling when retaining plate is removed.	Ensure that the lock ring splits are located at the 6:00 and 12:00 positions.
4		• Insert a tire bar at the 6:00 (split) to dislodge the lock ring pieces from the lock ring groove. • Use a second lock ring bar to pry both pieces of the lock ring free from the lock ring groove.	
		Watch for pinch points. Beware of any stored tension remaining in the lock ring halves.	**NEVER** place your fingers between the lock ring and the lock ring groove when prying. Always use lock ring bars.
5		• Acquire assistance from a second team member, and if necessary, a mechanical lifting device. • By pulling the bottom portion of each piece of the lock rings outward, carefully lift and remove the 2-piece lock ring from the wheel / rim. • Set the lock ring onto the ground in a safe suitable location.	
		The lock ring may open or close and pinch fingers.	Lift as a team, with clear communication with partner.

Safe Work Procedure 785 - A

Caterpillar 785

All Tire Positions - Vertical Demount and Mount

2 - Install a 2-Piece lock ring

1		• On a flat, clean working surface, join the two pieces of the lock ring with a retainer plate and retainer bolts. • Do <u>not</u> fully tighten the retainer bolts.	
		⚠ Improper joining of 2-piece lock ring could result in injury when placing it in the groove.	✓ Check that the threads on both the lock ring and the retainer bolts are in good condition.
2		• Acquire assistance from a second team member or a mechanical lifting device when placing the 2-piece lock ring. • With the lock ring ends positioned at the 6:00 and 12:00 position, carefully lift and place the 2-piece lock ring into the lock ring groove in the gutter section of the wheel.	
		⚠ Assembly failure could result if the lock ring is placed with the tapered surface facing outwards.	✓ Check that the lock ring is facing the correct direction with the manufacturer markings facing outwards.
3		• Connect the 2 bottom ends of the lock ring and install the second retainer plate – **do not fully tighten retainer bolts**. • Ensure that the lock ring is **<u>fully seated</u>** into the lock ring groove on the back section <u>THEN</u> tighten the bolts on BOTH of the retainer plates to the required torque value. • Use a work platform to access the upper retainer plate.	
		⚠ Improper seating of lock ring may result in serious injury during inflation.	✓ The lock ring <u>MUST</u> be fully seated into the lock ring groove at this time.

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