

Sealed Bearing Roller Reamer Field Operations Manual

MM-SRR-1S

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Redback™ Drilling Tools & Manufacturing specialises in supplying world leading downhole tools that provide drilling optimisation solutions to the largest oil companies worldwide. Redback Drilling Tools is an Australian based company owned by SGS.

We are SGS – the world's leading testing, inspection and certification company. We are recognised as the global benchmark for sustainability, quality and integrity. Our 99,600 employees operate a network of 2,600 offices and laboratories, working together to enable a better, safer and more interconnected world.



When the Reamer is removed from the hole the following inspection procedures should be followed.

CHECKING THE CONDITION OF THE BEARING IN THE CARTRIDGE

1. Pockets should be cleaned so that compacted drilling solids or other debris do not interfere with rotation of the cutters in the pockets.
2. Check for free movement in the cutter assembly with the use of a screwdriver. This is achieved by placing the screwdriver in the pocket area in-between the cutter and the pocket. Using the screwdriver as a lever, check for movement either up and down or sideways (this does not mean rotational movement).
3. If excessive movement is detected then change the worn cutter for a new re-dress kit.
4. If no movement is detected the cutters are good and can be used again.

CHECKING THE CUTTER WEAR ON THE CARBIDE BUTTONS

1. Measure your ring gauge accurately to determine the actual ID size. The minimum ring gauge size should be the hole size in operation at that time.
2. Pick the top row of buttons on each cutter. Turn the cutter so that the carbide button on each cutter is pointing straight out from the reamer.
3. Pass gauge ring over this row of buttons. As shown on drawing, page 5.

CHECKING FOR WEAR ON THE REAMER BODY

Should the reamer have to be re-dressed it is advisable to check for body wear in four key areas.

1. WEAR ON OUTSIDE DIAMETER OF BODY AROUND THE WEDGE AREA
 - Place a new wedge in an empty pocket and check if there is less than 4mm of wedge above the body. If so, the body is fit for further service.
 - If the wedge protrudes more than 4mm above the body surface, then the Reamer body has passed its useful life and should be taken out of service.
2. WEAR AROUND THE TOP EDGE RADIUS OF POCKET
 - Check the 1.5mm radius around the outer edge of the entire pocket.
 - If the radius has been damaged or worn away, replace the 1.5mm radius using an air-grinder and mounted point wheel (max. diameter of stone 25mm). Be careful not to damage the tapered faces of the pockets. The surface finish of the radius must be smooth.
3. GROOVING IN THE CUTTER POCKET AREA
 - Grooving may occur in the cutter clearance pocket area directly underneath the cutter.
 - This is a result of continued service with excessive wear in the cartridge between the pin and rotating cutter allowing the carbide inserts to groove the bottom of the pocket. (Refer to top of this page for inspection procedure on checking for excessive movement in the cartridge.)
 - A certain amount of material removed by grooving of the pocket will not pose any threat to the integrity of the tool. If grooving occurs, the following table is used to help determine if the roller reamer is still good for service.



CHECKING FOR WEAR ON THE REAMER BODY CONT.

- Before taking a groove depth measurement, remove all burrs around the grooves by means of an air grinder and mounted point wheel.

BODY SIZE RANGE	CARTRIDGE SIZE	MAX GROOVE DEPTH
6-00" to 6-3/4"	299	0.100"
7-3/8" to 7-7/8"	350	0.100"
8-1/2" to 9-7/8"	375 or 445	0.125"
10-3/4" to 10-5/8"	445	0.150"
11-3/4" to 12-1/8"	514	0.100"
12-1/4" to 13-1/4"	514	0.125"
12-1/4"	445	0.312"
13-1/2" to 14-1/2"	514	0.225"
14-3/4" to 15-3/4"	514	0.500"
16-00" to 18-1/2"	561	0.600"
20-00" to 22-00"	561	0.750"
23-00" to 24-00"	561	0.800"
26-00" to 28-00"	561	0.850"

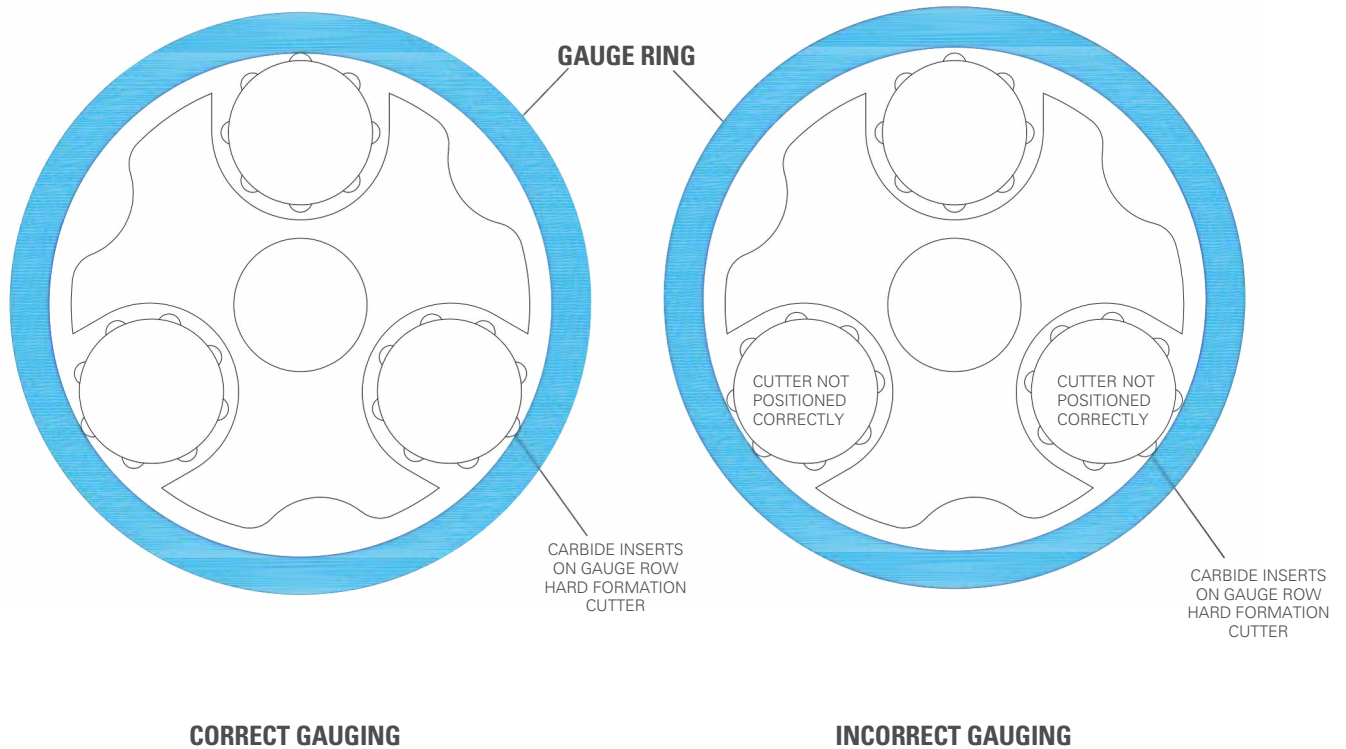
4. WEARING OF THE HARD FACING ON EACH END OF THE UPSET AREA

- Hard facing is applied to both ends of the upset length to protect it from excessive wear. If the parent material is visible through the hard facing, then the Roller Reamer should be removed from service and returned to workshop for reapplication of hard facing material.

CHECKING THE CONDITION OF THE THREAD INSERTS

1. Check the condition of the threaded insert in the base of the each pocket. Ensure that the threaded hole is free of all down hole mud and liquids.
2. Check to see that the insert is not protruding above the base of the pocket surface.
3. With a new bolt and the inhex socket out of a new redress kit box, screw the bolt with the inhex socket into the threaded hole by hand only. Do not use wrench. If the bolt will go all the way to the bottom of the hole with no resistance, the bolt hole is good for service.
4. If the bolt has resistance, the insert needs to be replaced using "Thread Insert" procedure found on page 12.
5. Check all 6 bolt holes on a 3 point / 8 holes on a 4 point tool before redressing the Reamer.

Roller Reamer Gauging



GAUGING TO BE DONE OVER TOP OF ROW OF BUTTONS

*Note: Above examples shows 8 1/2" hole size body, using 375 Redress kit



Maintenace

Maintain the Reamer with the following steps.

1. As soon as the Reamer is removed from the hole it should be laid down and washed off with fresh water.
2. Lubricate the threads with a good drill collar compound and apply thread protectors.
3. Determine whether the Reamer is still suitable for re-use using the inspection chapter guidelines.
 - If acceptable for re-use, store in a protected area.
 - If after inspection Cutters need to be undressed, refer to undressing chapter on page 7.
 - If after inspection Cutters need to be dressed refer to dressing chapter on page 9.
4. New cutter assemblies should be stored in a clean dry place out of the weather.
5. Used cutter assemblies still suitable for re-use should be thoroughly cleaned and dried, then coated completely with new light machine oil or new engine oil. Cutter assemblies should then be stored in a clean dry place out of the weather. Wooden kit box should be labelled with serial number of used kit, size & owners name.
6. After 6 months stored kits shall be cleaned, inspected and reapplication of light machine oil to all surfaces. Re-box with label still attached. Maximum length of time for used redress kit to be stored is 12 months.

Torque Setting Chart

REDRESS KIT SIZE	TORQUE SETTING
299 KIT	55 ft/lbs
350 KIT	80 ft/lbs
375 KIT	100 ft/lbs
445 KIT	200 ft/lbs
514 KIT	280 ft/lbs
561 KIT	280 ft/lbs

Undressing the Reamer

TOOLS REQUIRED FOR UNDRESSING

- Socket wrench with square drive
- Large Screw Driver
- In-hex Socket for wedge bolt (with new kit).
- Lifting Strap (with new kit).

CHECK BEFORE UNDRESSING

First, read all the Inspection Steps described in the Inspection Section of this manual on page 3. Be sure the tool needs redressing before starting the following procedure.

- Prior to disassembly, remove all dirt, mud, cement from the reamer. High pressure wash may be used on stubborn drilling mud.
- Body may be dressed in vertical or horizontal position.
- If the body is to be undressed in the horizontal position, ensure that the body is retained from moving around during disassembly. We recommend a stand on each end of the body to raise it off the ground up to a workable level.

UNDRESSING PROCESS

1. Clean out holes above the center bolt of each wedge. Compressed air may be used to free small amounts of drilling mud from areas that did not get cleaned by the pressure wash. Check the wedge, block and body for metal pressed over into bolt holes. If found, remove pressed over metal before going to the next step.

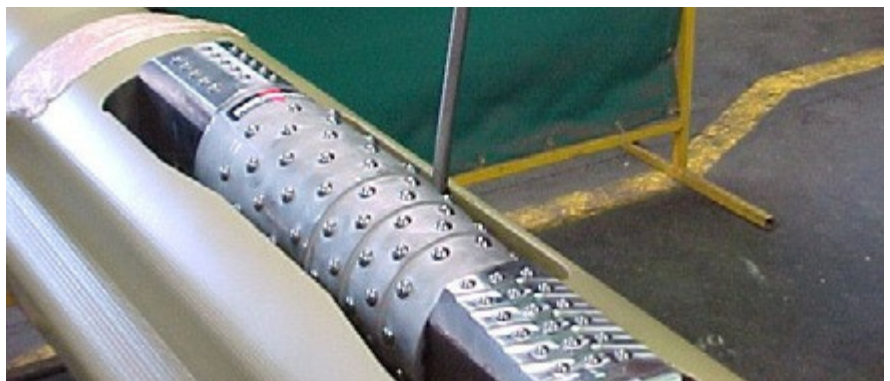


2. Find the In-hex socket that comes with a new redress kit. Size will depend on the redress kit being used. Place it in the center wedge hole. Push the In-hex socket down until you are sure it is at bottom. With the square drive bar attached turn anti-clockwise until you can remove the wedge from the cartridge.



3. Repeat for the second wedge in the same cartridge.
4. With both wedges removed, use a large screw driver to move the cartridge into the middle of the pocket.

Note: If the bolt is hard to turn, then screw back in the hole. Remove the In-hex socket, add drill collar compound into the bolt hole, between the head of the bolt and the wedge. Continue to remove the bolt and repeat if necessary.



Undressing the Reamer

UNDRESSING PROCESS

5. Slide one end of the plastic strap (complete with new kit) under the cutter section of the cartridge. Pull strap until equal length on both sides. Lift out of pocket with strap. Use bar through holes in strap on larger sizes.
6. Repeat for the second and third cartridges.
7. At this stage check the condition of the threaded inserts, two in each pocket. See Inspection on page 3 for further details.
8. If Reamer is to be left undressed, grease the pocket fully before storage.

Note: If the bolt is hard to turn, then screw back in the hole. Remove the In-hex socket, add drill collar compound into the bolt hole, between the head of the bolt and the wedge. Continue to remove the bolt and repeat if necessary.



Dressing the Reamer

TOOLS REQUIRED FOR DRESSING

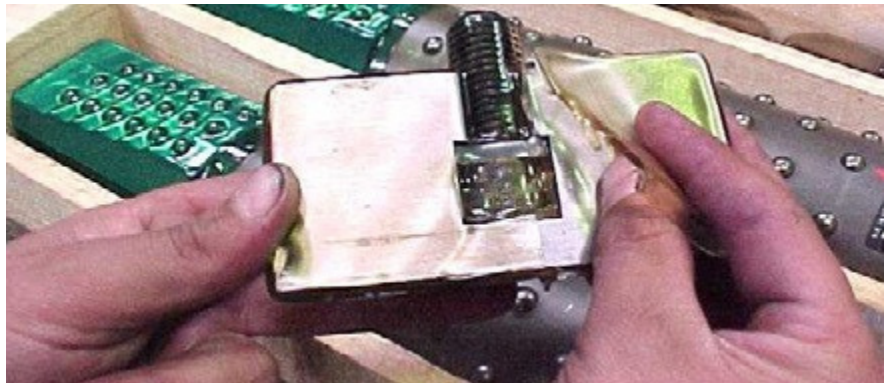
- Torque Wrench (see chart on page 6 for setting).
- In-hex Socket for wedge bolt (with new kit).
- Drill Collar compound (with soft flat brush).
- Gauge ring

CHECK PRIOR TO DRESSING

Clean out pocket area of the reamer, ensuring that all surfaces are free from foreign material, this includes down inside the taped holes. Check the edge of all pockets for steel that has been rolled, bruised, or hit over into the pocket surfaces. If this is the case, then remove metal until flush before dressing.

DRESSING PROCESS

1. Obtain a new set of cutters and remove from box, (check on the side of the box to see if you have the correct size of cutters).
2. Remove the protective wax from all parts, place on clean surface.

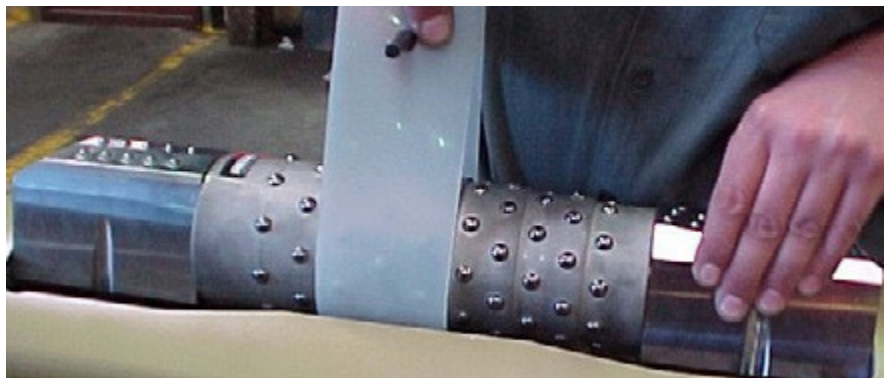


3. Check body for metal pressed over into pocket area, if found remove metal until flush.
4. Coat inside surfaces of pocket with a clean drill collar compound, use flat soft brush for application, (see foot note).



5. Lower cutter cartridge into pocket, push down to bottom of pocket. Move cartridge to side of pocket until it reaches face opposite drilled holes in bottom of pocket.

**Note: For use in lubrication of Redback Roller Reamer pockets. Redback Drilling Tools states that it is important to use a thread compound that meets or exceeds the performance objectives as set out in API RP 7A1 "Thread compounds for rotary shouldered connections".*



Dressing the Reamer

DRESSING PROCESS

6. Obtain one wedge and bolt assembly, also the In-hex socket drive (complete with kit). Enter the drive into top of wedge, then into the bolt head, hold drive and coat both sides of the wedge as well as the bolt thread with a drill collar compound. (See foot note.)
7. Lower the wedge, bolt and In-hex socket into the area adjacent to one of the blocks. Screw down to bottom of pocket by **HAND ONLY**
8. Repeat for the second wedge in the same cartridge.
9. With both wedges in place and from the Torque setting chart on page 6 in this book, obtain the correct foot/pounds for the size of cartridge being used. Set the wrench to the correct setting and pull down both bolts until the torque wrench trips out.
10. Repeat steps 3 to 9 for the second and third pockets.
11. Use Gauge Ring to check size of Reamer before running in hole.

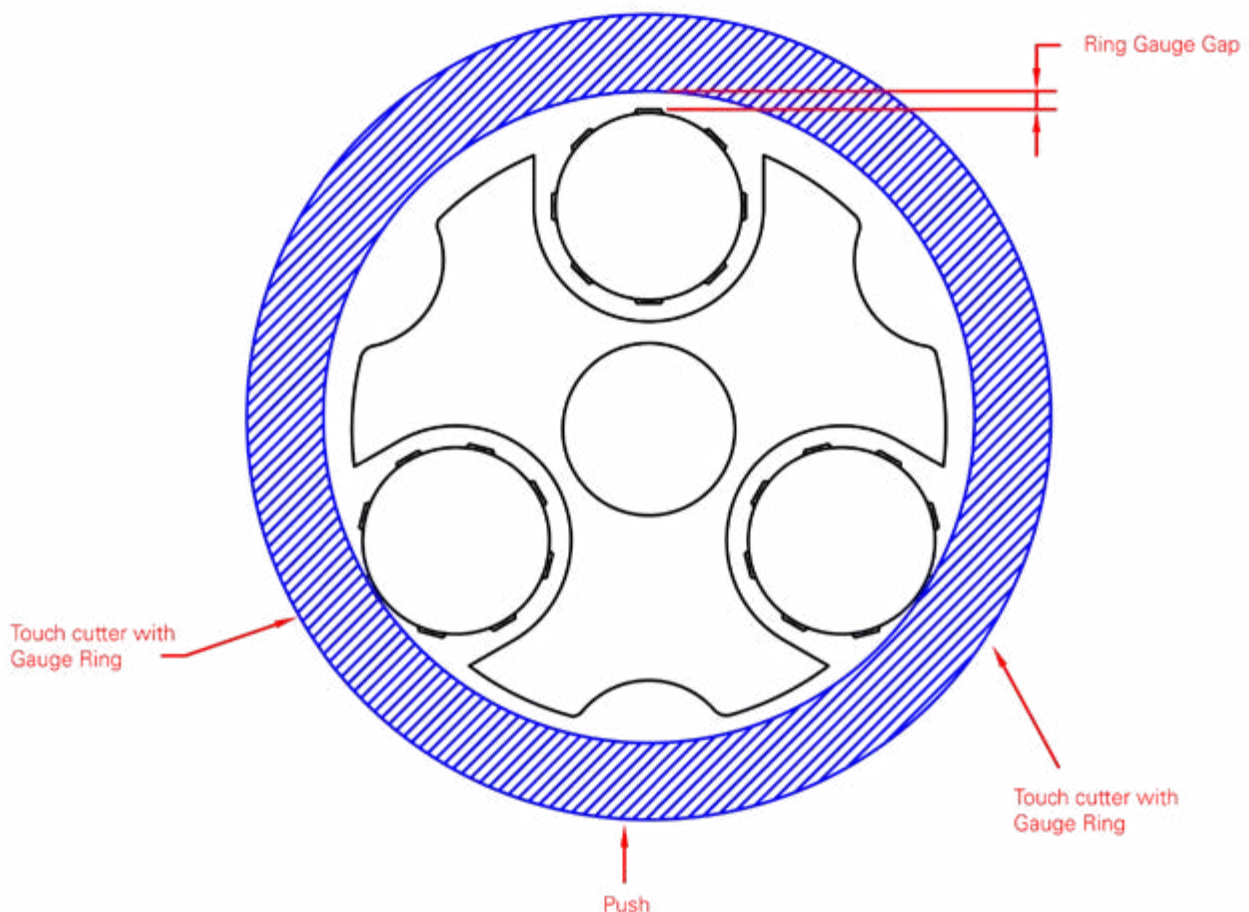
**Note: For use in Lubrication of Redback Roller Reamer pockets. Redback Drilling Tools states that it is important to use a thread compound that meets or exceeds the performance objectives as set out in API RP 7A1 "Thread compounds for rotary shouldered connections".*



Gauging Method for the Redback Roller Reamer

The following steps outline the Gauging Method for the Redback Roller Reamer:

1. Rotate all cutters with large flat screwdriver until the top row of buttons are facing directly upwards.
2. Pass gauge ring over this row of buttons as shown on diagram below. Place gauge firmly against two adjacent cutters thus leaving a gap at the third cutter.
3. Now measure the gap between the inner surface of the gauge ring and the worn carbide of the third cutter. Use a steel rule with 1/32" divisions to measure.
4. With the GAP measured use this amount and multiply it by 0.666666 to calculate diameter of Reamer under gauge.



Thread Insert

The Redback Roller Reamer is equipped with replaceable threaded inserts located in the pocket area. The threaded inserts provide a way to simply and easily change damaged threads without having to alter the body by re-threading.

These inserts are expected to have an effective service life which should exceed the life of the body. If, difficulties should arise, use the instructions shown here for installing new inserts.

REMOVAL OF INSERTS

1. Insert the spear removal tool into the damaged thread insert and lightly tap with hammer. This makes two small indentations into the top of the insert.



2. Apply pressure downward with the removal tool located in the two indentations, and turn counter clockwise until the thread is out of the body.



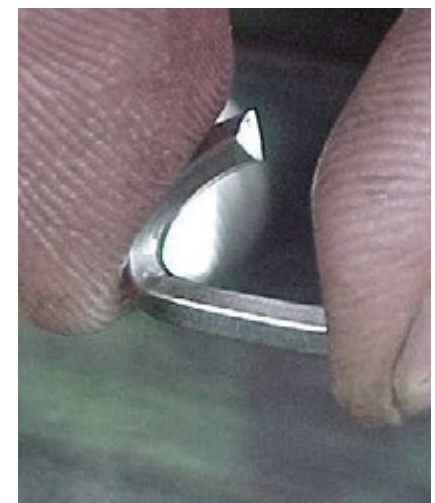
Thread Insert

REPLACEMENT OF INSERTS

1. When replacing the insert, first push the new one onto the insertion tool so that the tang locates in the slot of the tool.
2. With light hand pressure introduce the insert and tool into the tapped hole.
3. Screw in a clockwise direction until the insert becomes a $\frac{1}{4}$ of a turn below the surface of the pocket.



4. With the insert down, lift the tool up above the tang and turn 90°.
5. Place back down on top of the tang and tap down sharply with a hammer. Do not try to twist off the tang.
6. Blow out broken tang with air line. Look down hole to see if the tang has been removed.
7. Check insert installation by screwing a NEW bolt into the hole by HAND, this should go all the way to the bottom of the hole with no obstruction.





Job Specific Safety Analysis Plan

UNDRESSING & REDRESSING OF REDBACK ROLLER REAMERS

In conjunction with instructions in laid out in this manual

WORK PHASE	POTENTIAL HAZARD	REQUIRED ACTION
Layout of body and equipment prior to redress	Injury due to lifting equipment.	Personnel trained to Rigging considering the used of load rated lifting equipment.
All Work Phases	Tools rolling off supports.	Safety pins and stops installed on support rack.
Cleaning the Reamer after use.	Eye injury from air borne particles.	Wear eye protection.
Removal of Bolts.	Strain Injury.	Personnel trained in use of recommended hand tools. Refer to page 7.
Cleaning out Bolt Holes.	Bodily Injury. Eye injury from air borne particles.	Clean out Bolt hole. Be sure the In-Hex wrench is seated into bolt, as per manual. Refer to page 7. Wear eye protection.
Removal and inserting Roller Reamer cartridge.	Strain injury and injury due to cartridge falling.	Personnel trained, in manual handling techniques and use of hoists with objects above the weight range of 16-20 kilograms.
Reamer unsecured.	Tool can rotate when tightening cap screw causing injury to personnel.	Secure Reamer body with chain tong or suitable tool.
Clean out of pockets.	Eye injury from air borne particles.	Wear eye protection.
Torque up of wedges.	Strain injury.	Use only recommended torque settings. Personnel trained in use of recommended hand tools. Refer to page 10.
Removal of burrs and sharp edges with hand tools.	Injury from poorly maintained hand tools e.g. files without handles.	Ensure personnel are trained in the safe use of recommended hand tools.
Repair of radius around the top of the pocket with air grinder and mounted points.	Eye injury from air borne particles and bodily injury from air grinders mounted point.	Wear eye protection and ensure personnel are trained in the safe use of recommended hand tools.



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PATENTED DESIGN

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