

Safe Work Guidance Notes

Rock Breakers



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1. Foreword

General information about Rock Breaker's

While the information in this document covers the DNB range of Rock Breakers supplied by DM Breaker Equipment Pty Ltd, it is fair to say that many rock breakers in the industry are of a similar construction and utilized in a similar manner.

THESE GUIDANCE NOTES DO NOT REPLACE MANUFACTURERS INFORMATION AND SHOULD BE READ IN CONJUNCTION WITH THE OPERATORS MANUAL FOR YOUR PARTICULAR MAKE AND MODEL. ADDITIONALLY, THESE NOTES DO NOT REPLACE A SAFE WORK METHOD STATEMENT OR HAZARD ANALYSIS AND SHOULD BE USED WITH A SUITABLE RISK ASSESSMENT.

Rock breakers are specifically designed for tough operations. Most commonly used in the mining, construction and demolition industries for reducing the size of material that are either too hard or too large, the rock breaker can be stationary with a fixed mount but generally is used as a mobile unit attached to an excavator or skid steer.

The rock breaker uses a simple but efficient method of operation and, despite the wide range of rock breakers on the market; they are all composed of similar parts. The main parts of a rock breaker are: the housing or case, tie rod, back head, cylinder, valve, piston, tool and accumulator. The back head, front head and the cylinder are all tightly fixed with four tie rods. Enclosed in a heavy steel housing, the cylinder is the main part of the rock breaker containing a hydraulic circuit for piston. The piston is moved via hydraulic pressure. The back head, positioned above the piston, holds nitrogen gas and this gas acts both as a buffer on the up stroke, and as a driver for the down stroke. The pressure is transmitted via the piston to the tool, which uses kinetic energy for breaking or hammering, dependent on the tool choice.

DUE TO THE RISK OF ACCUMULATED AND RESIDUAL PRESSURES CONTAINED WITHIN THE BREAKER HOUSING, DISMANTLING OR DISSASSEMBLY OF A ROCKBREAKER SHOULD ONLY BE CARRIED OUT BY TRAINED AND COMPETENT PERSONNEL.

Recoil energy and mechanical forces are absorbed by the use of nylon bushings contained within the housing, protecting all components and the operator from vibration. At the base, the rock breakers feature high-grade steel bushings for vibration isolation. In order for the rock breaker to work at maximum efficiency, all components of the rock breaker need to be well-lubricated at regular recommended intervals. Auto-lube systems are the ideal solution, as they provide proper greasing procedure.

2. Scope

These notes provide guidance to principal contractors, operators and other persons involved in rock breaking operations and should be read in conjunction with other codes of practice on specific hazards and control measures relevant to your industry, including but not limited to:

- Demolition Work
- Excavation Work
- Managing Noise and Preventing Hearing Loss at Work
- Hazardous Manual Tasks

3. General Safety Information

Most incidents are caused by disregarding or ignoring basic fundamentals of operation, inspection or repair. These incidents can be avoided by recognizing and identifying potential situations before they occur.

The equipment should not be used without prior recognition of the manufacturer's specifications. The manufacturer's manual should be adhered to at all times.

Operate the breaker in accordance with all laws and regulations which affect you, your equipment and the worksite.

Ensure all protective wear including ear & eye protection is worn.

Ensure a risk assessment has been undertaken for the worksite and a safe working method statement or safety/hazard analysis completed.

The Carrier should be equipped with a physical safety barrier or screen to protect the operator from flying debris. Consideration should be given to the cabin in the form of COP's, ROP's and FOP's.

A hydraulic hammer is harder on oil than most other attachments, leading to increased oil degradation. Neglect of the oil system can lead to damage of the breaker but may also lead to increased wear or damage to the carrier. Oil sampling at regular intervals is highly recommended.

Do not operate a damaged, leaking, improperly adjusted, or incompletely assembled breaker.

Do not modify the breaker in any manner.

Only use breaker tools manufactured by DNB or DM Breaker Equipment. Use of breaker tools produced by another manufacturer may damage the equipment and will void the warranty.

To avoid personal injury or equipment damage, all breaker repair, maintenance and service must only be performed by authorized and properly trained personnel.

Do not operate this equipment if you are taking medication which may affect your mental judgement or physical performance. Do not operate this equipment if you are under the influence of drugs or alcohol.

Remove breaker from carrier during transport.

Rock breaking activities on certain materials could generate dust potentially containing a variety of hazardous substances such as asbestos, silica, lead or similar. Inhaling dust containing these or other hazardous substances could result in a range of medical issues.

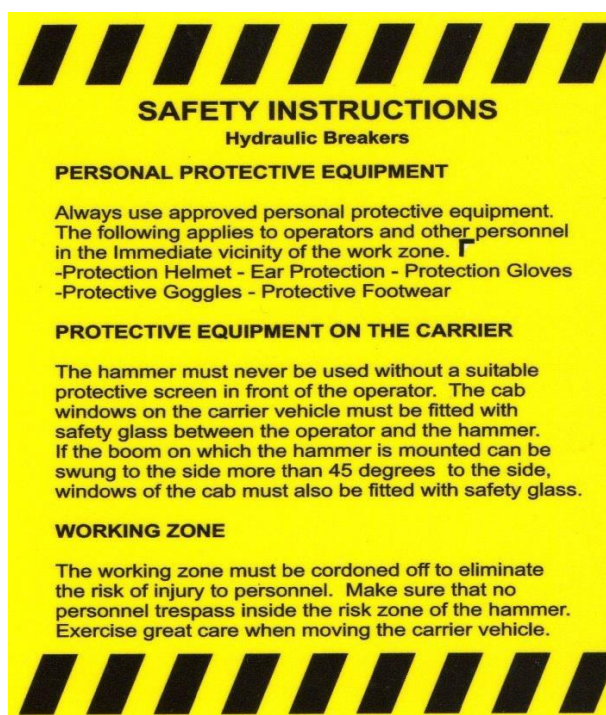
Never attach a sling or cable to a breaker to lift or hoist loads.

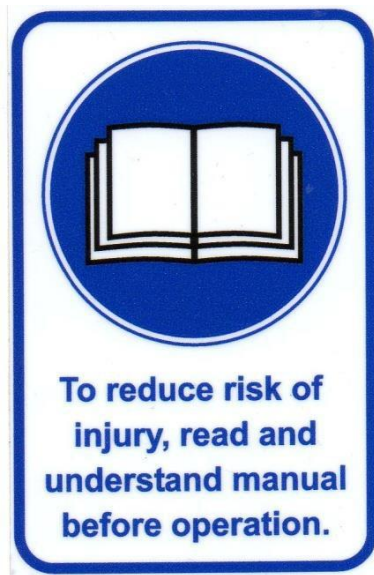
Be aware that a Rock Breaker during use can become extremely hot.

The word "carrier", as used in these notes, can mean an excavator, backhoe, skid steer or similar mobile equipment used to operate the breaker.

4. Inspection of the DNB Breaker

- WELDS - Check for cracks, repair as necessary.
- TOOL RETAINING PIN - Remove the retaining pin and inspect for peening caused by excessive blank hammering. The retaining pin must rotate freely.
- TOOL - Remove tool and inspect for peening caused by excessive blank hammering. Grease the shank before replacing.
- HYDRAULIC FLUID – Check for sufficient volume and filters are contaminant free.
- HOSES, NUTS & BOLTS – Check all for security, tighten where necessary.
- LUBRICATION – Check pins, bushings and greasing points.
- SAFETY DECALS - Do not operate the breaker unless all safety decals described in this manual are in place. The decals must be inspected periodically to ensure that all wording is legible.





Do not operate the breaker unless you have read the carrier equipment manual and fully understand all safety, operation and maintenance instructions.



Ensure that all maintenance procedures recommended in the manufacturer's manual are completed before using the equipment.

5. Operator Competency or Training

Do not operate the breaker unless fully trained or under the supervision of an instructor.

The safe control and operation of mobile plant requires a reasonable level of physical and mental fitness.

Mobile plant operators need to be sufficiently experienced, adequately trained for their work, or supervised by an experienced person. Instruction should include knowledge of hazards and the precautions to be observed to avoid them. Before operating any mobile plant, operators shall have read the operator's manual.

Employers should continue to monitor and assess operators at regular intervals to ensure the operator maintains the required standards.

Before operating any machine, the operator shall be familiar with unusual operating conditions that may require additional safety precautions or special operating instructions.

Operators have a duty to safeguard themselves and others in the place of work by observing recognized safe work procedures and practices and not misusing machines or removing safeguards provided for protection of workers.

6. PPE

Mobile plant operators and ground workers should be provided with and required to wear personal protective equipment such as, high-visibility clothing, hard hats, safety boots, safety glasses, hearing protection etc, as required and in accordance with the requirements of AS/NZS 4501

Suitable eye protection must be worn when there is a risk of eye injury. Flying grit and chips of rock are two common sources of danger to eyes in excavation work. Safety glasses must comply with the requirements of AS/NZS 1337.

Rock Breaking activities on certain materials could generate dust potentially containing a variety of hazardous substances such as asbestos, silica, lead or similar. Inhaling dust containing these or other Hazardous substances could result in a range of medical issues. In certain cases, respirators or other safety precautions should be used.

A breaker during use can become extremely hot.

7. Site Conditions

Rock breaking presents particular hazards to other workers and members of the public unless protective measures are taken.

Site Hazard and Risk Analysis should be undertaken prior to commencing breaking operations.

The safety of the public must be considered where rock breaking is carried out. A flying projectile from the breaker, breaker tool, rock or other material may cause serious or fatal injury to bystanders. Never operate the breaker when bystanders are in the work area. Where any person is at risk of interaction with rock breaking operations, suitable barriers are required between the persons at risk and the likely cause of danger. The type of barrier will depend on the level of risk and may consist of a hoarding or barricade or simple barrier and reflective tape.

A boarding is defined in the regulations as a substantial and fully sheeted fence or screen, while a barricade is defined as a temporary fence consisting of rigid vertical and horizontal members. The decision as to whether a hoarding or a barricade is necessary will depend on the location of the work being carried out.

In many instances, because of the nature and/or location of the work being carried out, the risk of injury or harm to members of the public will be negligible and neither barricading nor hoarding will be needed. In these situations, simple barriers and reflective plastic tape or mesh around excavations will be sufficient. However, where members of the public are likely to be in the vicinity of excavation works and the risk of injury or harm is real, a decision has to be made whether a barricade or hoarding is required for protection. In these situations, a hazard identification, risk assessment and control exercise should be carried out to determine the level of risk and the control measure to be implemented.

Safety regulations also require that suitable signage warnings of the risk are erected. These should be placed at appropriate locations around the perimeter of the worksite.

Vehicles and mobile plant moving in and around workplaces, reversing, loading and unloading, are activities frequently linked with workplace injuries and fatalities.

As operators of mobile plant often have severely restricted visibility of ground workers or nearby pedestrians, the movement of site visitors should be limited with barriers and signage.

Rock Breaking Operations can and does cause ground vibrations which may present a danger to other workers and worksites in the vicinity.

8. Cause of tool failure

- External Forces - The main cause of increased fatigue stress in a tool is any form of side force that creates bending during operation. Therefore, using the tool to pry, using the incorrect working angle, or attempting to break ground using the pull of the machine, are detrimental to the life of a tool and must be avoided.
- Blank Firing - This is any situation where the hammer piston strikes the top of the tool, but the working end of the tool is not in contact with the work. This includes when the tool slides off the work, and also on a break-through of the material being broken.
- Mechanical and Thermal Damage - Any form of damage to the surface of a tool renders it more liable to suffer fatigue failure. Care must be taken to prevent scratches, gouges, weld marks on the tool, or pick up between the tool and tool bushing due to lack of lubrication or excessive bending.
- Poor Lubrication – Metal to metal contact causing pick up could cause deep scour marks which, in turn, lead to the formation of fatigue cracks and eventual failure of the tool. Ensure that the tool shank is well lubricated before inserting it into the tool holder. Molybdenum Disulphide grease is recommended for the application at two-hour intervals, with the tool pushed fully up inside the hammer.
- Corrosion - Keep tools well-greased and sheltered from the weather when not in use.

9. Use of the breaker

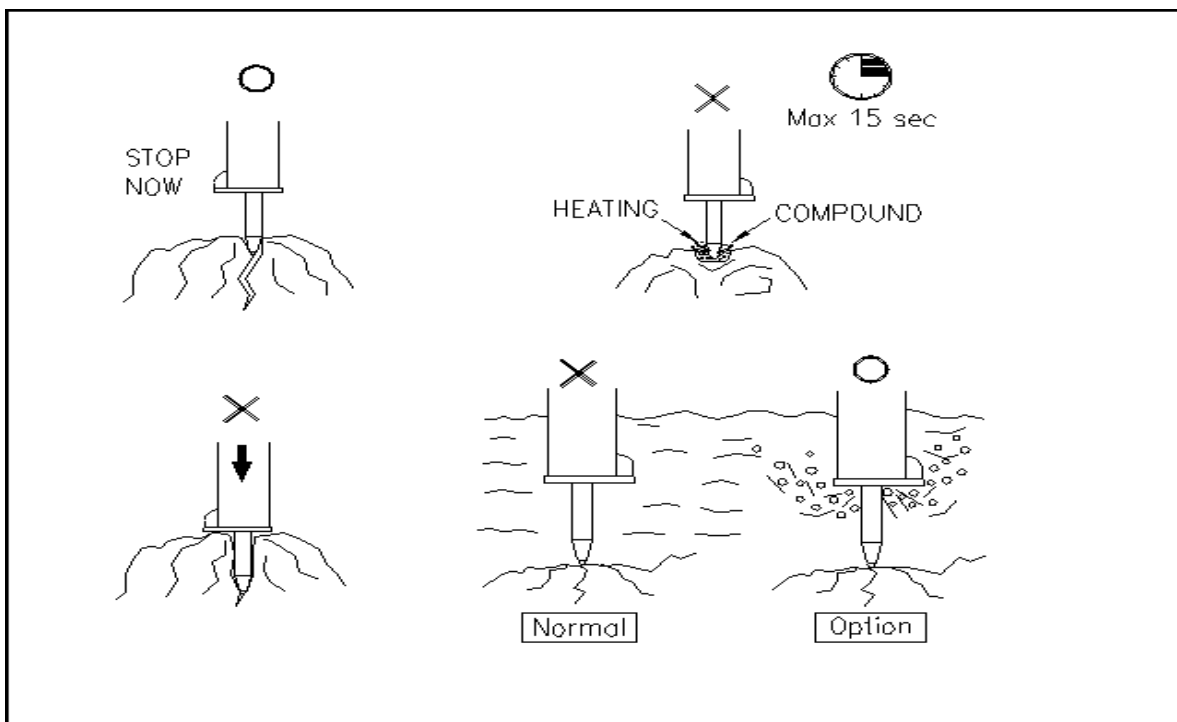
THE FOLLOWING NOTES DO NOT REPLACE A SAFE WORK METHOD STATEMENT AND SHOULD BE READ IN CONJUNCTION WITH THE MANUFACTURERS' MANUAL FOR YOUR PARTICULAR MAKE AND MODEL.

OPERATION METHOD

- The impact tool should be preloaded prior to commencing breaking. Press the tool firmly to the material to be broken and once sufficient force has been applied, the operation valve can be opened. While breaking, pressure must always be applied longitudinally on the tool.
- Ensure the object to be broken is stable prior to activating the breaker.
- Ensure the tool is always at right angles to the working face to be broken.
- Close the operating valve immediately cracks appear on the rock.

PROPER THRUST

- To use the breaker effectively, correct force must be applied. If the thrust is insufficient, energy from the piston will not be effectively transferred to the tool end and instead will be dissipated through the breaker body, arm and boom of the base machine, etc, resulting in damage to those parts.
- Conversely, if thrust is excessive and breaking is performed with the front of the carrier raised, the carrier may suddenly tilt forward at the moment the rock is broken, and the breaker body may impact against the rock resulting in damage.



PRECAUTIONS IN OPERATION.

- The Carrier should be equipped with a physical safety barrier or screen to protect the operator from flying debris. Consideration should be given to the cabin in the form of COP's, ROP's and FOP's.
- Become familiar with the carrier controls before operating the carrier and the breaker. While learning to operate the breaker and carrier, do so at a slow pace. If necessary, set the carrier mode selector to the slow position.
- Ensure all controls (levers and pedals) are in the neutral position before turning on the carrier's ignition.
- Before leaving the carrier, always lower the boom and ensure the carrier is stable. Never leave the machine with the engine running. Always engage the parking brake.
- Do not concentrate the tool in the same place for longer than one minute. If the tool fails to penetrate or produce any breaking of the material after being operated in one spot for 30 seconds to one minute, then change the tool position.
- Do not operate the breaker when the cylinders of your excavator are located at full stroke extension.
- Avoid blank firing. To prevent firing, the impacting power must be always applied in longitudinal direction to the tool.
- The breaker and the tool assembly should not be used as a lever or a rip. The tool and breaker body are not designed for side loading and as such, the tool is likely to be broken or the tool holder damaged.
- Do not operate the breaker with the components other than the tool immersed in water or mud. The piston or similar components may ingest water causing premature wear and/or internal damage.
- Do not submerge the breaker in water. Specific modifications are available for underwater work.
- When working in high temperature conditions, check the oil temperature constantly to ensure it does not exceed 175°F (80°C). If higher temperatures are measured in the tank, an oil cooler must be fitted.
- Operate breaker at manufacturers recommended engine speed. Raising engine speed over recommended levels does not increase breaker force but does increase oil temperature to the detriment of pistons and valves.
- Do not allow the breaker to drop onto working surface. Dropping the breaker onto a rock will apply excessive force to the breaker and carrier, resulting in damage to both.
- Do not hang or lift objects with the breaker.
- Do not touch the tool during hydraulic breaker operation. During breaker operation, the breaker parts can reach high temperatures.
- Do not sharpen or cut the tool point with a cutting torch. Excessive heat from gas cutting or welding can cause tool failure.

10. Installing & removing the breaker

Always consult the manufacturer's manual prior to installing or removing the breaker for the correct sequence of events specific to your breaker and carrier.

Use proper lifting equipment and tools when handling or servicing the rockbreaker.

Ensure that hydraulic coupling connections are in good working condition, free from dirt, debris and contaminants. If replacing couplers, replace them as a set.

INSTALLATION

- Place the hammer horizontal to carrier on wood blocks or gluts.
- Align the boom pin holes.
- Install the stick pin before the cylinder link pin.
- Connect hydraulic hoses.
- PRESSURE is on left; RETURN is on right.
- Open shut-off valves.

CHANGING THE TOOL

- Place the hammer horizontal on wood blocks or gluts.
- Ensure the carrier's transmission is locked and the parking brake is engaged.
- Remove and replace the tool in accordance with the operator's manual ensuring that you inspect all parts for wear and deformation. Clean the retainer pin housing and retainer pin, sufficiently grease the shank of the tool before reassembly.

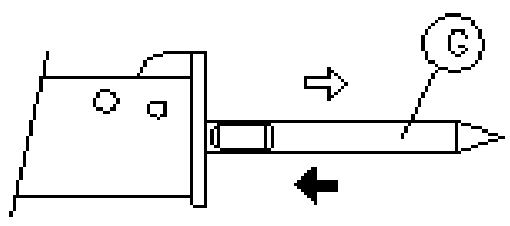
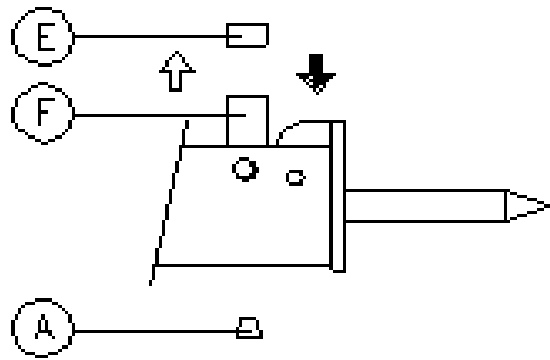
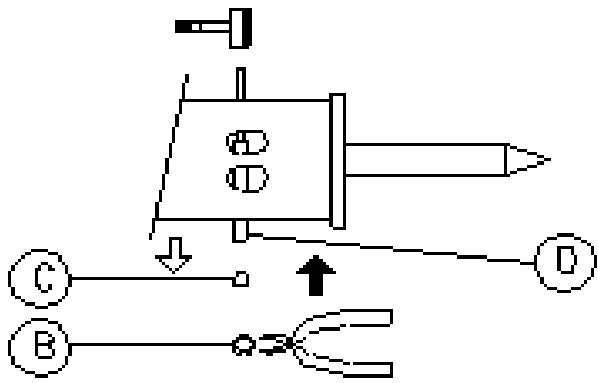
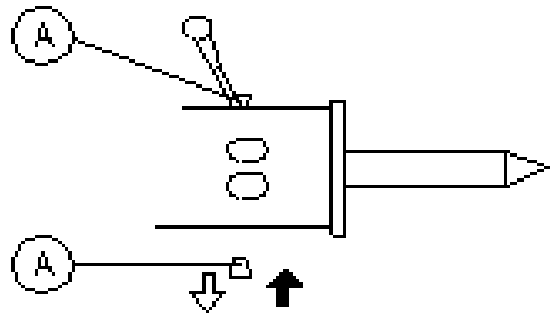
REMOVAL

- Close pressure and return line shut-off valves
- Disconnect hydraulic hoses (AO) before laying the hammer down.
- Cap the pressure and return lines on the carrier.
- Position the hammer horizontal on wood blocks and remove boom pins.
- The hydraulic lines must be handled carefully and sealed to prevent contamination from entering the hammer or the carrier hydraulic system.
- The tool end of the hammer should be set lower than the head end to prevent moisture from entering the hammer through the tool area.

STORAGE

- For short term storage, the breaker should be placed on wooden blocks or gluts.
- Ensure the tool is sufficiently lubricated
- Ensure the hydraulic couplers are clean, free of dirt and contaminants and capped.
- For long-term storage, the breaker should be stored vertically.
- Remove the tool and ensure the piston is fully retracted and all exposed parts well-greased.

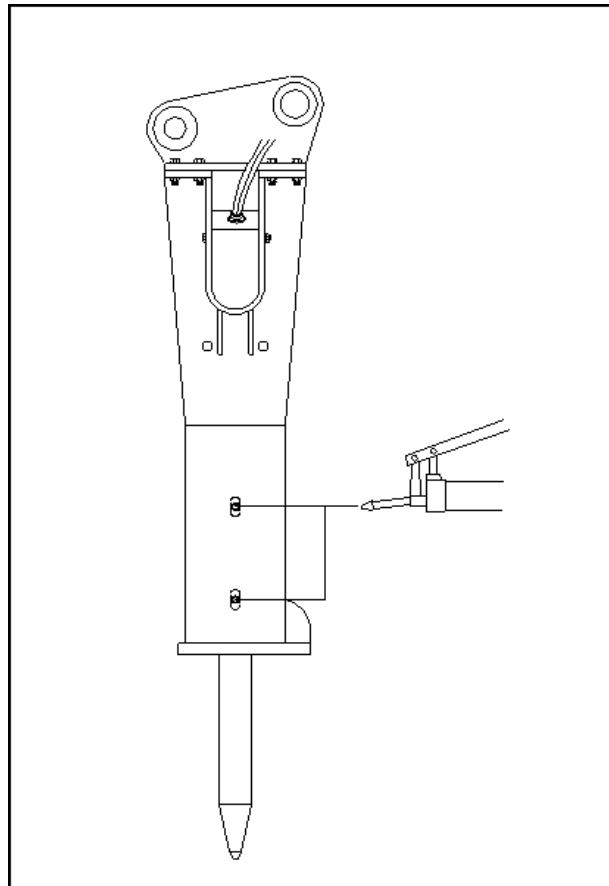
→ REMOVAL → INSTALL



11. Lubrication

Consult the manufacturer's manual for specifications of your breaker.

Effective hammer maintenance requires a sufficient supply of the correct grease to the tool. Place the hammer in a vertical position, applying enough downforce to push the tool up into the hammer. This prevents grease from entering piston impact area and ensures proper distribution of grease between the tool and tool bushings.



Turn the machine off.

Grease the hammer until grease begins to come out around the tool and lower bushing.

Grease hammer at least once an hour or install a DM Breaker Autolube System.

