

OPERATING & MAINTENANCE MANUAL

HYUNDAI RIPPER

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Hyundai Peoplei Hhyundai Peoplei

Hyundai Service! Hynugai Service!

Hyundai Products

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FOREWORD



WARNING!

It is very important for you to read and understand this manual before operating and to keep the instructions provided herewith. Never fail to follow the instruction related to safety.

I This manual contains instructions and information on safe and correct use of Hyundai Ripper.

- Please read and understand this manual before operation, inspections and maintenance of Hyundai Ripper.
- Keep this manual with your equipment all the time for your quick and easy reference, and read it regularly.
- Do not operate Hyundai Ripper until you have been trained in the use of all operating controls and understand Hyundai Ripper operation.
- Get a replacement manual from HYUNDAI.'s dealer if you lost it.
- If you transfer Hyundai Ripper to the other, do transfer this manual as well.
- The figures in this manual is for better understanding and may not correspond exactly to Hyundai Ripper. For exact shape, refer to the parts list or ask HYUNDAI.
- For the purpose of constant product improvement, some parts of this manual may be changed. If you found the parts unclear or not corresponding to Hyundai Ripper, call and consult HYUNDAI.'S dealer or service center
- Important information on safety is described in the safety information chapter of this book. Be familiarized with the instructions on the safe operation and observe the instructions before and during operation.
- Injury, death or damage caused by unauthorized product modifications and operation under incorrect application and/or use will not be responsible by HYUNDAI. Consult HYUNDAI. for such modifications and applications.
- Use HYUNDAI.'s genuine parts. HYUNDAI. takes no responsibility for damages caused by use of non-HYUNDAI.'s spare parts.
- For warranty, we refer you to the warranty conditions provided separately.

Our mission is to help you achieve your business success and peace of mind by providing you with Hyundai products and service.

Thank you for using our Hyundai.'s products.

[□] The copyright of this manual is owned by Hyundai.



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INTRODUCTION

Hyundai Ripper is an innovative vibratory ripper of demolition equipment.

Our innovative damper cushions with a link type vibratory ripper provide you with solution for drawbacks the most conventional link type rippers have.

The range of maintenance is greatly reduced because of overall use of wear-resistant steel and concise components. Noise is also lowered compared to other demolition and crushing equipment. Even underwater operation can be carried out without loss of performance and additional special devices.

Hyundai Ripper is ideal to any other work including, mines, quarry, tunnel construction and other civil works. Simple design, durable quality of the equipment and no pricey components enable to improve your work efficiency and maximize performance.

Be sure to read and understand this manual for correct use, best performance and long life of the equipment. You will also find important advice on correct handling of the attachment device, so that you can make maximum use of your ripper's technical advantages.

The content of this manual is identical to that of the original copy.

Hyundai. holds the right for extension and revision of this manual.



1. Safety Information

This manual describes the correct use of the product and basic safety instructions. Important instructions in this manual are marked with the below symbol. When you see the below symbol in this manual or stickers on the product, you must be alert to the possibility of personal injury or death. Be sure to observe the instructions in the safety message.

The safety messages in this manual do not describe all the possibilities that could cause personal injury, death or damage to the product. These safety messages are intended to provide basic instructions for safe operation and service.

Although this manual does not cover all the possible situations, it is the operator's responsibility to observe the safety instructions and regulations.

Remember! Safety is always first.

Safety Alert Symbol

The Safety Alert Symbol represents ATTENTION.

If you see the mark in this manual or on the products, never fail to read and observe the instructions for safe operation.



Signal Words

The words "DANGER", "WARNING", "CAUTION" and "IMPORTANT" appeared with the above Safety Alert Symbol indicate degree of risk of hazards or unsafe practices. All four degrees of risk indicate that safety is involved. Observe precautions indicated whenever you see the Safety Alert Symbol, no matter which signal word appears next to the "Exclamation Point" symbol.

DANGER!	Indicates imminent hazard of a situation that, if not avoided, is very likely to cause death or extremely serious injury. It may also be used to alert against product that may exploded or detonate if handled or treated carelessly.
WARNING!	Indicates potential of a hazardous situation that, if not avoided, could result in serious injury or death. It may also be used to alert against a highly unsafe practice.
CAUTION!	Indicates potential of a hazardous situation that, if not avoided, could result in minor or moderate injury. It may also be used to alert against a general unsafe practice.
IMPORTANT!	Indicates potential of damages that, if not avoided, could cause the damages to the products or shorten the product life.



1.1 Basic Safety Information

Know yourself

Operators and service personnel must wear appropriate safety equipment, including ear protection, respirator, hardhat, safety shoes, eye protection, heavy gloves etc., as required.

Note: The wearing of loose clothing or any accessories such as neckties, scarves, untied shoe laces, rings, wrist watches or long hair could cause personal injury or death.

Always use the proper tools for inspection or maintenance work, which must only be carried out after ensuring that the equipment has been stopped completely, and it is placed suitably in a safe place.

Know your equipment

Before installation or operation of Hyundai Ripper, the operator and maintenance personnel must read and understand the safety messages, operation manual and service instructions.

Only the operator who has been trained and qualified to operate the carrier and Hyundai Ripper should do so.

Be skilled and knowledgeable in all operational and technical aspects of the carrier and ripper.

Know the work site

Before operating Hyundai Ripper, check the area of work site for any unusual conditions that could be dangerous, and prepare the appropriate warnings for safe working.

Be careful, particularly when working in the vicinity of electric power lines, gas pipes or other buried services.

Pay particular attention to other workers, bystanders and other machinery that may pass by near to the work site. Immediately stop operation of Hyundai Ripper if personnel enter the danger area.

Know the Rules

Everybody who operates or maintains the equipment should know the meaning of the rules and laws in terms of handling the equipment.

Use Hyundai Ripper in accordance with all regulations regarding construction practice and public safety.

For emergency use, keep the fire extinguisher and the first-aid case in the operator's cab.











1.2 Preparation for safe operating



WARNING!

The following items must be prepared and checked in advance for safe use of this product. Be sure to observe and observe the following points.

- Hyundai Ripper should only be mounted on a carrier with sufficient load capacity.
- In case of using a quick coupler (hitch), determine the total weight including the quick coupler.
- Carriers below this weight class will not provide the required degree of stability and could even fall over during ripper use, causing personnel injury or machine damage. Carriers above this weight class may apply excessively high mechanical loads to Hyundai Ripper.
- Make sure Hyundai Ripper is compatible and match in capacity with carrier hydraulic systems.
- To protect the operator from injury due to flying rock splinters, the operator's cab should be equipped with a protective shield or splinter guard. For information on the cab protector, consult carrier manufacturer or Hyundai.'s dealers.
- Mounting Hyundai Ripper requires the presence of an assistant, who must be instructed by the carrier driver.
- The carrier driver and assistant should agree beforehand on clear hand signals.
- To avoid equipment damage, follow the carrier maintenance schedule before operating Hyundai Ripper.
- Check Hyundai Ripper for wear, getting loose, breakage or crack. Do not operate in case any damages or failure is found.

For details, refer to "3.1. Carrier requirements".

Safety instructions on Hyundai Ripper installation

When insert the mounting pin to install Hyundai Ripper on the carrier, the pin holes in the carrier's arm must be flushed with those in the mounting adapter of Hyundai Ripper. For this job, a carrier operator and an assistant should be careful and agree on the hand signals beforehand. Your finger or hand must not be used to check whether the holes are flushed. Once the mounting pins are inserted, lock the pins so that they are not taken off.

If quick coupler is used, be sure clamping is completed. When you connect the hose, tighten the connectors with prescribed torques.

And make sure of complete connection when you open the stop valve. It may cause personal injury if the incorrectly connected hose is pressurized. When connecting the hose, be careful not to have the O-rings damaged or missed, and keep all the connectors clean.

■ Check Hyundai Ripper and the carrier

Please check every necessary parts of Hyundai Ripper and the carrier before starting operation. Referring to check points in the manuals of Hyundai Ripper and the carrier, check any damages, breakage, crack, wear, deformation, connections, oil leakage and the safety related points.

For Hyundai Ripper, check carefully crack in the welded parts of Hyundai Ripper body, bolts and nuts, pins, oil leakage on the cylinder and hoses. Do not operate in case any damages or failure is found until it is fixed. In case such trouble is found, put the warning tag in the driver cab. It is good to let the same person remove the tag after trouble shooting.

It is good to let the same person remove the tag after trouble shooting.





1.3 Safety information on safe operating

WARNING!
The following instructions are on safety in operation with ripper. Read, understand and
observe the instructions. More information is provided in page 26, "4. Instructions for
using Hyundai Ripper ".

Never operate in incorrect applications

Operation in applications not allowed by the manufacturer must not be carried out.

Refer to page 27, "4-2. Correct working methods" for such applications.

Operate from the top downwards

Heavy broken concrete elements may fall down and damage Hyundai Ripper and the carrier, therefore, columns and supports must be broken from the top downwards

Never use for transportation purpose

Lifting and transporting loads such as concrete columns, steel beams or pipes on Hyundai Ripper may result in accident. There is a risk of crushing or cutting during the transportation.

■ Never use for hammering or ramming

Hammering or ramming with Hyundai Ripper may cause serious damage to Hyundai Ripper.

■ Prepare an escape for the carrier

Never fail to prepare an escape for the carrier for emergency. The direction needs to be opposite to the object of crushing and it should be straight way.

Stop operation on finding uncertainties

Never fail to stop the operation if an uncertain noise or vibration is detected during the operation and check the condition of the carrier and Hyundai Ripper.

Pay attention during operation

Do not read, do not listen to music, do not talk over the cell phone during the operation. Do not operate Hyundai Ripper as well as the carrier carelessly.



1.4 Safety information on maintenance



Danger!

When air spring is replaced or disassembling Hyundai Ripper, be sure non-pressure state in it. Be sure to remember that there might be a probability of severe injury or damage due to valve explosion in this case. Never conduct maintenance work for air spring at the operating position, where pressure increases very excessively. Air spring may explode. The maintenance of Hyundai Ripper must be carried out by skilled servicemen so

The maintenance of Hyundai Ripper must be carried out by skilled servicemen so please contact Hyundai. or their dealers in case the maintenance is required.

Always follow the instructions described in this manual when performing maintenance work on Hyundai Ripper.

Pay careful attention to all relevant safety regulations. Most accidents occur when the instructions are not observed.

- Maintenance work should be performed with the carrier completely stopped; the stop valves shut off.
- The carrier must be on firm and flat ground with all the control levers switched off.
- Only the proper tools should be used for maintenance. Use of improper tools may cause personal injury, or damage to Hyundai Ripper.
- Use only the lifting points provided and sufficiently strong lifting equipment when lifting Hyundai Ripper.
- The hydraulic oil may be very hot and may cause severe scald. Before disconnecting hydraulic lines, bleed all hydraulic pressure in the lines. And, always relieve tank pressure of the carrier.
- Do not start maintenance on Hyundai Ripper until it has cooled because Hyundai Ripper is heated up during operation.
- Some components, for example, tool, valve, motor or hydraulic connection parts become very hot.
- Oil spouted out from the crack or small hole on hydraulic system can penetrate the skin and cause severe injury. Therefore, be sure that all the connections are tight, and pipes and hoses are in good condition. Use a sheet of cardboard or wood to search for suspected oil leaks.
- Oily, greasy ground may be very slippery. Collect any oil and grease and dispose it correctly for safety and environment.
- Unauthorized alteration on Hyundai Ripper may cause Hyundai Ripper serious troubles or reduce ripper life and performance. These cases cannot be guaranteed by Hyundai.
- Air spring contains nitrogen gas, so special care should be taken. It should be handled according to detailed descriptions in this manual. There is a danger of explosion when the pressure in air spring surpasses the standard level.
- Never conduct maintenance work for Air spring at the operating position, where pressure increases very excessively. Air spring may explode.
- Always use only genuine parts from Hyundai. Infringement by using non-genuine parts may cause damage to the products and injury and automatically voids warranty.



2. Product information

2.1 Main parts name and description

- Gear box: This is a main driving part that performs striking action of the tool body with eccentric gears synchronized in it.
- Main Body: This fixes the link, guide shift, and Air spring and has the bottom plate to connect the top bracket.
- Link: This guides Chisel body or Tip body on its work path.
- Air Spring: This is filled with nitrogen gas and increases striking power as accumulator.
- Hydraulic Motor: This drives eccentric gears in the gear box.
- Hydraulic Block: This hydraulic system block controls the hydraulic direction and return inertia.
- Mounting Cap: This connects to the excavator.
- Chisel body and Tip body: They are the basic part that receives kinetic energy from the gear box and performs striking necessary for the crush.
- Chisel and Tip: This part directly blows the object to be crushed.



2.2 Technical specification



Description	Unit	HSR250	HSR300	HSR400	HSR500	HSR800
Operating	Kg	2620	3450	4440	5600	10500
weight*	lb	5776	7606	9789	12346	23149
Dimension	mm	787 x 1148 x 2870	863 x 1321 x 3231	915 x 1401 x 3385	1060 x 1554 x 3665	1404 x 1600 x 4100
АхВхС	inch	30.98 x 45.20 x 112.99	33.98 x 52.01 x 127.20	36.02 x 55.16 x 133.27	41.73 x 61.18 x 144.29	55.28 x 63.00 x 161.42
Chisel	mm	110	120	130	140	180
diameter Ø	inch	4.33	4.72	5.12	5.51	7.09
2nd relief	Bar	250	250	280	280	300
pressure**	Psi	3626	3626	4061	4061	4351
Operating	Bar	180-220	180-220	210-250	210-250	240-270
pressure	Psi	2610-3190	2610-3190	3045-3626	3045-3626	3481-3916
	lpm	170-200	180-220	240-280	250-310	500-560
OILIIOW	gpm	45-53	47-58	63-74	66-82	132-148
Frequency	bpm	2,500~3,500	2,500~3,200	2,000~2,800	2,000~2,800	2,200~2,500
Air spring	Bar	4	5	5	5	5
pressure	Psi	58	72	72	72	72
Suitable carrier	ton	20~25	28~34	36~43	46~60	70~90
	lb	44092~ 55115	61729~ 74957	79366~ 94798	101412~ 132277	154323~ 198416

General description

This equipment installed in the excavator is used to breakup and crush rock, concrete and asphalt. This equipment, patented by Hyundai., is manufactured with special wear resistant steel. Hydraulic pressure provides power to breakup and destroy more easily for the equipment. This equipment is designed for high productivity with strong blowing power.

Low noise

The noise level generated during operation is proportional to the hardness of the ground foundation where the operation is performed. Noise generated by crushing soft materials is negligible. The noise level increases high when hard materials like limestone is crushed. However, this level is lower by 20dB, compared to the hydraulic breaker.

Underwater usage

Without any adjustment and change, this equipment can be used safely for underwater work with no degradation of performance. Washing with clean water is recommended after underwater operation.

Work Scope

This equipment can be operated at any place without any problem of no-load blow. This feature produces idealized working condition for tunnel, wall, roof, any other similar work, etc.



2.3 Productivity and Performance of Hyundai Ripper

■ The RQD value in regard to the hardness property of the rock is classified as follows:



	В	С	D	Е	F	G
Hyd. Breaker	•	•	•	•	•	•
Sterling Ripper	•	•	•	•	•	•
Vibro Ripper		•	•	•	•	•
Dozer				•	•	•
Bucket						•

Performance for Hyundairipper



SR80
SR50
SR40
SR30
SR25
SR15

3. Installation

IMPORTANT!

Improper installation can cause serious damage to Hyundai Ripper and to the carrier. Do not install Hyundai Ripper if you are unsure. Contact your HYUNDAI dealer for more information.

3.1 Carrier requirements

Hyundai Ripper can be installed on any carrier that meets necessary mechanical and hydraulic installation requirements.

Check following points when installing Hyundai Ripper:

Carrier weight

Hyundai Ripper should only be mounted on a carrier with sufficient load capacity. In case of using a quick coupler, determine the total weight including the quick coupler. For more information about suitable carrier weight, please contact Hyundai. and their dealers.

Mounting dimension

To fit Hyundai Ripper on the carrier, proper mounting adapter must be used. This mounting adapter varies according to carrier model and should be ordered separately with follows:

Hyundai standard mounting adapters are designed to fit most carrier, and parts for fitting, such as spacers and pins can also be provided according to mounting dimensions of arm width, link width, arm pin diameter and link pin diameter of your excavators. For more information about mounting dimension, please contact Hyundai. and their dealers.

A: Excavator arm width

- **B: Excavator link width**
- C: Excavator arm pin diameter
- D: Excavator link pin diameter



Hydraulic line

Check the nominal bore size of Hyundai Ripper piping lines on the carrier. Both supply and return lines

must

have sufficiently large inner diameters. Small line size causes backpressure increase, overheating of oil or irregular blows.

Do not use Hyundai Ripper with a carrier, which does not meet necessary mechanical and hydraulic installation requirements. Otherwise, it may cause serious damage to Hyundai Ripper and the carrier.

Hydraulic line

Check the nominal bore size of Hyundai Ripper piping lines on the carrier. Both supply and return lines must

have sufficiently large inner diameters. Small line size causes backpressure increase, overheating of oil or irregular blows.

Hydraulic pressure

The hydraulic pressure and oil flow of the carrier's ripper piping should be adequate for operating the ripper. The maximum hydraulic pressure of the carrier must be higher than the recommended relief pressure setting for Hyundai Ripper. If not, the impact rate of Hyundai Ripper becomes slow or Hyundai Ripper does not start blowing.

Oil flow

Oil flow, which controls impact rate of ripper, is the most important factor in the hydraulic parameters to operate ripper with a good performance, and should not only be too low but also be too high. Insufficient oil flow cause low impact rates, and on the contrary excessive oil flow causes an increase in the operating pressure and overheating of the oil. If the output of the pump is more than the maximum acceptable flow of Hyundai Ripper, a flow control valve is needed.

Oil cooler

Too low or too high oil temperature reduces the working performance of a ripper. The temperature of the hydraulic oil shall never exceed 90°C (194°F), maximum allowed limit, which may cause damage to Hyundai Ripper as well as the carrier. If the carrier's oil cooler is too small, either the original cooler should be replaced with a larger one or an auxiliary cooler must be installed.

For sufficient cooling of oil, return oil from Hyundai Ripper must run through oil cooler to oil tank.

★NOTICE

Fire prevention oil or vegetable oil should not be used without prior consent of HYUNDAITECHNOLOGY Inc.

 $\sqrt{\text{Allowable temperature range: -20°C/+80°C}}$ (depending on the oil in use)

 $\sqrt{\text{Allowable viscosity: } 25\text{cSt} - 150\text{cSt}}$

3.2 Mounting Hyundai Ripper on the carrier

\wedge	DANGER!
	While mounting Hyundai Ripper or removing the bucket, make sure that there are no
	persons in the vicinity of the carrier.
	When moving the carrier, do not touch any part of the carrier or hydraulic ripper.
	Keep hands away from linkage area and pin-bores.
	When aligning pin-bores, never put a finger into the bore, align only by sight or with
	using drift pin. Agree with the assistant on clear hand signals.



- Following the direction of an assistant, carefully move the excavator arm (2) into the adapter, until the bore in the arm is flush with those in the adapter.
- Insert the arm pin (3).
- ◆ Fit the stop ring (5) to the arm pin (3) and lock by using the bolt and nuts (4&6).
- Lift up the extension boom (1) to a proper height.
- Extend the bucket cylinder (8) until the bore in the link (10) is flush with those in the adapter.
- ◆ Fit the stop ring (5) to the bucket pin (9) and lock by using the bolt and nut (6&7).

Check there are any mechanical difficulties, slacks or incompatibility in manipulating.



5. Stop ring

- 6. bolt
- 7. Nuts
- 8. Bucket cylinder
- 9. Link pin
- 10. Link

3.3 Connecting the hydraulic lines of Hyundai Ripper



- 1. High pressure hose (In)
- 2. Low pressure hose (Out)
- 3. Drain hose (To oil tank)
- 4. Stop valves

Before connecting the hydraulic lines to the carrier, check following points:

- To avoid ripper damage, the hydraulic oil of the carrier must be kept clean. Check the contamination of the oil, then, if necessary, change the oil or flush the oil through a external filtration system, and replace the carrier oil filter according to the maintenance schedule of the carrier.
- Check the pressure setting of the relief valve on Hyundai Ripper hydraulic line, this pressure-relief setting should be at least 30 ~ 40 bar higher than the measured maximum operating pressure of Hyundai Ripper.
- The sealing faces and connecting threads of the hoses or fittings must be undamaged and free of sand or similar foreign particles.



If the hydraulic lines are in good preparation for operating Hyundai Ripper, connect Hyundai Ripper as follows:

- If the connection hoses are not installed on Hyundai Ripper, remove the cover plate on the service window and connect the "IN" & "OUT" &" DRAIN" hoses (1, 2,3) to Hyundai Ripper.
- Confirm both of the stop valves (4) are closed.
- Remove the end caps from the stop valves (4) and remove the hose plugs from the hoses. Put them in the toolbox for safekeeping.
- Connect the "IN" & "OUT" &" DRAIN" hoses (1,2,3) to the stop valves on both sides of the carrier arm.
- Open the stop valves (4).

When attachment pipes were newly installed for a carrier or the pipes are not cleaned, the pipes must be flushed out through U-hose for more than 5 minutes before connecting the pipes with input line and return line of Hyundai Ripper. After flushing pipes, change the hydraulic oil filter of the carrier. Remind most damage of motor piston of Hyundai Ripper and the seals may be caused by foreign objects or debris inside of the hydraulic oil, so it is important to keep it clean for long life time of Hyundai Ripper.



All three hose must be connected from Hyundai Ripper to the carrier. "IN" & "OUT" hoses must bear at least 350 bar of continuous pressure and additional pressure peaks.

We recommend using the 350bar hose for the pressure hose and recommend using over 120 bar hose for return hose. (We supply 350bar for "IN" & "OUT" hoses, and 120bar for DRAIN" hose.)



3.4 Inspection after installation

After Hyundai Ripper has been installed on the carrier and set ready to operate, installation inspection must be carried out. Check inspection items and specifications as follows:

- Shape of mounting and fitting (Pins and stop-rings)
- Hoses' connection and fitting between Hyundai Ripper and carrier
- Connection of each parts of Hyundai Ripper
- Abrasion, crack, defect of each parts of Hyundai Ripper

And start operating Hyundai Ripper slowly and check the following:

- ♦ Whether there are irregular operating motions
- ♦ Oil leak of connection of hoses and each parts of Hyundai Ripper

	WARNING!
/!\	Wear safety shoes to protect feet.
	Personal injury can result from dropping pins during dismounting.

3.5 **Dismounting Hyundai Ripper from the carrier**

Put Hyundai Ripper on a clean, flat, level surface, and engage the parking brake on the carrier machine.

- Close the stop valves completely.
- Disconnect the hydraulic hoses (I, O) from the stop valves.
- Ensure no leakage occurs from hoses and stop valves.
- To prevent contamination, apply the end caps to the stop valves and hose plugs to the hoses.
- Remove the stop rings from the arm and link pins.
- Lift the arm away from Hyundai Ripper, so that Hyundai Ripper can be carried

away, or another attachment mounted on the carrier.



3.6 Tools replacement

Δ	WARNING!
<u>\</u>	The tool shall only be installed in the way described. Failure to do so could allow the tool to be drawn out from Hyundai Ripper with force possibly causing safety accidents. When installing the tool, the carrier must be switched off before fitting or removing the tool. Always wear safety glasses and gloves because metal chips or debris may fly off when driving the tool or the tool pins. Never put fingers in the tool pin-bores of Hyundai Ripper. Do not stand in front of tool: possible blank blow caused by the pressure trapped inside
	Hyundai Ripper can cause personnel injury. In case of large size ripper, the tools are very heavy and difficult to lift by hands. Always use a hoist with a sling when lifting the tool. Be careful of falling down. After operating Hyundai Ripper, the tool, especially the tip, may remain very hot for some time and can cause severe burn.



IMPORTANT!

Use only genuine HYUNDAI tools. Use of other brands of tool may occur serious trouble to Hyundai Ripper and cause warranty rejected.

It is important that the tool be used correctly for longer tool life. Pay particular attention to Section **"4. Instructions for using Hyundai Ripper"**, and refer to a extra document "A guide for prefer use of tool" to determine the warranty guide for tool failure.

- Tips replacement
- 1. Position Hyundai Ripper at plane ground.
- 2. Unscrew bolts completely.
- 3. Remove the tips.



• Inspection after tip removal

Once the tip is removed, check the condition of bolt inserting holes of the tip body. When the new tips are installed, check if there is minimal wobbling in the tips & the gum of tip body, and check if bolt holes are in line with the bolt holes of the tips. If the bolts cannot be screwed, tip body must be worn or damaged. In this case, the tip body must be replaced or fixed. Otherwise, the bolts might be bent or broken. It is necessary to inform the supplier. Please inform a qualified service engineer of that issue.

• Deformation of tip

Keeping blowing at hard rock generate heat on the tips and it may deform the tip. Do not keep blowing at the same point for a long time and check frequently the condition of the tips when working at hard rock.

★ Note

If any deformation of the tips are caused by incorrect use, it will be out of warranty.

Worn chisel can bring out lower efficiency of operating work.

♦ Tip installation

- 1. Install in reverse sequence of tip removal.
- Chisel replacement

Chisel Removal Process

- 1. Remove the pin after disassembling the snap rings and the washers in front head.
- 2. Remove the chisel.



Inspection after chisel removal

Once the chisel is removed, check the condition of pin inserting hole of the front head and the condition of chisel friction area. When the new chisel is installed, check if there is minimal wobbling in the front head & front bush, and check the condition of thrust plate. If they are over worn and wobbling excessively, replace the thrust plate and the front bush. Otherwise, the pin might be bent or broken. It is necessary to inform the supplier. Please inform a qualified service engineer of that issue.

♦ Deformation of chisel

Keeping blowing at hard rock generate heat on the chisel and it may deform the chisel. Do not keep blowing at the same point for a long time and check frequently the condition of the chisel when working at hard rock.

★ Note

If any deformation of the chisel is caused by incorrect use, it will be out of warranty.

Worn chisel can bring out lower efficiency of operating work.

Chisel installation

1. Install in reverse sequence of chisel removal.

When the new chisel is installed, check if there is minimal wobbling in the front head & front bush.

3.7 Air Spring

Danger!Be sure to charge or discharge gas into air spring at rest position. Never conductmaintenance work for air spring in the working position, where pressure increasesconsiderably. Air spring may explode and cause severe injury or death.The pressure in Air spring must never be exceeded over 10 bar. Air spring mayexplode and cause severe injury or death.Charing or discharging gas must be performed by using the charging kit officiallyauthorized. Air spring may explode and cause severe injury or death.
Important! Charge more than 99.8% pure nitrogen gas into air spring. If you charge other gas, air spring may explode. Air spring may explode and cause severe injury or death.

- Replacement Air Spring
 - Defected, split, punctured or twisted air spring must be replaced.
 - Wash with water only.

Be sure to adjust pressure of air spring always at rest position.

- The equipment pressure is always adjusted at the stop position.
- Position Hyundai Ripper in a horizontal position straight upward from the ground and check the pressure.
- Nitrogen gas must be charged between 3 and 7 Bar (cf. Factory setting pressure: 4-5Bar)
- For short boom and/or short arm in use, air spring may be pressed more and the pressure is recommended to be charged 1-2Bar)
- The higher air spring pressure is filled with, the higher vibratory power is generated. But shock and stress transmitted to a carrier may be increased so it is recommendable to adjust pressure according to working condition.





★ Warning

When air spring is replaced, pressure must be discharged. The valve must not be shocked or loosened in the pressure-hold state of air spring. Be sure to remember that there may be a probability of severe injury or damage due to valve explosion in this case.

3.8 Rubber Thrust



WARNING!

Replacement of Rubber Thrust must be carried by a qualified and skilled technician with full knowledge of Rubber Thrust including assembling and disassembling Rubber Thrust.

- Replacement Rubber Thrust
 - Stop the engine of carrier and position Hyundai Ripper in a horizontal or vertical position.
 - Dismantle covers by unscrewing bolts and separate Rubber Thrust from Hyundai Ripper.
 - Check the condition of Rubber Thrust and replace it with the new one if it cannot be used any longer.
 - Assemble Rubber Thrust in reverse order. the bolt must be tightened with proper torques.
 If you find some defect in the bolt condition, replace it with new one.
 - Rubber thrusts are consumables which need to be replaced after every 150 hours.



4. Instructions for using Hyundai Ripper



WARNING!

The following information must be checked for efficient and safe work, preventing breakdown before starting operation.

4.1 Correct using methods

Operating temperature

The operating temperature of Hyundai Ripper is $-20 \sim +90^{\circ}$ C (- $4 \sim +194^{\circ}$ F).

If the ambient temperature is lower than $-20^{\circ}C(-4^{\circ}F)$, Hyundai Ripper must be warmed up before starting operation in the way described at the carrier's manual. During operation, they will remain warm.

If the oil temperature exceeds $+90^{\circ}C(+194^{\circ}F)$, please stop the carrier and wait until the oil has cooled to operating temperature range. For continuous operation with high duty, maximum oil temperature is recommended not to exceed $+80^{\circ}C(+175^{\circ}F)$. An auxiliary oil cooler must be fitted if needed.



- ✓ Allowable temperature range: -20°C/+90°C (depending on oil used)
- ✓ Allowable viscosity: 25 cSt ~ 150cSt
- \checkmark Ideal viscosity: 40 cSt ~ 60 cSt

The hydraulic oil base on mineral oil should be selected. Oil is selected according to precise viscosity corresponding to ideal viscosity in the general operation mode. If oil viscosity less than the allowable value, the motor life can be shortened.

Hydraulic oil for the excavator should change according to the user's instructions.

Λ	IMPORTANT!
	If the oil temperature exceeds $+90^{\circ}C(+194^{\circ}F)$, please stop the carrier and wait until the
	oil has cooled to operating temperature range. Extreme oil temperature may cause
	serious damage on the seals in the carrier and ripper.
	WARNING!
	Stop operating immediately if anyone moves into the danger area, i.e. within a radius of
	at least 20 meters around Hyundai Ripper. Must be observant of other workers,
	bystanders and other equipment in the danger area.



4.2 Correct working methods

WARNING!
Please do install the proper protection shield on the carrier's cab to prevent possible
injury from flying pieces of broken rock or the cut steel pieces.

DANGER!
Improper operation of Hyundai Ripper could result in serious injury or death. Never
operate Hyundai Ripper unless you are properly trained.



Advance

Move the impact point from the edge to the interior. Never try to break off a too large block, if the object has not broken within 30seconds.

The object should be broken up piece by piece in small blocks.

Large distance steps will not improve working results. Operating Hyundai Ripper longer than 30 seconds may cause damage to Hyundai Ripper.



Angle of attack

Hyundai Ripper should always be positioned at right angles to the surface of the material.

If Hyundai Ripper is operated at slant angle. The chisel slide off the material surface and it cause blank blows that damage Hyundai Ripper.

And the chisel will wear more quickly, or broken more frequently.

Never use as a sledge ripper

Before starting up, place the chisel point on the ground.

Never attempt to use Hyundai Ripper as a sledge ripper to break material,

as the result of such action will cause damage to Hyundai Ripper and the carrier.

90



Never drive the chisel into the ground

If the advance is too large and the chisel is not rocked to release the dust, the chisel will be driven into the material without breaking the material.

This causes the chisel tip to glow red-hot and lose its hardness.

As a result, the chisel wears out more quickly.

Operating in this way is not permitted.

Dust dampens impact power, when the chisel is inserted into the ground, and reduces the efficiency of Hyundai Ripper.

Tilt Hyundai Ripper slightly backward and forward, not more than 5° , while operating so that the dust can escape.

Do not rock Hyundai Ripper at angles greater than 5° or the chisel will be broken.

Never use as a lever

Do not use the chisel as a lever; e.g. crowbar, as this will cause the chisel to break.

Under any circumstances, operating in this way is not permitted.

Most of bending failure of the chisel may be caused by lever action in

stone that is inside hard or frozen ground. Be careful and stop operating

if you feel sudden resistance under the chisel.

Never use for transport purposes

Hyundai Ripper is not designed to lift or transport loads.

Never use the chisel as a lifting point.

This is dangerous and could damage Hyundai Ripper or the chisel.



Never use the chisel or hydraulic ripper to move rocks or other objects

Hyundai Ripper is not designed for this usage.

Do not use Hyundai Ripper or chisel to roll, push the object or reposition

the carrier.

This may cause damage to Hyundai Ripper and the carrier.

Blank blows

Blank blows, which are impact on the chisel without contact with the object, are very harmful for Hyundai Ripper.

Always press the chisel down onto the material before starting Hyundai Ripper. And stop operation immediately as soon as the object has been broken. If operation is continued, blank blows could result in excessive wear to major components.

Rubber Thrusts

Give attention to conditions of rubber thrusts during working with Hyundai Rippers. Rubber thrusts are consumables which need to be replaced after every 150 hours.

5. Marking and labels

-

Labels for safety descriptions and instructions are attached on the equipment. If damaged or erased, they can be obtained from the manufacturer or dealership.

The labels are attached on the equipment body.

- Read the instruction manual completely
- Your understanding of all information is mandatory

- ♦ Noise Level: 80~90db. Put on protective gear
- Keep at least 20m away from the equipment during Be careful of scattering pieces.
- Upper cushion is at risk of explosion

Model nameplate and serial number

Name plate of the product locates in the main body.

The name plate includes following data (refer to picture below);

- 1. MODEL NAME
- 2. SERIAL NO.
- ③. MANUFACTURING YEAR
- ④. GROSS WEIGHT
- ⑤. FLOW RATE
- 6. OPERATING PRESSURE

	CE DO NOT DEFACE OR REMOVE THIS PLATE				
	MODEL NAME				
	SERIAL NUMBER				
	MANUFACTURING YEAR	Working Weight kg			
	OIL FLOW	SETTING PRESSURE bar			
A HYUNDAI CORE MOTION 3rd. Floor, 55, Bundang-ro, Bundang-gu, Seongnam-si, Gyeonggi-do, Korea					

In case name plate is damaged, the data can be found in designated location for product information.

Model name of Hyundai Ripper is engraved in the left of the upper part of the gear box and serial number is in the right of the upper part of the gear box.

6. Storage of Hyundai Ripper

- Before long term storage
 - Clean and lubricate Hyundai Ripper carefully.
 - Remove rust and poorly coated area.
 - Protect all unprotected metal surface with a rust inhibitor
 - Store in warm and dry place if possible.
- Recommended storage condition
 - Temperature: -40°C/+80°C (Note! Operating temperature is different from these values.)
 - Humidity: 60% or under

★NOTICE

Observation of conditions and instructions described above is recommended for re-use of the product.

7. Troubleshooting

Problem	Possible cause	Solution		
	Abnormal operation due to low engine rpm of the excavator	Increase the engine rpm to proper value		
	Operation pressure lower than recommended value	Check operation pressure of Hyundai Ripper connected.		
Weak vibration	Excessive oil in eccentric gearbox due to damaged motor seal	Check return pressure and motor. Drain oil completely from the housing and fill up to recommended amount.		
	Pressure and oil flow problem of a carrier	Contact the manufacturer of the carrier		
	Closed shutoff valve	Open the valve		
	Connection in wrong direction of the hose	Check direction for hose connection Check if supply direction is on the left side from viewpoint of the operator's seat.		
No blowing	Error in motor operation	Replace		
	No hydraulic supply to the equipment	Check piping of the equipment		
	Error in operation of gear box	Contact a service engineer		
Low efficiency of	Blunt tip or blunt chisel	Replace		
equipment	Excessive hydraulic oil in eccentric gearbox	Drain oil and fill up to the required level		
Abnormal noise Error in operation of eccentric gear during operation housing		Contact a service engineer		
Leakage at plug	Damaged plug or O-ring	Fill up oil and notify a service engineer		
Oil leak in Upper cushion	Damaged outer surface or oil leak at load valve	Replace Air spring or valve		
Over pressure inside the gearbox	Damaged motor sealing	Stop the excavator. Contact a service engineer		
Oil leak at	Loosen screw or union nut	Fasten again.		
hydraulic motor	Damage O ring	Change O ring		

7.1 Maintenance, Inspection and repair

Daily inspection

Before operation, daily visual inspection is performed as follows:

- Oil leak probability
 - Hydraulic motor
 - Control block
 - Gear box
 - Oil plug
- Hose condition (wear, entangle, scratch)
- Wear condition of tool body, tip, and pin
- Condition of Air spring (tear, deformed rubber)
- Condition of screw and bolt fastening
- Probability of deformation and split
- Overall condition of equipment
- Contact between equipment and excavator
- Condition of lubrication plug
- Check gap distance of gap control cylinder.

The figure below shows where the inspection points are:

The whole inspection can be conducted in a few minutes. Even though only one problem is detected out of all described above, proper measures should be taken for cost and time saving.

Visual Inspection			
Problem	Procedure		
Oil leak - Hydraulic motor / Control block	Find the location and remove.		
- Air Spring	Contact a service engineer for enquiry.		
- Oil plug	Fill lubricant and contact a service engineer		
- Hydraulic hose	for enquiry.		
- Gear Box	Replace as quickly as possible.		
- Rubber Thrust	Contact a service engineer for enquiry.		
Tip abrasion or Chisel abrasion	Replace with the genuine part.		
Widened gap / Pin damage between tool body, tip cover and tip.	Replace with the genuine part.		
Fastening of screw and bolt Loss and loosening	Replace with a genuine part. Refastening		
Distortion and split	Contact a service engineer for enquiry.		
General condition of the equipment	Keep Hyundai Ripper clean and in fine condition.		
Wear of the stopper in the gearbox	Replace if necessary		
Loss of labels	Attach new labels.		

★ Note

Disregard for these problems may invalidate equipment warranty.

7.2 Care and maintenance schedule

Work hours below indicate inspection interval. These hours are the maximum hours for general work in the normal work environment. If there is anything omitted in the chart below, contact a service engineer for enquiry.

Check connection of all bolts of each part of Hyundai Ripper	8h			
Check connection of the equipment to excavator	8h			
Check oil leak in the hydraulic line (Hose, Motor, Control Block)	8h			
Check if there is oil leak in the plug	8h			
Check if there is oil leak in the gearbox	8h			
Check if there is twist and damage in the gearbox	8h			
Check if there is entangle and damage in the upper bracket	8h			
Check the label for safety guide	8h			
Check oil leak, tangle and split in the upper cushion	8h			
Check condition of tool body and tip.	8h			
Check and inject grease into front head	8h			
Check the condition of Rubber Thrusts		40h		
Check and inject grease into Pivot units one time in a week.		40h		
Change hydraulic oil of the gear box			500h	
Check if there is any corrosion in the installed parts			500h	

1) If the lubrication plug is damaged, replace it as quickly as possible.

2) Comply with oil level specified in the manual. Excessive oil in the eccentric gear housing may cause severe damage to Hyundai Ripper's function.

7.3 Lubrication of gearbox

Use SAE-120 gear oil for the housing. HYUNDAI recommends SAE80 - 100 or more qualified oil.

Replace oil after 100 hours of initial operation and thereafter, every 500 hours or once a half year.

Oil quantity

- HSR250 : 5.0L (1.32 Gallon)
- HSR300 : 7.0L (1.85 Gallon)
- HSR400: 8.0L (2.11 Gallon)
- HSR500: 9.5L (2.51 Gallon)
- HSR800: 19.0L (4.75 Gallon)

■ Oil change for gear box

- Move the position of Ripper so that the oil port can be released.
- Eliminate residual pressure in gear box completely by loosening the plug little by little.
 Collect used oil in separate container to dispose.
- Fill oil to the level specified in the manual of the applicable ripper model. Close with the plug again and fasten it fully. Replace any damaged plug with new one. Always check if the plastic seal of the plug is intact and still in-service life. If metallic debris is found in used oil, notify a qualified service engineer and let the engineer decide if the bearing is replaced or the eccentric gear housing should be cleaned.

! CAUTION

After half process of disassembling plug, check whether internal pressure exist or not. After checking above, start disassembling.

7.4 Pressure relief of gearbox

The pressure relief valve locates in the upper part of the gear box inlet. The valve depressurizes when adjust overpressure which can be produced in the gear box and in maintenance time. The overpressure is made only when the sealing of the hydraulic motor shaft is damaged.

Cause of damage on motor sealing

- Overpressure in drain line off the product.
- Complete shut off of return stop valve or start operating at the same time when the valve is shut partially.
- Disruptors that can exist in hose, quick coupling for hydraulic connection, return circuit line and

clogged return filter of the product.

! CAUTION

Recommended maximum pressure of the flow in drain hose is 6 bars.

In case operation force weakens suddenly, stop operating and open depressurizing relief valve cap to connect hose for depressurizing (supplied item) and check if the inside is filled with oil fully. If so, discharge oil through depressurizing hose to eliminate internal pressure. And, at this time, lock shut off valve of the product and contact qualified customer service. Operating Ripper in this condition causes overheat in the eccentric gear housing and damages to functions seriously

8. Torque

■ Max. tightening torque for bolts steel quality 8.8

	Torque		
Bolt diameter X Thread pitch(mm)	Nm	Lbs.ft	
M4 x 0.7	3	2.2	
M5 x 0.8	5.5	4	
M6 x 1.0	10	7.5	
M7 x 1.0	16	11.9	
M8 x 1.25	22	16.3	
M8 x 1.0	23	17	
M10 x 1.5	45	33.3	
M10 x 1.0	50	37	
M12 X 1.5	53	39.2	
M12 x 1.25	78	57.7	
M12 x 1.75	94	69.6	
M14 x 1.5	119	88	
M16 x 1.5	120	89	
M18 x 1.5	265	196	
M20 x 1.5	360	266.4	
M22 x 1.5	480	355.2	
M24 x 2.0	610	451.4	

Torques of these above bolts are for dry condition. If the threads are lubricated before assembly, reduce the tor1que setting by 10%.

Notes