

# Operation & Maintenance Manual

COMFORT INTELLIGENCE™

## HEP PULVERIZERS ROTATABLE

## Foreword

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### **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.

This manual contains instructions and information on safe and correct use of HYUNDAI Pulverizers.

- Please read and understand this manual before operation, inspections and maintenance of the pulverizer  
Keep this manual with your equipment all the time for your quick and easy reference, and read it regularly.
- Do not operate the pulverizer until you have been trained in the use of all operating controls and understand the hydraulic pulverizer operation
- Get a replacement manual from HYUNDAI dealer if you lost it.
- If you transfer the pulverizer to the other, do transfer this manual as well.
- The figures in this manual is for better understanding and may not correspond exactly to the pulverizer. 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 the pulverizer, call and consult HYUNDAI 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 unallowed application will not be responsible by HYUNDAI. Consult HYUNDAI for such modifications and applications.
- Use HYUNDAI genuine parts. HYUNDAI takes no responsibility for damages caused by use of non-HYUNDAI spare parts.
- For warranty, we refer you to the warranty conditions provided separately.

We always exert all our efforts for your satisfaction, and promise you quick and constant service.

We thank you for using HYUNDAI pulverizer and wish you a good luck in every your job,

Jan. 2024

**HYUNDAI CONSTRUCTION EQUIPMENT.**



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\* Specifications and features presented in this document are subject to change without notice.

# 1. Safety Information

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

The safety messages in this manual do not describe all the possibilities of personal injury or death or of damages to the product. This safety manual and the marks with symbols are intended to provide some of basic instructions for safe operation, inspection and maintenance. It is operator's responsibility to observe the safety instructions and regulations though this manual does not include all the possible situations.

***Remember! Safety is up to you***

## Safety Alert Symbol





The Safety Alert Symbol represents that **ATTENTION** is involved.

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.

- |   |  |
|---|--|
|  <b>DANGER!</b>    | 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. |
|  <b>WARNING!</b>   | 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.   |
|  <b>CAUTION!</b>   | 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.   |
|  <b>IMPORTANT!</b> | Indicates potential of damages that, if not avoided, could caused to the product or shorten the product life.  |

## 1.1. Basic safety information



### WARNING!

The following instructions are those that should never be fail to observe in operation of construction equipment.

### Know yourself

All the operators and service men must wear safety equipment required, hearing protection, respirator, hard hat, safety shoes, eye protection glass, heavy gloves and other necessary equipment. Wearing loose clothing or any accessories such as flopping cuffs, dangling neckties and scarves, untied shoe-laces, rings, wrist watches and long hair could be the cause of personal injury or death.

Use the proper tools for inspection or maintenance work, which must be carried out after ensuring the equipment stops completely and is placed stably in the safe place.

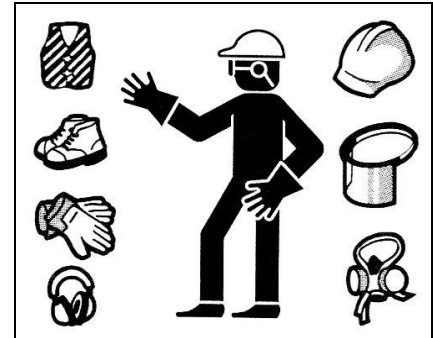


Figure 1

### Know your equipments

Never fail to read and understand the safety messages, operation manual and maintenance manual before installation and operation of the pulverizer. The operator who has been trained and licensed should only operate the carrier and the pulverizer. Familiarize yourself with the operating especially safety related devices such as safety lock, emergency stop and the others.

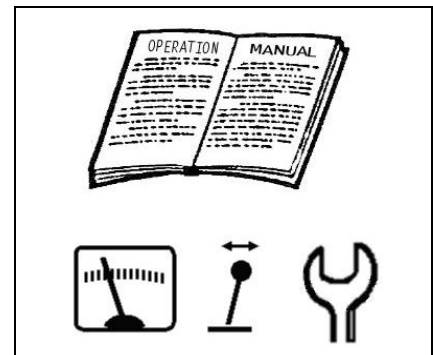


Figure 2

### Know the work site

Before beginning operation, check in and around the work site for any unusual conditions that could be dangerous and prepare the appropriate warnings for safe work.

Be careful, especially when work in the vicinity of electric power line, buried gas lines or oil tank. And pay your careful attention to the people and the cars reside and passing near to the work site. Prepare for every possible injury and damages.

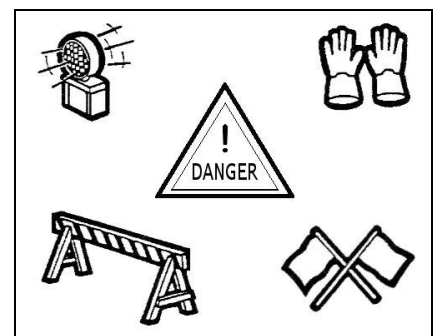


Figure 3

## Know the rules

Every people who operate or maintain the equipment should know the meaning, rules and laws in terms of equipment handling. They should know also the traffic rules, fire service act, emergency measures and where the relief equipment is.

Keep the fire extinguisher and the first aid case in the operator's cabin for emergency use.

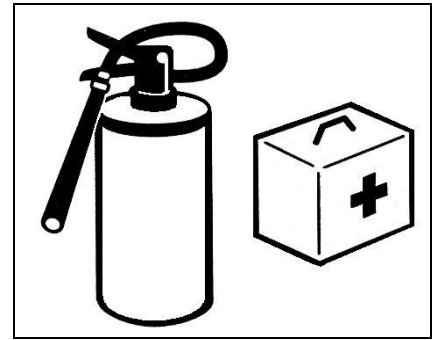


Figure 4

## 1.2. Preparation for safe operation



### WARNING!

Read and observe the following instructions on safety.

### Install the pulverizer on the suitable carrier

The suitable carrier must be selected taking the weight and hydraulic system of the pulverizer into consideration. The carrier may fall over if the pulverizer is installed on the carrier, which does not fit the pulverizer. All hydraulic lines for the pulverizer use must satisfy the specification and quality provided in page 17, "5.2. Requirements on the carrier".

### Protect the operator from the flying splinters

To protect the operator from the heavy concrete elements falling down when the pulverizer is working on the tall columns, supports and brick, the carrier should be equipped with the cab protector strong enough for the falling elements. For more information on the cab protector, please consult carrier manufacturer or HYUNDAI dealer.

### Safety instructions on the pulverizer installation

When insert the mounting pin to install the pulverizer on the carrier, the pin holes in the carrier's arm must be flush with those in the mounting adapter of the pulverizer. For this job, an carrier operator and an assistant should be careful and agree on the hand signals beforehand. Your finger or hand must not used to check whether the holes are flush. 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-ring damaged or missed, and keep all the connectors clean.

## Check the pulverizer and carrier

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

For the pulverizer, check carefully crack in the welded parts of pulverizer body, bolt and nut, pin, oil leak on the cylinder and hose. 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. (Figure )

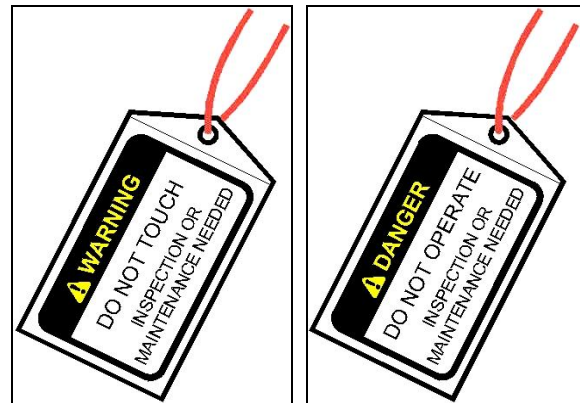


Figure 5

## Check safety in work site

Check if the building has a sufficient load capacity to bear the weight of the carrier in case it is necessary to work on the roof or ceiling of the building.

## 1.3. Safety information for operating the pulverizer



### WARNING!

The following instructions are on safety in operation with pulverizer. Read, understand and observe the instructions. More information is provided in page 26, “6.3. Operation”.

### Never operate in unallowed applications

Operation in applications not allowed by the manufacturer must not be carried out. Refer to page 26, “6.3 Operation” for such applications.

### Operate from the top downwards

Heavy broken concrete elements may fall down and damage the hydraulic pulverizer 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 the pulverizer 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 the pulverizer may cause serious damage to the pulverizer.

### Prepare a escape for the carrier

Never fail to prepare a 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 the pulverizer.

## **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 the pulverizer as well as the carrier carelessly.

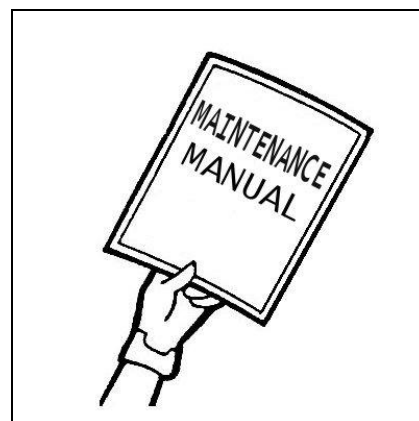
## **1.4. Safety information for maintenance of the pulverizer**

### **Follow the manual**

Follow the instructions described in the manual when performing maintenance work on the pulverizer. Pay your careful attention to all relevant safety regulations. Do not hurry. Most of accidents occur when the instructions are not observed.

### **Use proper tools**

The proper tools should be used for the maintenance work. Use of improper tools may cause personal injury or damage to the parts of the pulverizer. Wear the eye protective glasses especially when removing and replacing the cutter blades because the metal chips may fly off and cause injury if they are struck with a hand hammer made of steel.



**Figure 6**

Use only the lug provided and sufficiently powerful lifting equipment when lifting the pulverizer. Lug and ropes must be in good condition.

### **Ensure that the pulverizer and carrier stop completely**

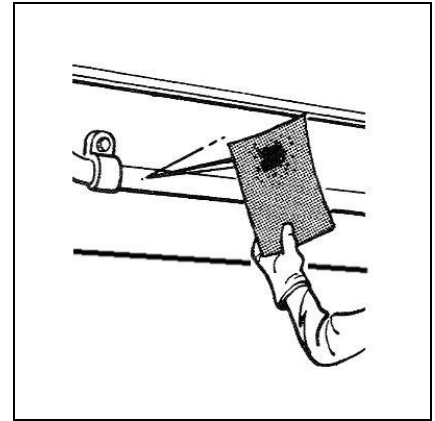
Maintenance work should be performed with the pulverizer jaw completely closed. Make sure to shut-off the stop valve of the hydraulic line for the pulverizer or to use a support to sustain the opened jaw if maintenance work should be carried out with the jaw opened.

Place the carrier on the firm and flat ground with all the control levers or switches in a safe position.

## **Pay attention to hot oil and high pressure in hydraulic system**

Special attention is required when performing maintenance of hydraulic system. Never disassemble the pulverizer as soon as the pulverizer has been stopped because the hydraulic system is still in high pressure. Follow the instructions and release the residual pressure in the system. Pressure may remain in the speed up valve, and it may be burst if it is disassembled with the pressure inside.

Oil running out from the crack or small hole on hydraulic system may cause personal injury. The hydraulic oil becomes very hot. And compressed air in the oil tank may cause oil spouting when disconnecting the line. Bleed off the compressed air by opening slowly the filler cap of the oil tank.



**Figure 7**

## **Wet ground may be slippery**

The oil wet on the ground may be very slippery. Collect any oil and dispose it correctly.

## **Do not alter or modify**

Unauthorized alteration or modification of the pulverizer shall not be guaranteed by HYUNDAI.

## 2. Configuration and ordering information

### 2.1. Main components

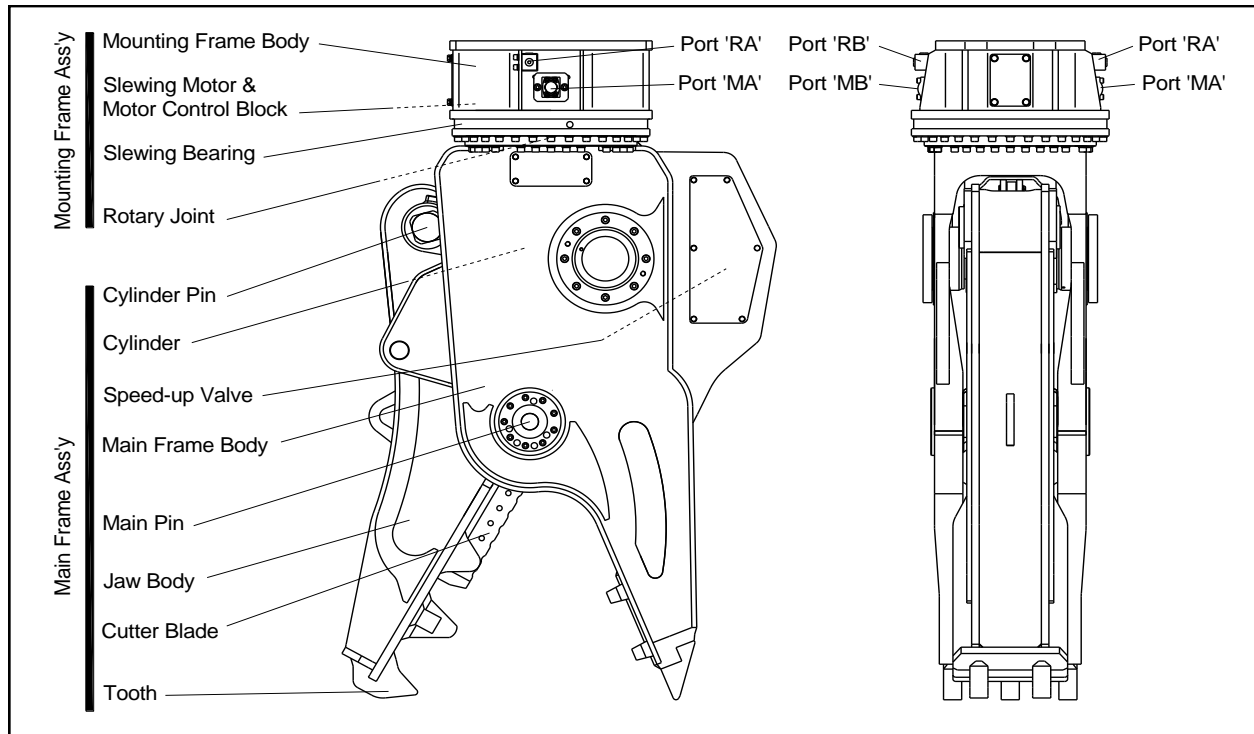


Figure 8 (HEP 200R, 250R - Trunnion Type)

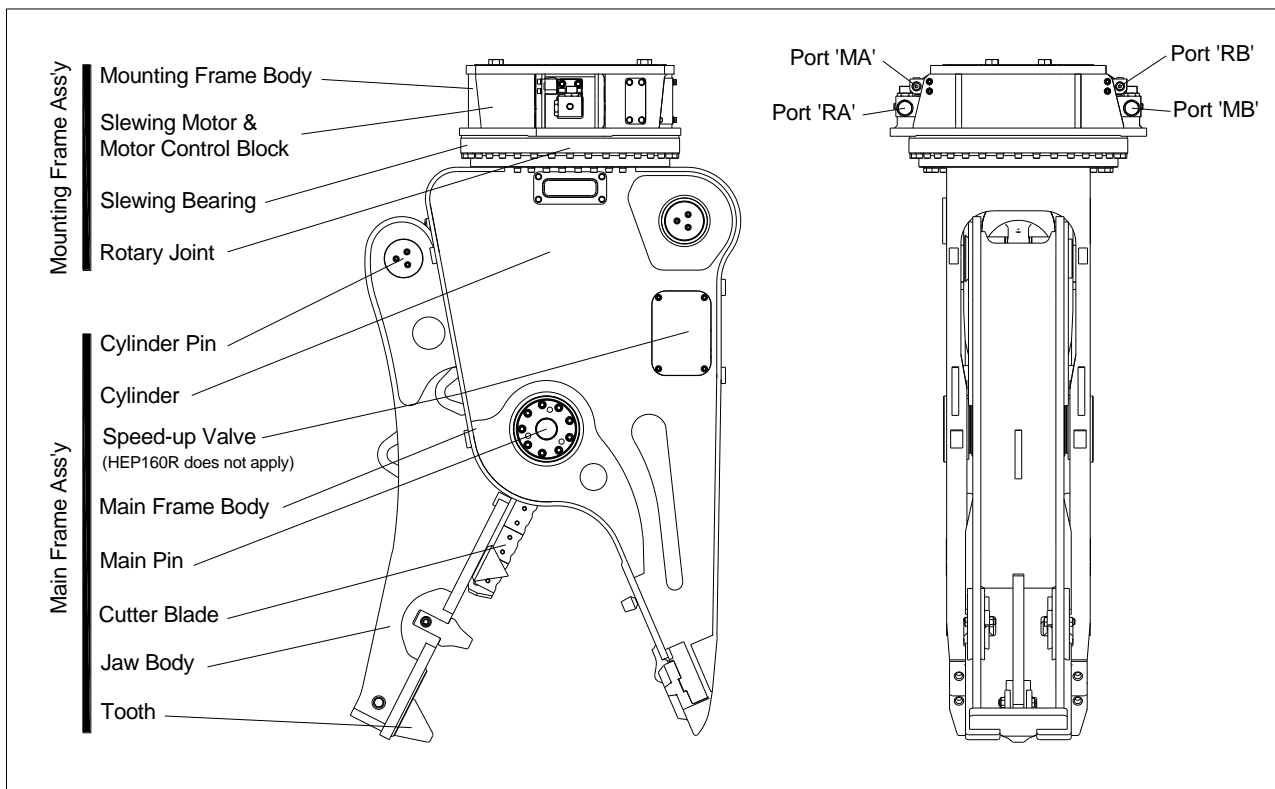
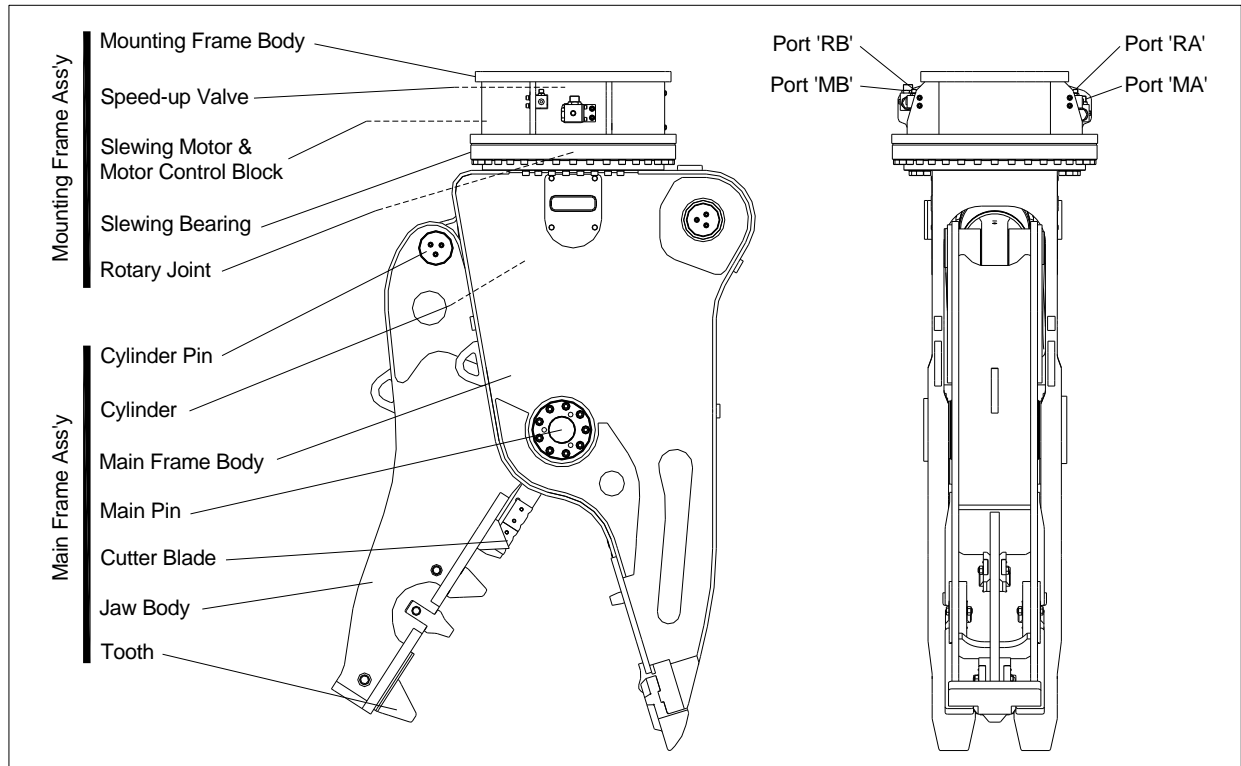


Figure 9 (HEP 160R, 350R - Clevis Type)



**Figure 10 (HEP 450R - Clevis Type)**

The followings are to be supplied as standard parts :

- Pulverizer ass'y
- Operation manual
- Standard accessories (fittings, hoses, blade adjust kit, etc)
- Standard tool kit
- Parts list

## Ordering information

Model Code :	<b>HEP</b>	160 R
		200 R
		250 R
		350 R
		450 R

Notes : 1) Installation must be confirmed whether it is possible in accordance with the carrier dimension.  
Consult it with HYUNDAI dealer.

## 2.2. Option components

The following parts are to be supplied as option only

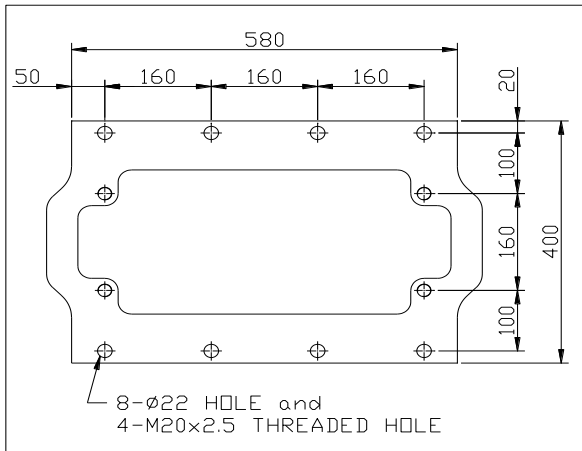
- Standard mounting adapter <sup>1)</sup> (can be installed on most popular carriers)
- Mounting pin & bush set <sup>1)</sup>
- Special tools for cylinder maintenance
- Piping kit <sup>2)</sup> (including the hydraulic rotation circuit)
- 

Notes : 1) Installation must be confirmed whether it is possible in accordance with the carrier dimension.  
Consult it with HYUNDAI dealer.

2) Refer to page 19, "5.3. Installation of hydraulic piping on the carrier" for more information

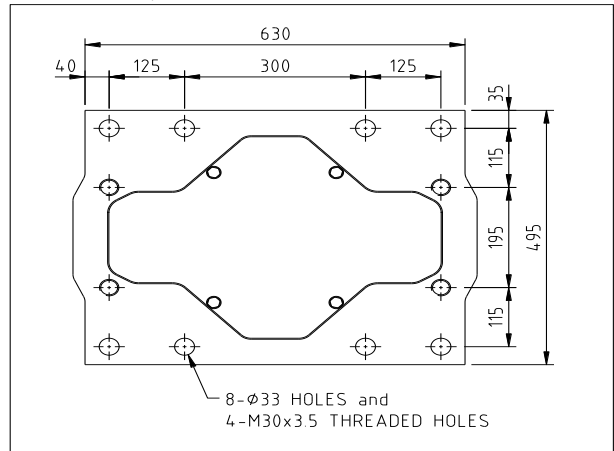
## 2.3. Mounting dimension for the adapter plate

**HEP 160R**



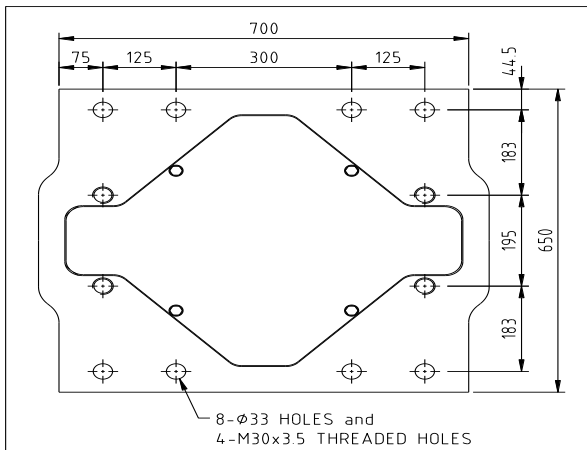
**Figure 11**

**HEP200R, 250R**



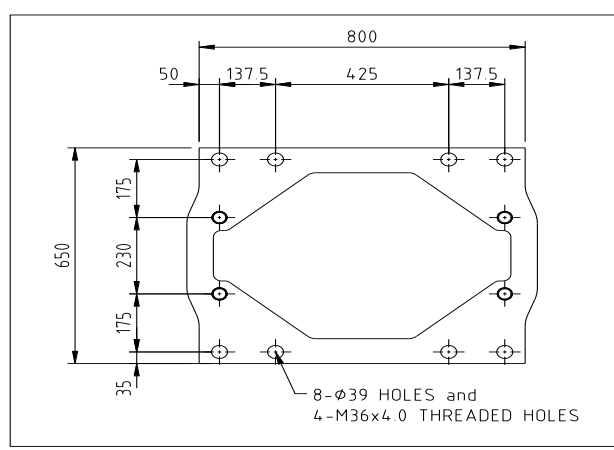
**Figure 12**

**HEP 350R**



**Figure 13**

**HEP 450R**



**Figure 14**

### 3. Technical specifications

Model		HEP 160R	HEP 200R	HEP 250R	HEP 350R	HEP 450R
Working Weight <sup>1)</sup>	kg	1,250	1,817	2,517	2,934	4,219
Overall Length <sup>2)</sup>	mm	1,855	2,142	2,473	2,586	3,075
Overall Width	mm	1,203	1,450	1,715	1,699	1,949
Max Jaw Opening	mm	721	774	941	974	1,142
Effective Jaw Depth <sup>3)</sup>	mm	629	648	809	850	1,107
Jaw Width	mm					
Fixed Jaw		384	438	470	510	550
Moving Jaw		298	350	372	392	398
Cutter Blade Length	mm	240	240	360	360	240
Oil Flow	lpm	100~180	150~250	150~250	200~300	200~300
Max Operating Pressure	bar	350	350	350	350	350
Max Cylinder Force (at 350 bar)	tonne	89	99	121	136	175
Max Oil Flow-rate for Rotation	lpm	24	35	35	35	74
Max Operating Pressure for Rotation	bar	140				
Max Rotation Speed	rpm	15				
Rotation Angle		> 360°				
Operation Temperature Range	°C (°F)	-20 ~ +90 (-4 ~ +194)				
Applicable Excavator <sup>4)</sup>						
Carrier Weight	tonne	13 ~ 16	17 ~ 25	20 ~ 27	28 ~ 36	40 ~ 50
Bucket Capacity	m <sup>3</sup>	0.5 ~ 0.6	0.7 ~ 0.8	0.8 ~ 0.9	1.0 ~ 1.4	1.5~1.7
Hose Connections						
Main		Pressurizing Port 'MA' : Jaw Closing Pressurizing Port 'MB' : Jaw Opening				
Rotation (at the view from carrier)		Pressurizing Port 'RA' : Counter-clockwise Pressurizing Port 'RB' : Clockwise				
Type of Hose Connection Ports <sup>5)</sup>						
Main (Port 'MA' and 'MB')		BSP 3/4	BSP 1	BSP 1	BSP 1-1/4	BSP 1-1/4
Rotation (Port 'RA' and 'RB')		BSP 1/2	BSP 1/2	BSP 1/2	BSP 1/2	BSP 1/2

Notes : 1) Total weight of the speed-up and hydraulic rotation version excluding mounting adapter, hydraulic hoses, fittings and mounting pins.

2) The maximum length excluding mounting adapter with jaws fully closed.

3) The length measured from throat to the outer tip.

4) The carrier weight must be heavier than the recommended carrier class in case long boom and/or long arm are equipped. For more details, consult the manufacturer of the carrier.

5) JIS B2351 type 'O' O-ring boss ports

## 4. Markings and labels

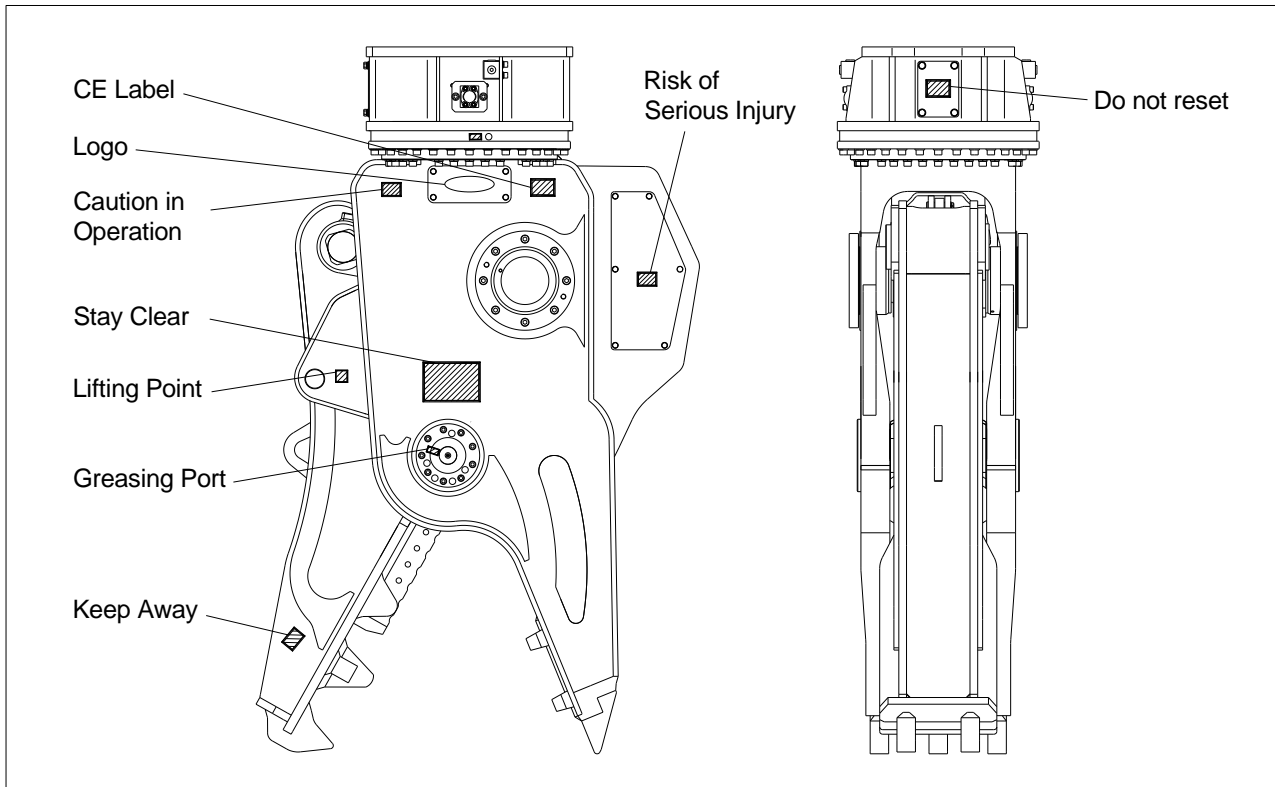


Figure 15 (HEP 200R, 250R)

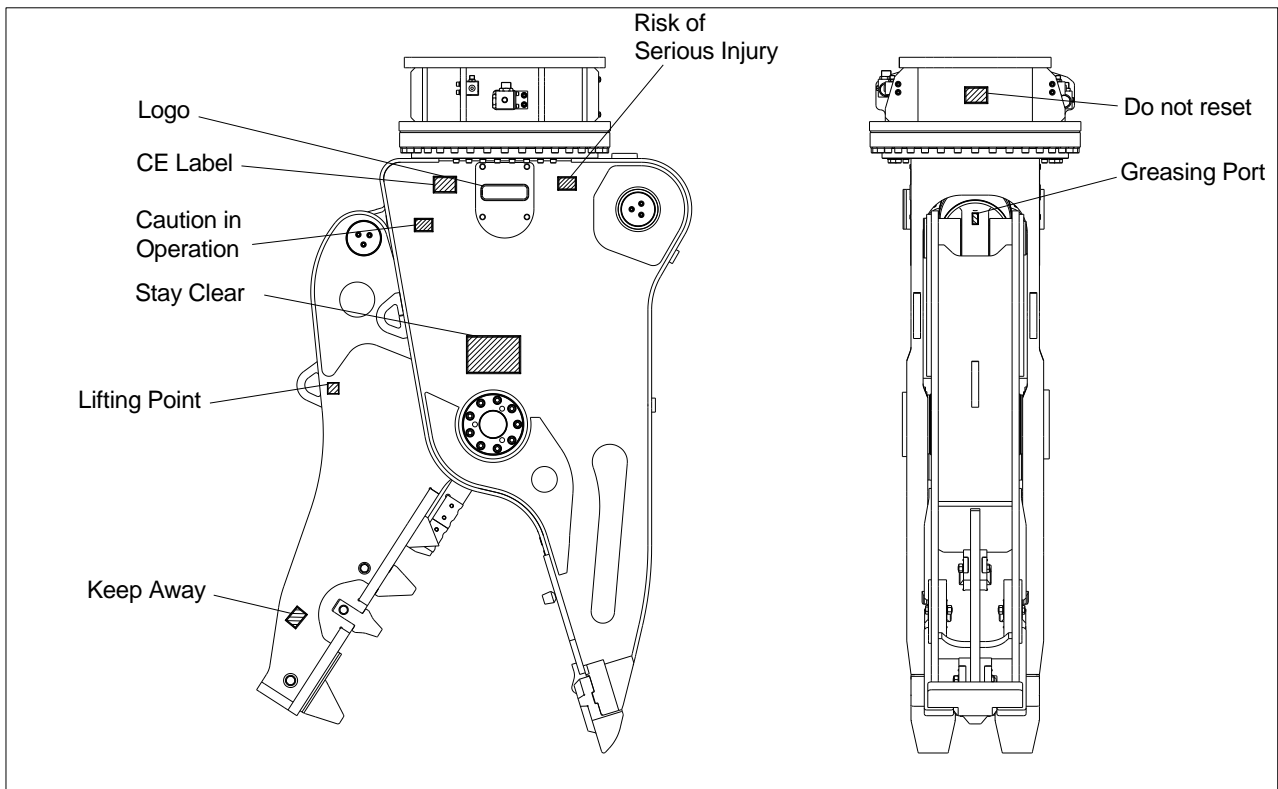
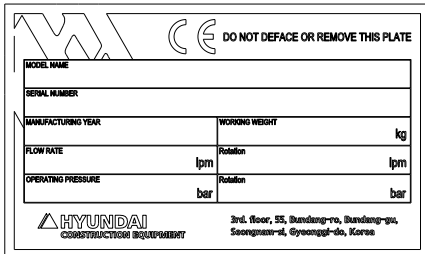


Figure 16 (HEP 160R, 350R, 450R)

Pay attention to the marks and labels related to safety.



**HYUNDAI Logo**

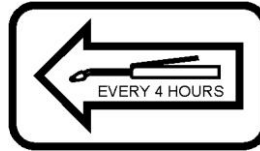


**CE Label**



**Lifting Point**

Indicates the hooking points when lifting the pulverizer



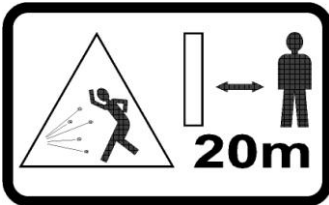
**Greasing Port**

Indicates grease apply point. Apply grease at the interval prescribed



**Keep Away**

Indicates “do not get into the open pulverizer jaw”.



**Stay Clear**

Indicates that the distance must be kept to be safe from the flying rock splinter



**Do not reset**

Indicate “do not reset the slewing motor control valve”.

## Caution in Operation

**⚠ DANGER**

- The operator must be adequately protected within the cab using the necessary window guarding.
- Do not operate when bystanders are in working area.
- Keep out from the open jaws. Risk of accident!
- Be sure to secure the jaw prior to maintenance job.

**⚠ IMPORTANT**

- Lubricate every greasing point at the specified interval.
- Never use for unallowed applications.
- Follow all maintenance schedules.

Read the manuals prior to initial use and follow the safety instructions.

A095-0097

## Risk of Serious Injury

**⚠ DANGER**

- Never disassemble the hydraulic parts before closing the jaws completely. Danger of injury or death!
- High pressure may remain in the cylinder or speed-up valve. Danger of explosion! Follow the instructions.
- Oil can be very hot after operating. Risk of burns! Wait for machine cooling before any maintenance work.

**⚠ IMPORTANT**

- The maintenance of the speed-up valve is recommended to be performed by authorized service personnel only.

A095-0099



## 5. Installation

---

### 5.1. Lifting the pulverizer



#### **DANGER!**

Be sure of observing the instructions below because they are related to safety

- Move the pulverizer with the jaws completely closed and hydraulic lines plugged.
- When lifting the pulverizer, use only the lug provided and sufficiently powerful lifting equipment.
- Ropes and rugs must be in good condition.

### 5.2. Requirements on the carrier



#### **WARNING!**

Be sure of observing the instructions because they are related safety and the life of the pulverizer

HYUNDAI hydraulic pulverizer, HEP series is designed to be used with an hydraulic excavator. Refer to the following points when deciding an excavator for the pulverizer.

#### ● **Carrier weight :**

- The excavator may fall over if the capacity is not good enough to use the pulverizer or if it is equipped with a long boom and/or a long reach arm. Proper excavator should be decided for use with the pulverizer or such long boom and arm.

#### ● **Hydraulic system :**

- The hydraulic system of the carrier must be suitable for the pulverizer. Low flow rate and pressure results in slow working speed and low crushing force respectively. Check the specification of the carrier.
- For the hydraulic pulverizer, the inner diameter of the hydraulic line must be 1" (25mm) or bigger. If the inner diameter is small inadequately, back-pressure increase and the hydraulic oil in the lines may be overheated.
- Have the bigger line for the jaw closing than the line for the jaw opening. We recommend 1-1/4" (32mm) inner diameter line for the jaw closing.

- The seamless steel tube with thickness of more than 4.5mm (schedule 80 or higher) must be used. And the hose must satisfy SAE R11~14.
- Generally speaking the hydraulic oil originally recommended for the carrier can be used for the HYUNDAI hydraulic pulverizer. However, since working with the hydraulic pulverizer will heat the oil much more than the usual excavation work, the viscosity of the oil must be checked. When the pulverizer is used continuously, the viscosity of the hydraulic oil should be 15~100 cSt at the whole operating temperature range. For more details about hydraulic oil, refer to page 36, Chapter “7.7. Hydraulic oil”
- When installing the pulverizer with no pre-filled oil in it, the pulverizer’s cylinders need a lot of oil. So you must fill the oil by the proper level in oil tank after operating the pulverizer two or three times.
- Hydraulic system must have a proper cooling system in order the temperature of the hydraulic oil not to exceed 90 °C (194 °F) which may cause damage to the pulverizer as well as the carrier. If the carrier’s oil cooler is too small either the original cooler must be replaced with a larger one or an auxiliary cooler must be installed.

● **Retrofitting from breaker piping to pulverizer piping :**

- When retrofitting the breaker piping lines to pulverizer piping lines, take the return line of the existing breaker piping lines for the jaw closing lines of the pulverizer. If the return line of the existing breaker lines is also installed for low pressure only, we recommend you to replace all the piping lines with the adequate piping lines as required above and make the lines both supply and return lines to high pressure lines. If the breaker supply line is taken for the jaw opening line, relief valve on the breaker supply line does not need to be reset. (But the setting pressure must be more than 250 bar)
- For more detailed information, refer to HYUNDAI service center.

## 5.3. Installation of hydraulic piping on the carrier

- Basic circuit for pulverizer piping

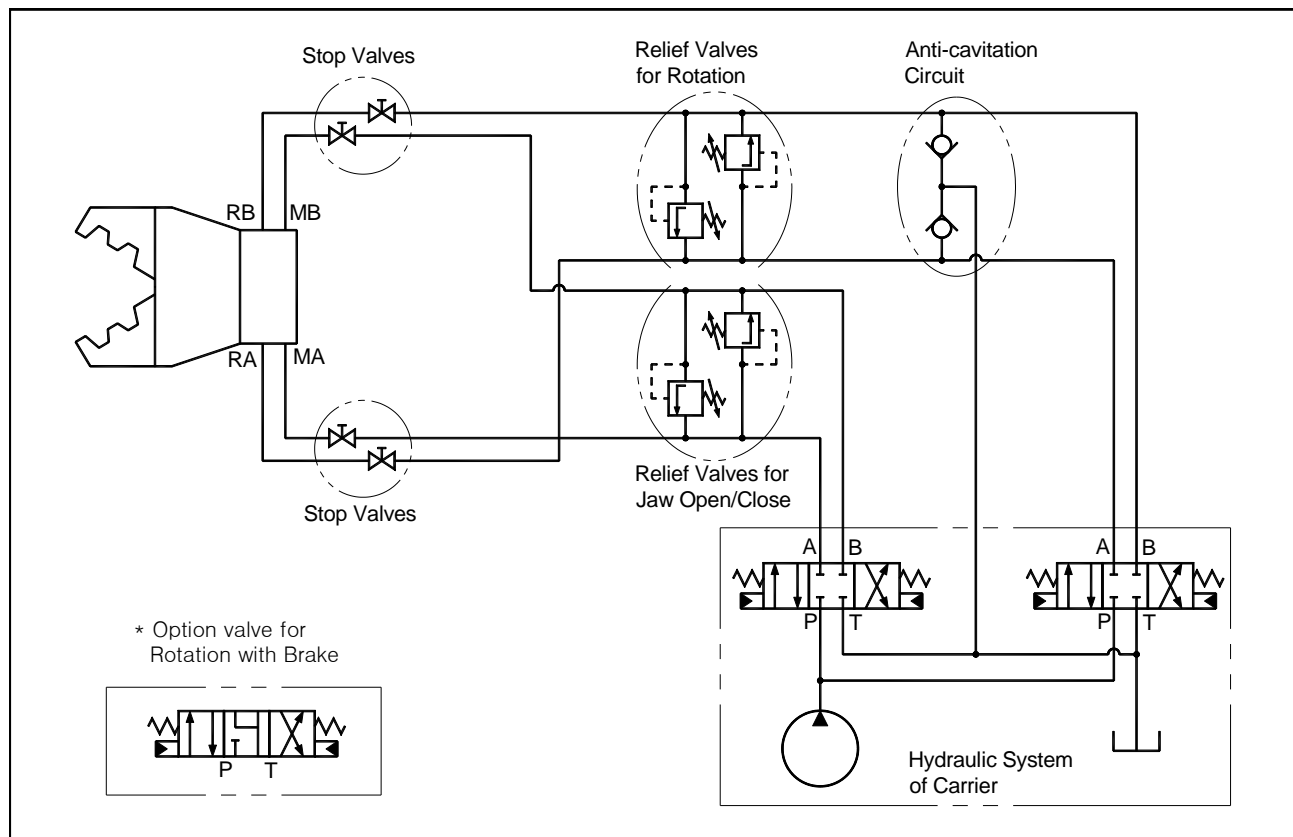


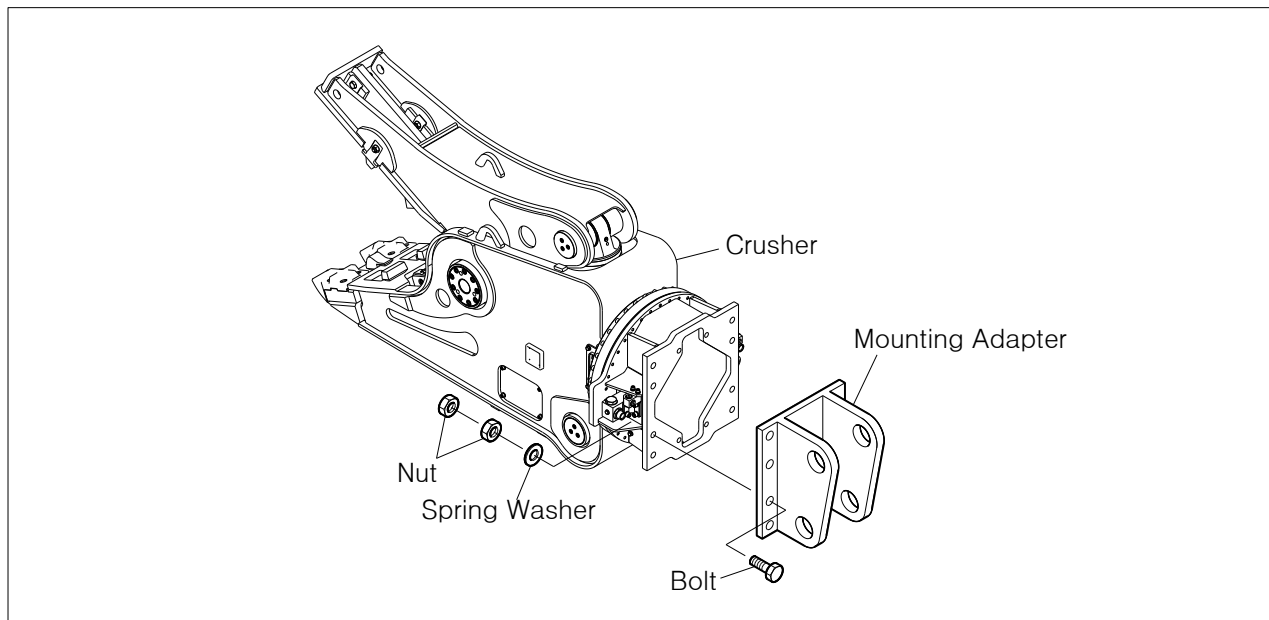
Figure 17

The following functions are required in the hydraulic circuit for the pulverizer :

- Relief valves to set the maximum pressure in jaw opening and closing operation
- Relief valves to set the max. pressure in rotation operation  
(but, it is not necessary if output flow of the rotation circuit is smaller than maximum flow rate for rotation. Refer to page 14, "3. Technical specifications")
- The circuit to prevent cavitation in the rotation line when rotation motor stops  
(The hydraulic motor may be damaged if this circuit is not installed)
- Stop-valves in the connection with the hose from the pulverizer.
- The circuit to release the residual pressure in the rotation motor when rotation motor stops.  
(If the pulverizer has a slewing brake.)
- Standard piping kit for HYUNDAI HEP series pulverizer  
By this kit, all of Jaw opening, closing and rotating of the pulverizer can be carried out with one spare valve of the carrier. For more information, ask HYUNDAI dealer.

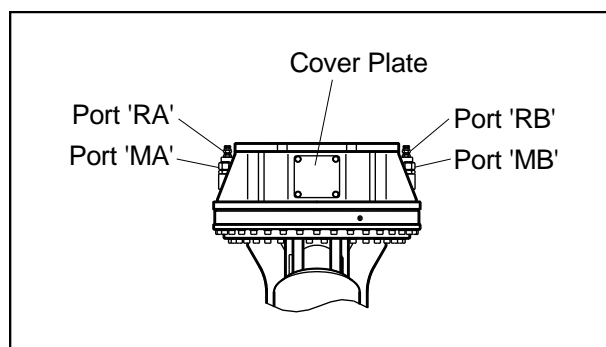
## 5.4. Mounting the hydraulic pulverizer

### ● Step 1 :



**Figure 18**

- Attach the mounting adapter to the base plate using bolts, spring washers and nuts. We recommend you to double the nut, and never neglect to use the spring washer.
- In case both pin holes of the mounting adapter are not on the same level, operating direction should be considered to decide on pin hole for each arm and link arm of the carrier. If main operation is upward, the carrier's arm needs to be connected with the higher hole of the mounting adapter, but with lower hole for the operation downward.
- Check the direction of hose connecting port. Piping line on the carrier should be in the same direction as the ports of the pulverizer. The followings are the directions of hose connecting port of the pulverizer. (Figure 19)  
 Pressurizing Port 'MA' : Jaw Closing  
 Pressurizing Port 'MB' : Jaw Opening  
 Pressurizing Port 'RA' : Counter-clockwise  
 Pressurizing Port 'RB' : Clockwise

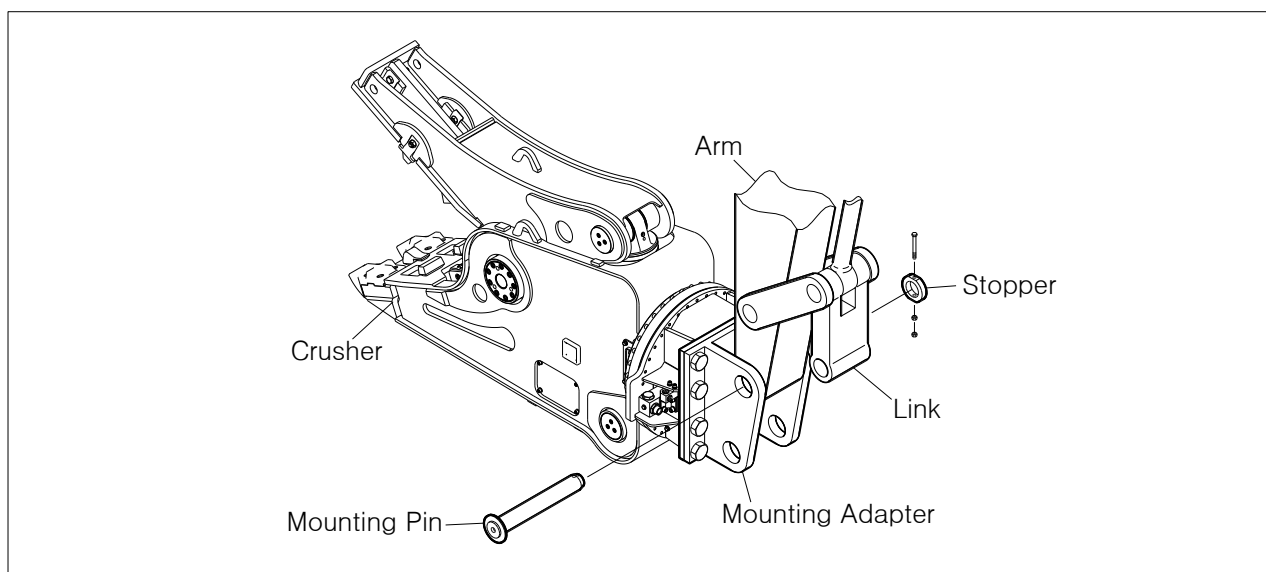


**Figure 19**

Notes : Rotating direction is looked from the driver cap in the carrier

- For the free rotating operation, block the port 'RA' and 'RB' by the screw caps supplied with the pulverizer.

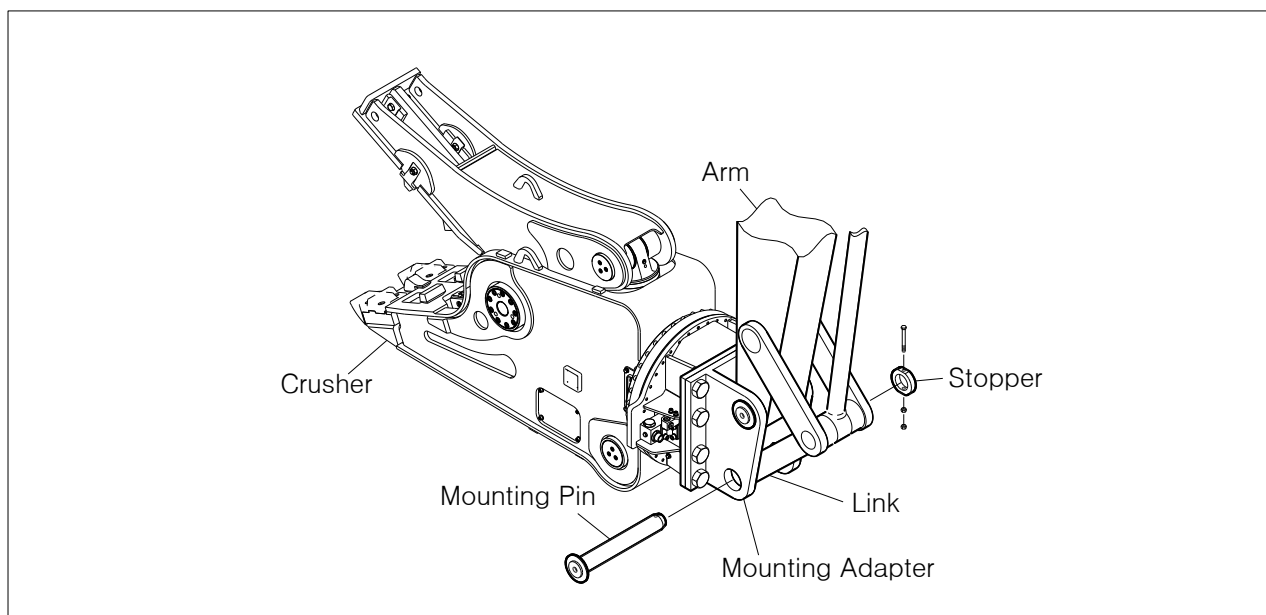
● **Step 2 :**



**Figure 20**

- Before mounting the pulverizer, please put it on the flat place to take care of the direction of the mounting adapter as the drawing.
- Set the carrier's engine speed to low idle, and move the stick of carrier slowly until its hole is aligned with that in the mounting adapter. Insert the mounting pin and assemble the stopper and its fasteners. According to mounting adapter, the stopper and fasteners may not correspond exactly to Figure 20.

● **Step 3 :**



**Figure 21**

- Move the shovel cylinder and align the hole of carrier link with that in the mounting adapter in the same way as the Step 2.



## DANGER!

When aligning the pin holes, never insert fingers into the pin holes or the inner space of the linkages. Unexpected movement of carrier may cause a severe injury.

Match the holes by only visual lining up. While moving the carrier, make sure that there is no person in the vicinity of the carrier.

Personal injury can result also from dropping the mounting pins during the installation work. Wear safety shoes to protect feet.

### ● Step 4 :

- Remove the end caps from the connection ports on the pulverizer and the stop valves on piping line, then connect the main port and rotation port each other with proper hydraulic hoses.
- The connecting threads must be undamaged and clean from sands, water, etc.
- Open the stop valves on piping line.

## 5.5. Adjustment of the rotation device

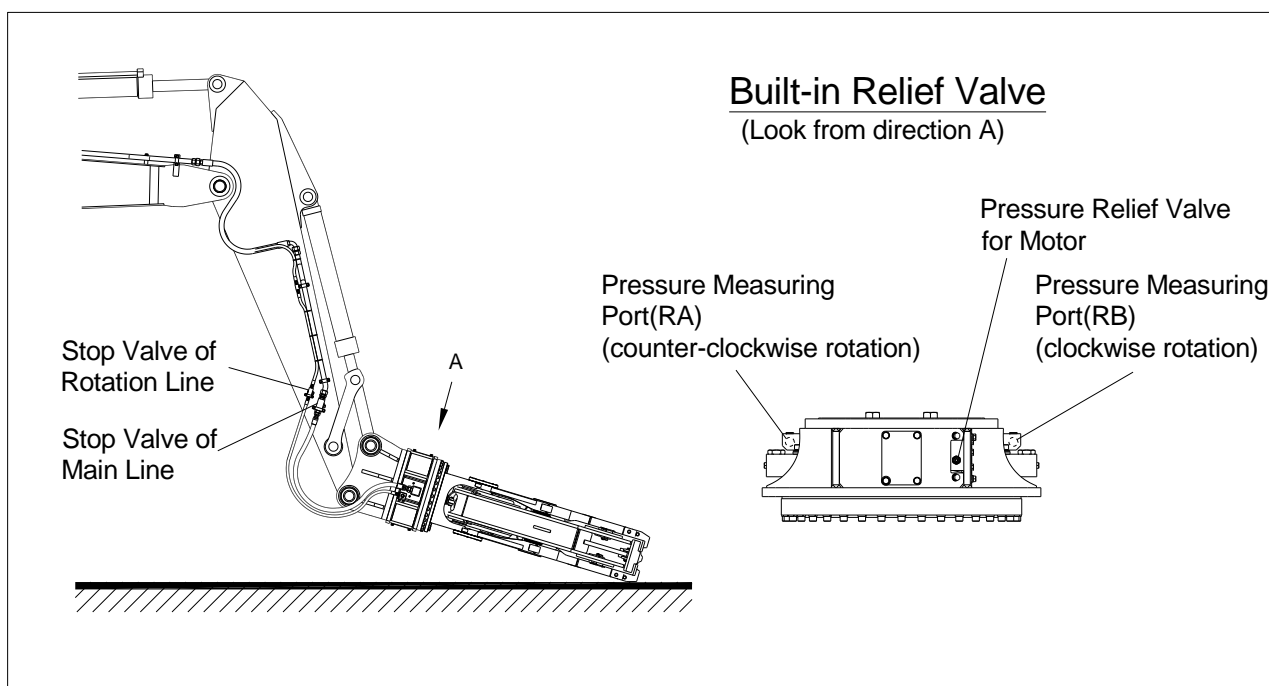


Figure 22

A motor control block, in which a relief valve to protect rotation motor is built in HYUNDAI hydraulic pulverizer HEP series. Do not reset the motor control block because it is set in the factory when delivery. If reset is required, follow the instructions below.

A motor control block will be seen as Figure 22, if you take the cover plate off from Figure 19.

### Setting of the relief valve :

- Port for pressure check is positioned in both ports 'RA' and 'RB'. Place a pressure gauge into either port, and set the minimum pressure unscrewing the pressure relief valve to the end. The pressure gauge must be for 400 bar or more.
- Place the pulverizer to the ground or the other strong structure so that the pulverizer cannot rotate.
- Increase pressure by screwing the screw adjuster until the pointer of the pressure gauge reaches the recommended pressure with the rotation actuator of the carrier switched on.  
Recommended pressure : 100 bar
- Pay attention to the max pressure since motor life will be reduced if it is used over maximum pressure.



#### **DANGER!**

Pay attention to the safety in case a worker is vicinity of working area. Never operate the pulverizer with workers in close proximity to the pulverizer.



#### **IMPORTANT!**

Do not reset the relief valve if possible. The rotation motor life will reduce if the pressure is set exceeding the allowed pressure.

### ● Setting of the throttle valves :

- Position the pulverizer for rotation, and rotate it.
- Set the rotation speed by adjusting the flow control valve in the carrier's rotation pipe.
- The proper rotation speed is 7~12 rpm and it must not exceed 15 rpm.



#### **IMPORTANT!**

It will cause personal injury, damage to the pulverizer, or inconvenience operation if the rotation speed of the pulverizer is too high. The service life of the rotation bearing will reduce if it exceeds 15 rpm.

## 6. Operating the pulverizer

---

### 6.1. Preparation for safe and correct operation

After whole installing procedure as described in the previous chapter, the pulverizer is ready to operate.

However, before starting up the pulverizer, please make sure the followings :

- mechanical connection between the pulverizer and the carrier
- locking status of the mounting pins
- hydraulic connections between the pulverizer and the carrier
- exact setting of the relief pressure
- no oil leaks from the hydraulic connections and any parts of the pulverizer
- no defective or loosened parts of the pulverizer
- cracks, wear, loss, etc.

Check the followings moving the pulverizer :

- corresponding the jaw movements and the rotating direction with the appropriate actuating switches in the carrier's cab
- smooth opening and closing of the jaws
- smooth rotating of the pulverizer
- no abnormal sound and no vibration during the operation



#### **WARNING!**

Read carefully and follow all safety regulations concerned with the preparation for safe operation. Refer to page 7, "1.2. Preparation for safe operation".



## 6.2. Greasing

Apply grease to every grease nipple – marked with the “Greasing Port” label – at the joint pins and slewing bearing of the pulverizer using recommended greases.

- Recommended greasing Interval : Every 2 hours
- 4 ~ 5 strokes from a grease gun to each greasing nipples are sufficient in each case
- Adapt greasing interval and amount of grease to working conditions
- Insufficient greasing may cause abnormal wear of the joint pin or slewing bearing
- Grease with the following properties are recommended :
  - No dropping point (or very high, over 250 °C / 480 °F)
  - Max. working temperature over 150 °C / 300 °F
  - Min. working temperature under lowest ambient temperature
  - Additives : molybdenum disulphide (MoS<sub>2</sub>), graphite or equivalent
  - Grade (thickness) NLGI 0~2
  - Water resistant
- Recommended grease

Manufacturer	Grease
SHELL	Extrema MDS
ESSO	EOL 232
WYNNS	GS80
KRUBBER	Unimoly GB2
TEBO	Geargrease MDS

## 6.3. Operation



### WARNING!

Read carefully and follow all safety regulations concerned with safe operation. Refer to page 8, "1.3. Safety information for operating the pulverizer".

#### ● Operating temperature :

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

If the ambient temperature is lower than  $-20^{\circ}\text{C}$  ( $-4^{\circ}\text{F}$ ), the pulverizer have to 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  $+90^{\circ}\text{C}$  ( $+194^{\circ}\text{F}$ ), 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  $+80^{\circ}\text{C}$  ( $+175^{\circ}\text{F}$ ). An auxiliary oil cooler must be fitted if needed.

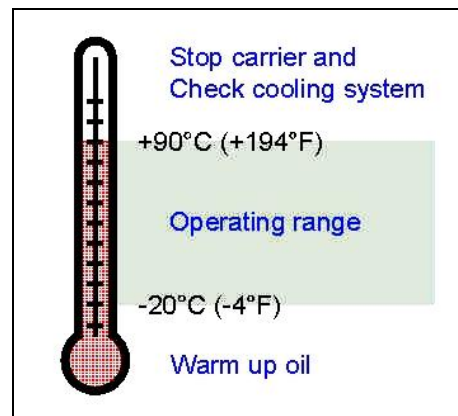


Figure 23

The oil temperature during operating the pulverizer depends on ambient temperature condition, on cooling capacity of carrier's hydraulic system and on working duty for the pulverizer. Use the hydraulic oils of high viscosity in high oil temperature.



### IMPORTANT!

If the oil temperature exceeds  $+90^{\circ}\text{C}$  ( $+194^{\circ}\text{F}$ ), 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 pulverizer.

#### ● Correct working method :



### WARNING!

Stop operating immediately if anyone moves into the danger area, i.e. within a radius of at least 20 meters around the pulverizer. Must be observant of other workers, bystanders and other equipments in the danger area.



### 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!

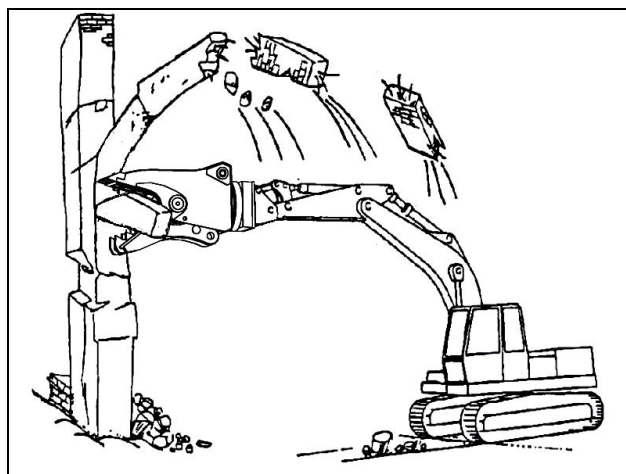
Improper operation of the pulverizer could result in serious injury or death. Never operate the pulverizer unless you are properly trained.



## **DANGER!**

### ***DO CRUSHING FROM THE TOP DOWNWARDS.***

Always be careful of falling down of broken elements. When crushing columns, chimneys and brick wall, the crushing operation has been done from the top to the bottom. In case of the large construction of heavy concrete, the supporting elements must always be broken later. If not, there is a danger they may collapse.



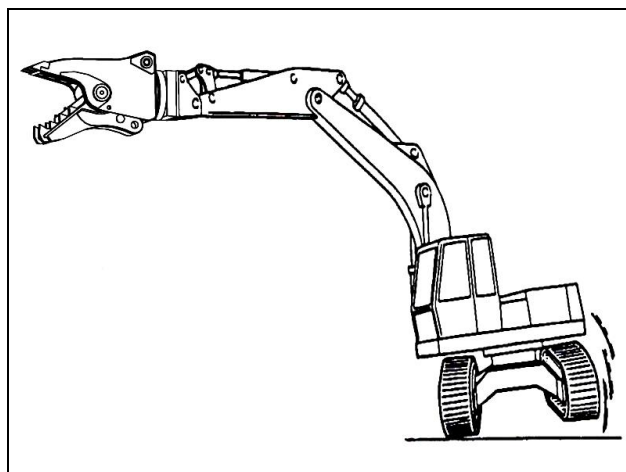
**Figure 24**



## **WARNING!**

### ***DO NOT OPERATE TO EITHER SIDE OF THE CARRIER WITH THE BOOM AND ARM EXTENDED.***

This can make a danger of the carrier fall over.



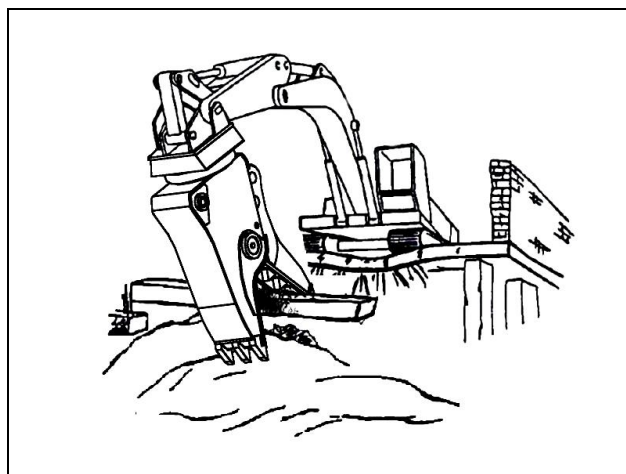
**Figure 25**



## **DANGER!**

### ***MAKE SURE THE STRENGTH OF STRUCTURE WHICH SUPPORT THE CARRIER.***

Check the strength of roofs or ceilings in advance is sufficient to maintain the weight of the carrier. If any doubt exist about the strength, do not operate on it.



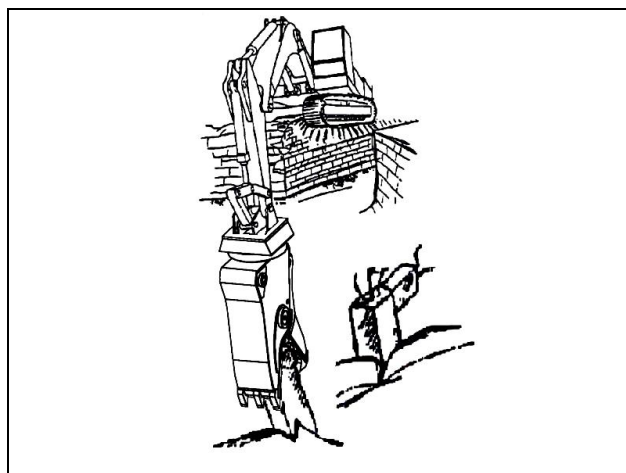
**Figure 26**



**DANGER!**

***ENSURE POSITION OF THE CARRIER.***

Do place the carrier on the even flat ground during the operation. If not, there is a danger the carrier may fall down and turn upside.



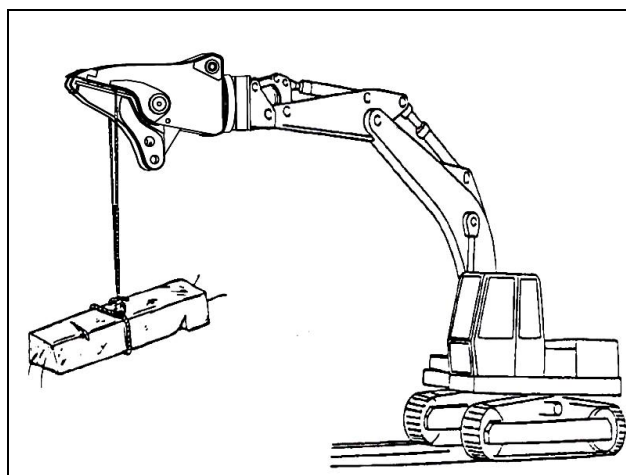
**Figure 27**



**WARNING!  
IMPORTANT!**

***DO NOT USE FOR TRANSPORT PURPOSES.***

The hydraulic pulverizer is not intended to hoist or tow any object. To do so can bring out the risk of unexpected turning upside-down and the damage in the pulverizer.



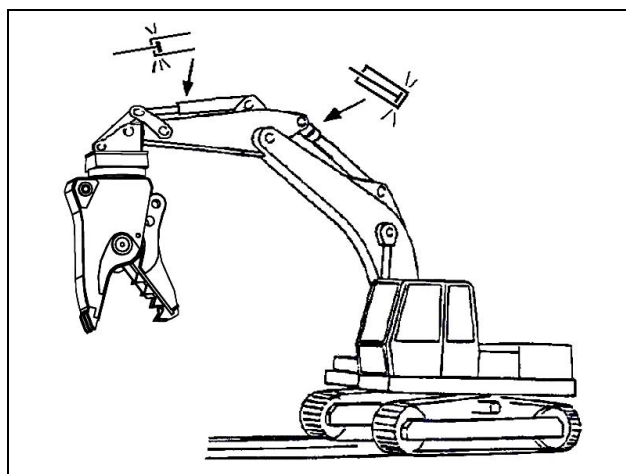
**Figure 28**



**IMPORTANT!**

***DO NOT OPERATE WITH THE CARRIER'S  
HYDRAULIC CYLINDERS FULLY  
EXTENDED OR RETRACTED.***

Make sure that the piston of the hydraulic cylinders of the carrier are at least 100 mm away from the stroke end before operating pulverizer. Failure to do so will cause damage to the carrier's hydraulic cylinders.



**Figure 29**



### IMPORTANT!

#### ***DO NOT SUPPORT THE CARRIER WITH THE PULVERIZER.***

Never support the carrier's weight with the pulverizer -i.e. jack-up with pulverizer- to rotate the carrier's undercarriage. This will cause serious damage to the pulverizer.

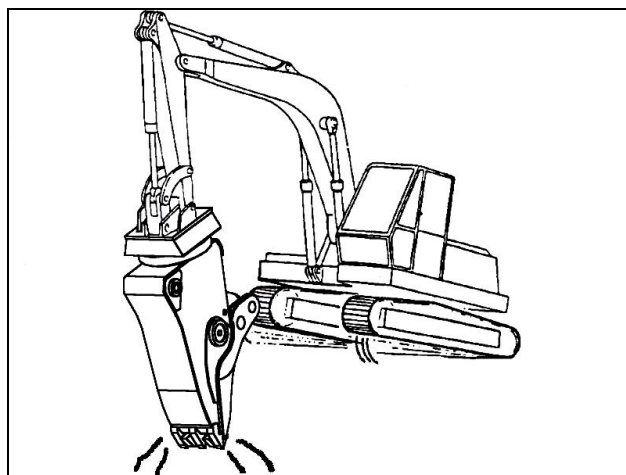


Figure 30



### IMPORTANT!

#### ***DO NOT MOVE AN OBJECT WITH THE PULVERIZER.***

Never use the pulverizer to move any object such as broken pieces. It will cause damage to the pulverizer.

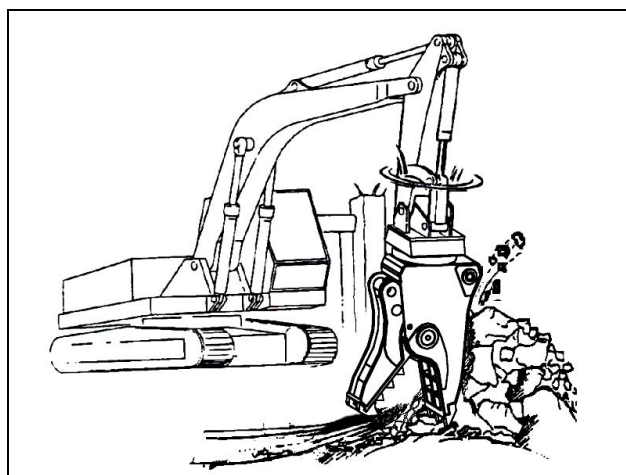


Figure 31



### IMPORTANT!

#### ***ADVANCE THE WORKING POSITION IN SMALL DISTANCE.***

Reposition the pulverizer at a different point of attack in small distance. Advance the crushing point from the narrow place to wider one.

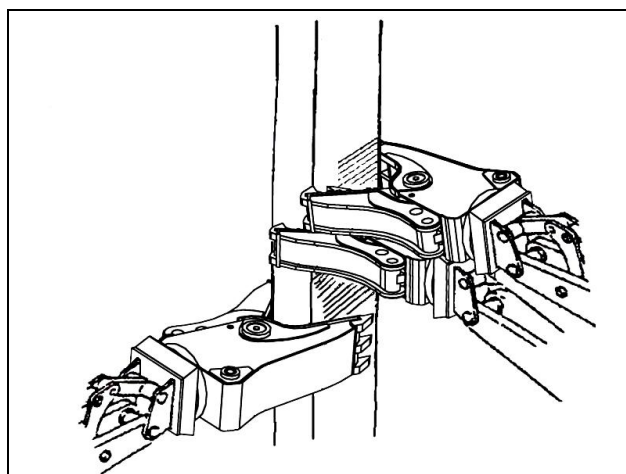


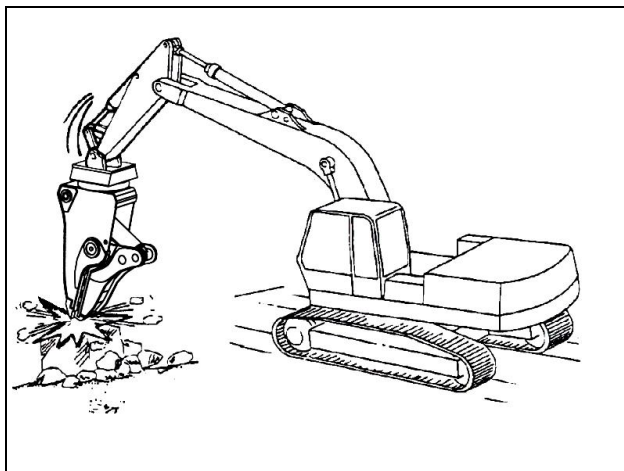
Figure 32



**IMPORTANT!**

***NEVER USE AS A HAMMER.***

Never attempt to use the pulverizer as a hammer or ramming tool. This will lead to the serious damage to the pulverizer.



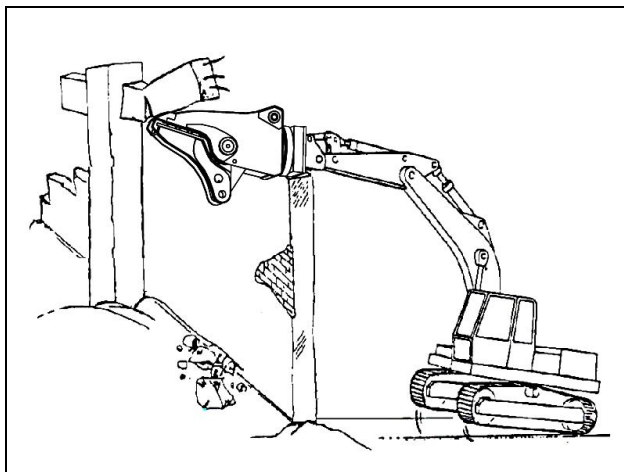
**Figure 33**



**IMPORTANT!**

***NEVER USE AS A LEVER.***

Never attempt to use the pulverizer as a lever or support. It will cause serious damage to the pulverizer.



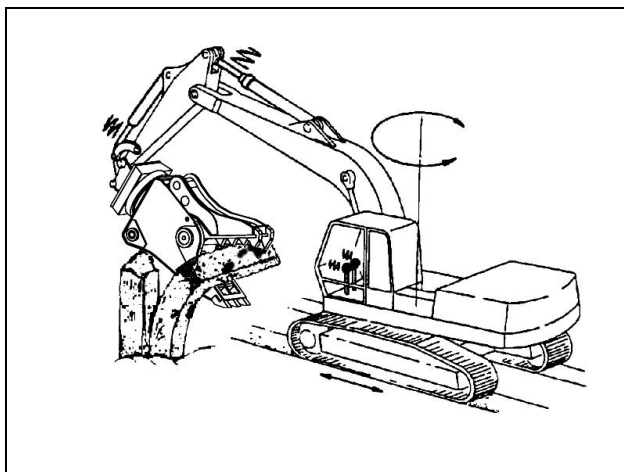
**Figure 34**



**IMPORTANT!**

***DO NOT MOVE THE CARRIER WHILE CRUSHING IS IN PROGRESS***

This will cause serious damage to the pulverizer.



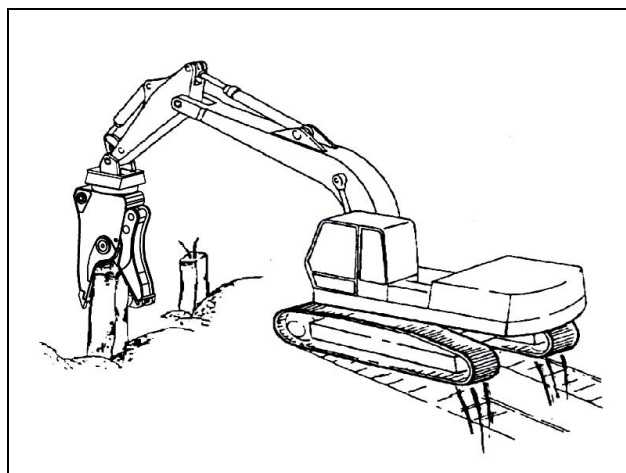
**Figure 35**



**IMPORTANT!**

**NEVER PULL AT HEAVY ELEMENTS**

Do not pull at heavy columns, girders or foundation with the pulverizer. This will cause serious damage both the pulverizer and the mounting adapter.



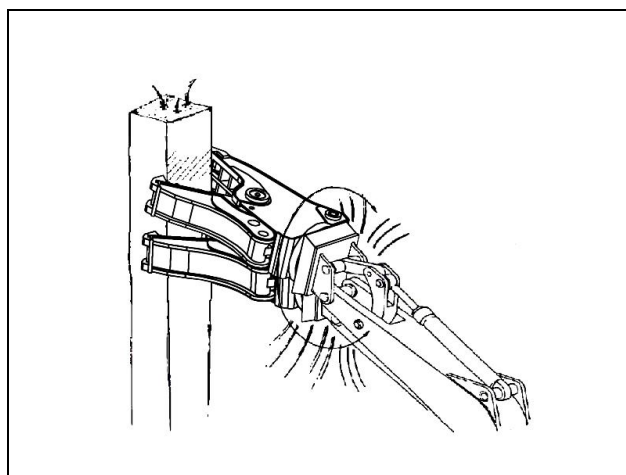
**Figure 36**



**IMPORTANT!**

**DO NOT ROTATE THE PULVERIZER WHILE CRUSHING IS IN PROGRESS**

This will cause damage to the pulverizer and carrier's arm.



**Figure 37**

*\* Please consult HYUNDAI dealer for the operation in special applications such as :*

- underwater use
- cutting high temperature object
- biting off ladle slag in iron works

## **6.4. Steel cutting**

The HYUNDAI hydraulic pulverizer, HEP series is designed to be used for the demolition of concrete structure containing reinforcement rebar and for the cutting small steel profiles.

Please do not cut large steel fabrications such as "I" and "H" beam, rails and the materials made of hardened steel. This may cause serious damage to the pulverizer.



## 7. Inspection and Maintenance

---

### 7.1. General information

Routine inspections and maintenance work must be carried out to keep the hydraulic pulverizer in the best operating condition. The following sections list the inspection and maintenance intervals, check points over the pulverizer and carrier.



#### **WARNING!**

Read carefully and follow all safety regulations concerned with maintenance of the pulverizer. Refer to page 9, "1.4. Safety information for maintenance of the pulverizer".

Whenever maintenance work is carried out, keep always following instructions.

1. Park the carrier on a firm and flat ground
2. Close the jaws of the pulverizer completely.
3. Lower the pulverizer to ground and put the pulverizer on a rigid and clean support.
4. Lower the engine speed to the lowest idle position.
5. Wait for at least 10 minutes to allow the residual pressure in the pulverizer be released.
6. Turn the stop valves to "OFF" position



#### **DANGER!**

Never put your body into the open jaws. ***Risk of death or serious injury!***

Followings are the basic inspections to be checked always :

- ✓ Check, whenever inspecting, if there is a crack at the welded part of the pulverizer (visual inspection).
- ✓ Check, whenever inspecting, the wear and rounding of the jaws, cutter blades and teeth. Change worn blades and teeth in good time.
- ✓ Check, whenever inspecting, if there are oil leaks at the hydraulic components or the hydraulic connections of the pulverizer.
- ✓ Check, whenever inspecting, if all fasteners such as bolts, nuts and snap-rings come loose, and retighten them to the prescribed tightening torque, if necessary. Broken parts must be replaced immediately. Refer to page 35, "7.5. Tightening torques" for detail instructions.
- ✓ Check that the blade clearances. The blade clearance should not exceed 2 mm.  
For steel cutting, the maximum blade clearance is 1 mm. Refer to page 34, "7.3. Changing the cutter blades" for detail information.  
Adjust the clearance of cutter blade according to the instructions, if necessary.

In order to prevent possible damages to the pulverizer from unallowed maintenance work, please keep following instructions :



- The hydraulic components of the pulverizer - such as hydraulic cylinders, speed-up valve, rotation motor, etc. - are precision made hydraulic elements. These parts are strongly recommended to maintain by authorized HYUNDAI service.
- Absolute cleanliness and great care are basic and essential matters in handling of any hydraulic components. Dirt is the worst enemy in hydraulic system.
- Sealing components such as packings, O-rings and plugs in the hydraulic system should be oiled with very clean oil before assembly.



### **DANGER!**

Never attempt to disassemble the hydraulic cylinder and the speed-up valve of the pulverizer. High pressure can be maintained in these components long after the system has been shut down. This residual pressure can cause hydraulic oil or parts such as plugs to shoot out at high speed if the pressure is not released completely.

Please consult HYUNDAI service for the maintenance of these components.

## **7.2. Maintenance intervals**

### ● **Every 2 hours**

- Grease the joint pins.

### ● **Daily**

- Retighten loose components. Especially :
  - Bolts at the rotation bearing
  - Bolts in the cutter blades
 (The bolts and lock-washers for above parts must only be replaced by HYUNDAI genuine parts.)
- Check the wear or breakage of the cutter blades.
- Check if the hydraulic connection become loose.

### ● **Weekly**

- Check the wear of the jaws and pulverizer body.
- Check carefully if there is a crack in the welded part of the pulverizer.
- Check the hydraulic components of the carrier.
- Check abnormal sound or vibration during the jaw movements and rotation of the pulverizer.

### ● **Every 1000 hours, or yearly**

Contact HYUNDAI service or dealer for yearly maintenance. Yearly service is recommended to be done by authorized HYUNDAI service after 1000 operating hours.



### **IMPORTANT!**

Neglecting the yearly service can cause severe damage to the pulverizer.

The maintenance intervals may need to be shortened depending on the operating conditions.

### 7.3. Changing the cutter blades

Change the cutter blades if there are the wear, breakage or any damage at the edge of cutter blade during the operation. When replacing the cutter blades, please observe the following instructions :

- Always wear the eye protective glasses and use a plastic or copper hammer when removing and inserting the cutter blades. Because the cutter blades are made of very hard material, the metal chips may fly off to eye and cause serious injury if they are struck with a steel hammer.
- Use only HYUNDAI genuine fixing bolts and lock-washers. Ensure that they are tightened correctly to the prescribed tightening torque.
- If the condition of the bolts and lock-washers is not good, always use new bolts and lock-washers when fitting new cutter blades.
- Make sure there is no particle at the contact surface between the jaw and blades. Cutter blades must contact the jaw completely.

### 7.4. Adjustment of the cutter blade clearance

Proper adjustment of the blade clearance keeps the pulverizer providing maximum cutting performance, and it will prevent materials from jamming into the clearance between the cutter blades. This will consequently protect the parts of jaw from serious damage.

Check the blade clearance :

- Close the jaws of the pulverizer.
- Measure cutter blade clearance using a feeler gauge
- If clearance is greater than the specified maximum clearance, adjust the blade clearance according to the following procedures.
- Permissible maximum blade clearance is : **2 mm**
- Blade clearance of **0.2 ~ 0.5 mm** is recommended to be achieved after adjustment.



#### **DANGER!**

Never put your hand into the open jaws. ***Risk of death or serious injury!***



#### **IMPORTANT!**

Adjusting the blade clearance under the specified value - i.e. overlapped - cause damage to the blades. Always keep the blades from contacting each other.

## 7.5. Tightening torques

Thread Spec.	Head Size	Tightening Torque [N•m]	Comments
M8 x1.25	13 Hex head	35 ~ 40	
M8 x1.25	6 Hex socket	35 ~ 40	
M10 x 1.5	17 Hex head	30 ~ 40	U bolt
M10 x 1.5	17 Hex head	70 ~ 80	
M10 x 1.5	8 Hex socket	70 ~ 80	
M12 x 1.75	19 Hex head	120 ~ 130	
M12 x 1.75	10 Hex socket	120 ~ 130	
M14 x 2	22 Hex head	190 ~ 210	
M14 x 2	12 Hex socket	190 ~ 210	
M16 x 2	24 Hex head	300 ~ 330	
M16 x 2	14 Hex socket	300 ~ 330	
M20 x 2.5	30 Hex head	550 ~ 650	
M20 x 2.5	17 Hex socket	550 ~ 650	
M24 x 3.0	19 Hex socket	960 ~ 1050	
M30 x 3.5	46 Hex head	1950 ~ 2350	
G1/4	6 Hex socket	20 ~ 25	Plug
G1/4	19 Hex head	40 ~ 45	Adapter
G1/4	19 Hex head	36 ~ 40	Hoses
G3/8	22 Hex head	50 ~ 55	Adapter
G3/8	22 Hex head	45 ~ 50	Hoses
G1/2	27 Hex head	95 ~ 105	Adapter
G1/2	27 Hex head	85 ~ 95	Hoses
G3/4	12 Hex socket	150 ~ 180	Plug
G3/4	36 Hex head	180 ~ 195	Adapter
G3/4	36 Hex head	160 ~ 175	Hoses
G1-1/2	46 Hex head	400 ~ 430	Plug

## 7.6. Replacing the teeth

Check all bolts regularly to ensure they have not come loose.

Worn teeth must be replaced in good time. In many cases, the damaged bolt can only be unscrewed by mechanically damaging the nut or the bolt.



### WARNING!

Missing teeth must be replaced immediately. Working without teeth causes serious damage to the tooth support, jaw and the body.

## 7.7. Welding guide for the jaws and teeth

If there are serious wear at the hard-faced area and the teeth of the jaw, rewelding work can be carried out by the way of welding instruction as follows. However, in order to achieve the best quality, working by a qualified welding expert is recommended.

When hard-facing the jaw, it is important to ensure that there is still a buffer layer on the base metal of the jaw. If this is not the case, the buffer layer should first be welded at target area before hard-facing the jaw.

Before welding, any fitted components such as cutter blades must be removed from the jaws.

Followings are recommended welding instructions for the best quality.

- **Welding buffer layers prior to hard-facing**

Welding filler : AWS E7016, DIN E5154B(R)10, KS E4316

Arc welding by electrode operation. Welding after installation of windscreen

- **Hard-facing on the jaw**

Dry electrode at 350~400 °C for 1 hour before welding

Preheating temperature : 150 ~ 180°C

Welding filler : DIN E2-55, KS DF2B-600-B

Interpass temperature : max. 150 °C

Same as the buffer layer. Hard-facing must only be applied on an existing bufer layer.

- **Welding teeth**

Preheating temperature : 150 ~ 180°C

Welding filler : Croni 29/9 AWS A5.4 E312-16, DIN8556

The tooth may take the risk of crack during the welding if not preheated properly.

For detail dimensions for rewelding work, refer to "Workshop manual" of HEP series or consult HYUNDAI service.

## 7.8. Hydraulic oil

Generally speaking the hydraulic oil originally intended for the carrier can be also used in the hydraulic pulverizer. However, since working with the hydraulic pulverizer will heat the oil much more than the usual excavation work, the viscosity of the oil should be selected properly.

When the pulverizer is used continuously, the temperature of the hydraulic oil normalizes at a certain level depending on working conditions and on the carrier's hydraulic system. At this temperature, the viscosity of the hydraulic oil should be 15 ~ 100 cSt.

The hydraulic pulverizer should not be started if the viscosity of the hydraulic oil is above 1000 cSt or operated when the viscosity of hydraulic oil is below 15 cSt.

Following table shows hydraulic oils recommended for pulverizer use.

Manufacturer	Hydraulic Oil
TOTAL	Total Equivis ZS46
SHELL	Tellus Oil T32, T46
MOBIL	Mobil DTE 13M, 16, 24
CALTEX	Caltex HD Z46
ESSO	Univis N32, N46
TEXACO	Rando Oil 32S, 46

In summer and hotter climates, oils of viscosity class HLP 68 (68 cSt at 40°C) or higher should be used.

Using the oil with higher viscosity (too thick) may cause :

- Stiff operation of the speed-up valve
- Risk of cavitation in the pumps and hydraulic motor
- Bypassing the filter, impurities in oil not filtered

Using the oil with lower viscosity (too thin) may cause :

- Efficiency losses (internal leaks)
- Damage to seals and oil leaks
- Accelerated wear in moving parts due to insufficient lubrication

### ● Special oils

In some cases special oils (e.g. biological oils and non-inflammable oils) can be used with HYUNDAI hydraulic pulverizer. Observe following aspects when considering the use of special oils:

- The viscosity range in the special oil must be in the given range (15 ~ 1000 cSt at any ambient temperature)
- The lubrication properties must be good enough
- The corrosion resistance properties must be good enough

Contact oil manufacturer or HYUNDAI dealer for more information about special oils.

### ● Hydraulic oil purity

No separate filter is required when the hydraulic pulverizer is installed in the carrier. The hydraulic oil filter of the carrier will clean the oil flowing through the pulverizer. The purpose of oil filter is to remove impurities from the hydraulic oil since they cause accelerated component wear, blockages and even seizure. Impurities also cause the oil to heat and deteriorate. Air and water are also impurities in oil. Not all impurities can be seen with the naked eye.

### ● Oil filter

In hydraulic pulverizer work, the carrier's oil filter must fulfill the following specifications:

- The oil filter must allow maximum particle size of 25microns (0.025mm).
- The oil filter material must be fiber cloth or very fine metallic mesh to withstand pressure fluctuations.
- The oil filter must have a volume flow capacity of at least twice the pulverizer's maximum flow

In general, oil companies guarantee new oil to have a particle count of 40 microns maximum. When adding oil to existing tank the oil must be filtered.

The impurities in the hydraulic oil can cause damages to the pulverizer and carrier as follows :

- The working life of the hydraulic elements is significantly shortened
- Valves do not function properly due to spool stick
- Wear of cylinder rod and seals
- Shortened working life and reduced efficiency of hydraulic oil (overheats of oil, deteriorates of oil quality, electro-chemical changes in hydraulic oil)

We recommend to replace the hydraulic oil and oil filters at the intervals shown in the following table, which is based on the pulverizer operating time.

Hydraulic Oil	Every 1000 hours
Oil filters	Every 500 hours

### ● Oil cooling

The maximum permitted hydraulic oil temperature in continuous pulverizer operation is 90 °C (194 °F). Therefore, a reliable hydraulic oil thermometer is necessary. If there is no thermometer on the carrier one must be installed. The temperature of hydraulic oil depends on ambient conditions, the cooling capacity of the carrier and on the oil flow through the pulverizer.

When the hydraulic pulverizer is used continuously it is necessary to have cooling system with extra cooling capacity compared with normal excavation work. The oil cooler of the carrier must have a oil flow capacity of at least twice the pulverizer's maximum oil flow. The cooler must stand the dynamic pressure of 20 bar (290 psi).

If the carrier's oil cooler is too small either the original cooler must be replaced with a larger one or an auxiliary cooler must be installed. For this, please contact your carrier's dealer or HYUNDAI dealer.

## 8. Dismounting and Storing the pulverizer

---

Dismount and store the pulverizer according to following instructions :

- When dismounting the hydraulic pulverizer from the carrier, put the pulverizer on the firm and flat ground after check if there is no obstacle within the swing area of the carrier.
- Also the jaw of the pulverizer must be kept completely close.
- Take care of the safety against the pulverizer after dismounting so that it can't fall over.
- After turn stop valves to "OFF" position, disconnect hydraulic hoses from the stop valves.
- Apply end caps and plugs to hoses and stop valves to prevent contamination.
- The hydraulic pulverizer recommended to be deposited for storage on a wooden support of sufficient size and strength.
- Also the jaw of the pulverizer must be kept completely close.
- Collect any oil which runs out when the hydraulic hoses are disconnected and dispose of it correctly.

## 9. Trouble shooting

Trouble	Cause	Remedy
Pulverizer does not run	The stop valves in the pipe line is locked	Open the stop valves
	The hydraulic oil in oil tank is too small	Check the oil level in oil tank and fill the oil properly
	Out of actuating switch	Replace solenoid of the switch
The operation of jaw is not smooth or doesn't run suddenly.	Speed-up valve defective	Contact HYUNDAI service
The crushing power is weak	Operating pressure is too low	Correct operating pressure or contact HYUNDAI service
The steels doesn't be cut very well	Cutter blade is worn or broken	If necessary reset or replace cutter blade
	Cutter blade clearance is too big	Adjust cutter blade clearance.
Pulverizer can not rotated or abnormal noise during rotation	Hydraulic motor, pinion or slewing bearing are defective	Contact HYUNDAI service
Operating temperature is too high	Pressure relief valve is defective	Replace the pressure relief valve
	Oil level in tank too low	Fill hydraulic oil
	Cooling capacity of the carrier's oil cooler is too small	Contact HYUNDAI service
Oil leaks from the hydraulic connections	Connecting adapter is loose	Tighten adapter
Abnormal noise at joint pin	Insufficient greasing	Apply grease

- Consult the other troubles and more details with HYUNDAI dealers or HYUNDAI service center.



