

# OPERATION AND MAINTENANCE MANUAL

(The contents given in this manual are not binding and are subject to change without notice. The details given are guidelines and are for illustration purpose only.)

Edition : XL/RV-2/18-19/1000

HYVA INDIA PVT. LTD.  
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## FOREWORD

Dear Customer,

This manual outlines the maintenance and operating practices of Hyva Tipping System fitted on your vehicle. The purpose of this manual is to assist you in maintaining the system and get maximum life out of components. This is also to educate you in good operating practices and safety of equipment at all times. Overall it helps you to obtain better performance at optimum operating costs.

All service and maintenance tasks are to be carried out at the specified intervals.

This manual briefs about the system and components for your understanding and knowledge. Fault diagnosis given in this manual helps you in diagnosing the problem in a systematic manner.

Some of the items/accessories/features given in this book may not be fitted on your vehicle, but they are applicable to other versions.

Hyva India Pvt. Limited  
Mumbai

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# SAFETY

## IMPORTANT SAFETY NOTICE

Proper service and repair is extremely important for the safe operation of your machine. The service and repair technique recommended by HYVA and described in this manual are both effective and safe methods of operation. Some of these operations require the use of tools specially designed by HYVA for the purpose.

## SAFETY

### GENERAL PRECAUTIONS

Mistakes in operation are extremely dangerous. Read the Operation and Maintenance Manual carefully BEFORE operating the machine.

- 1 Before carrying out any greasing or repairs, read all the precautions given on the decals which are fixed to the machine.
- 2 When carrying out any operation, always wear safety shoes and helmet. Do not wear loose work clothes, or clothes with buttons missing.
  - Always wear safety glasses when hitting parts with a hammer.
  - Always wear safety glasses when grinding parts with a grinder, etc.
- 3 If welding repairs are needed, always have a trained, experienced welder to carry

out the work. When carrying out welding work, always wear welding gloves, apron, glasses, cap and other clothes suited for welding work.

- 4 When carrying out any operation with two or more workers, always agree on the operating procedure before starting. Always inform your fellow workers before starting any step of the operation. Before starting work, hang "UNDER REPAIR" signs on the controls in the operator's compartment.
- 5 Keep all tools in good condition and learn the correct way to use them.
- 6 Decide a place in the repair workshop to keep tools and removed parts. Always keep the tools and parts in their correct places. Always keep the work area clean and make sure that there is no dirt or oil on the floor.

### PREPARATIONS FOR WORK

- 7 Before adding oil or making any repairs, park the machine on hard, level ground, and block the wheels to prevent the machine from moving.
- 8 Before starting work, rest dump body on prop and hang

## SAFETY

- “UNDER REPAIR” board on them.
- 9 When disassembling or assembling, support the machine with blocks, jacks or stands before starting work.
- 10 Remove all mud and oil from the steps or other places used to get on and off the machine. Always use the handrails, ladders or steps when getting on or off the machine. Never jump on or off the machine. If it is impossible to use the handrails, ladders or steps, use a stand to provide safe footing.
- 13 Before starting work, remove the leads from the battery. Always remove the lead from the negative (-) terminal first.
- 14 When raising heavy components, use a hoist or crane.
- Check that the wire rope, chains and hooks are free from damage.
- Always use lifting equipment which has ample capacity.
- Install the lifting equipment at the correct places. Use a hoist or crane and operate slowly to prevent the component from hitting any other part. Do not work with any part still raised by the hoist or crane.

### PRECAUTIONS DURING WORK

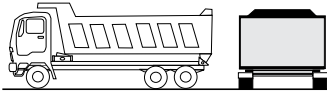
- 11 When removing the oil filler cap, drain plug or hydraulic pressure measuring plugs, loosen them slowly to prevent the oil from spurting out.
- Before disconnecting or removing components of the oil and air circuit, first release the pressure completely from the circuit.
- 12 The oil in the circuit is hot when the engine is stopped, so be careful not to get burnt.
- Wait for the oil to cool before carrying out any work on the oil circuit.
- 15 When removing covers which are under internal pressure or under pressure from a spring, always leave two bolts in position on opposite sides. Slowly release the pressure, then slowly loosen the bolts to remove.
- 16 When removing components, be careful not to break or damage the wiring. Damaged wiring may cause electrical fires.
- 17 When removing piping, stop the oil from spilling out. If any oil drips on the floor, wipe it up immediately. Fuel or oil on the floor can cause you to slip, or can even start fires.

## SAFETY

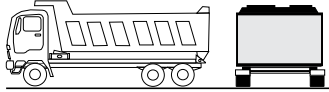
- 18 As a general rule, do not use gasoline to wash parts. In particular, use only the minimum of gasoline when washing electrical parts.
- 19 Be sure to assemble all parts again in their original places.  
Replace any damaged parts with new parts.
  - When installing hoses and wires, be sure that they will not be damaged by contact with other parts when the machine is being operated.
- 20 When installing high pressure hoses, make sure that they are not twisted. Damaged tubes are dangerous, so be extremely careful when installing tubes for high pressure circuits. Also, check that connecting parts are correctly installed.
- 21 When assembling or installing parts, always use the specified tightening torques. When installing protective parts such as guards, or parts which vibrate violently or rotate at high speed, be particularly careful to check that they are installed correctly.
- 22 When aligning two holes, never insert your fingers or hand. Be careful not to get your fingers caught in a hole.
- 23 When measuring hydraulic pressure, check that the measuring tool is correctly assembled before taking any measurements.
- 24 While carrying out welding on tipper, earthing should be done nearer to the welding spot. Earthing should not be done through cylinder and other hydraulic components, to avoid damage due to sparking.
- 25 While carrying out welding on head board / load body, the tipping cylinder and other hydraulic components should be covered with fire-resistant cover so that welding spatters will not damage stages and seals.

# SAFE PRACTICES

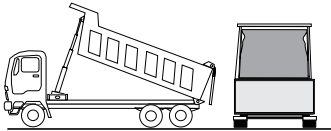
## Do's



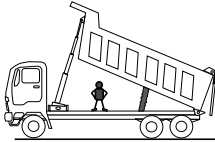
OVER  
LOAD



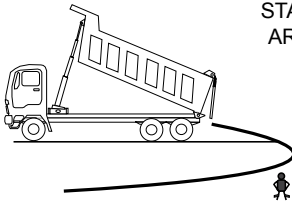
LOAD  
UNEVEN



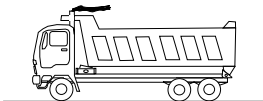
TIP ON  
UNEVEN  
GROUND



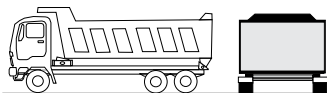
STAY UNDER AN  
UNSUPPORTED  
BODY



STAY IN THE WORKING  
AREA OF THE TIPPER

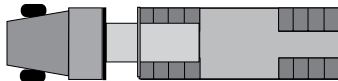


DRIVE WITH RAISED  
BODY

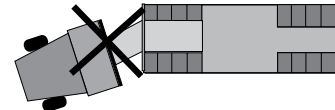
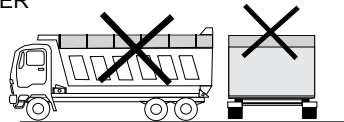
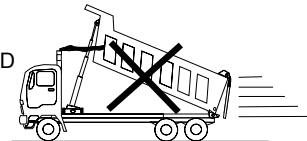
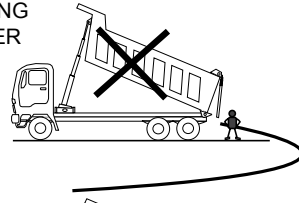
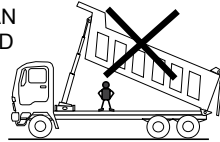
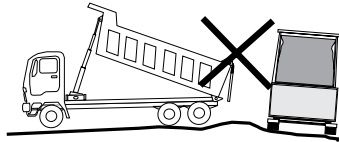
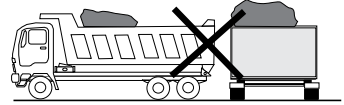
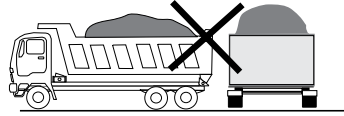


EXTENDING TIPPER  
BODY HEIGHT

TIP WITH TRAILER IN AN ANGLE  
TO THE TRUCK



## Don'ts





## PERIODIC CHECKLIST

### DAILY CHECKS POINTS (BEFORE STARTING THE TRUCK)

- Check the Oil level in the Oil Tank. Oil level has to be in the middle of the sight glass or level Indicator, while the body is resting on the sub-frame.
- Make visual inspection of Hydraulic System i.e. P.T.O., Pump, Tank, Valve, Hoses and Couplings for leakages.
- Check all Pneumatic and Hydraulic connections for slackness.

### PERIODIC CHECK POINTS - WEEKLY

- Breather Element must be cleaned once in a week with compressed air only.
- Lubricate all greasing points on the tipper. (Cylinder Eye End, Hyfix, Cylinder mounting bush, Stabilizer, Body Prop, Rear Hinge Shaft, Side locking tail door mechanism - Refer Greasing Layout on Page No. 65)

**Note :** Greasing is recommended on a daily basis for Mining tippers.

- Care should be taken while tightening Pivot Mounting Bolt (see Fig. ), so that Pivot Spring does not get compressed completely. A minimum gap of 0.5 mm should be maintained (equivalent to



thickness of a Hacksaw Blade) so that this Spring can offer required compression under load.

- Check Gearbox Oil level.
- Check Pivot bracket bolts, Attachment bolts (80 Nm) and Cylinder Cradle Mounting Bracket Bolts, Rear hinge shaft/pin locking, Pump Mounting Bolts, Stabiliser pin locking bolt and tighten if necessary. Check Tail door locking mechanism linkage (nuts & lock pins), Body lifting bracket bolts (for FC cylinder), Check gap between trunnion pin & Cylinder mounting bracket bush (Replace bush if gap observed is more than 1.5mm).

**Note :** Tightening Torque for Cylinder Mounting Bracket Bolts is 200 Nm and Pump Mounting Bolts is 50 Nm.

## RECOMMENDED REPLACEMENT

Sl. No.	Description of Items	Replacement Periods
1	Air Breather Filter Element (08102117)	Once in every 4 months in normal working condition. (Non Mining application)
		Once in every 2 months in dusty working condition. (Mining application)
2	Return Line Filter Element 150Lpm (14896991A)	Once in every 4 months in normal working condition. (Non-Mining application)
		Once in every 2 months in dusty working condition. (Mining application)
	Return Line Filter Element 300Lpm (14896990)	Once in every 4 months in dusty working condition. (Mining application)
3	Hydraulic Oil	First change at 6 months and thereafter once in a year.

**Note :**

- 1) Over and above the schedule, Filter and Breather elements need to be replaced whenever hydraulic oil is changed.
- 2) In the event of metal particles being found, due to failure of components, hydraulic oil needs to be changed alongwith new components.

### RECOMMENDED HYDRAULIC OIL

We recommend Super-clean anti-wear, oxidation stable and rust preventive Hydraulic oil conforming the characteristics according to BIS-11656-86 and DIN 51524/2.

Make	Brand & Type	Ambient Temperature	
		From	To
HYVA	HYVA Superfluid	- 5°C	60°C

# OPERATION INSTRUCTIONS

Before putting your vehicle into operation, it is necessary to familiarize yourself thoroughly with the mode of the operation and function of the tipper.

## LOADING

- Body must be uniformly loaded.
- Please load as per the specification chart provided in order to ensure longer life and safer operation.
- Ensure proper loading or hopping process in order to avoid undue impact load on vehicle.

## TIPPING

- Before tipping, make sure the tipper is standing on level & stable ground.
- Make sure that front wheels are in line with rear wheels.
- Ensure that hand brake of the vehicle is in "ON" position.
- In neutral gear, start the engine, build up the air pressure upto 7-8 kg/cm<sup>2</sup>, then press the clutch pedal and engage the PTO slowly using air control valve lever inside the cabin
- In case of vehicle with tail gate system, ensure that the safety lock pin is removed & stowed in open position from the tail door locking mechanism.
- Ensure that mechanical lock pin is removed from the tail door locking mechanism before tipping operation. Otherwise this will damage the locking mechanism.
- Start tipping by using the air control inside the cabin.

## LOWERING

- Using the air control inside the Cabin, lower the tipper body. Lowering operation automatically disengages PTO.
- Do not put the engine in high R.P.M, while lowering the body.

## GENERAL TIPS

- Please ensure the raising of body prop while doing any work on chassis or sub-frames underneath the body.
- Please remember, incorrect operational practice may be fatal to the vehicle and cause even casualty of human life.

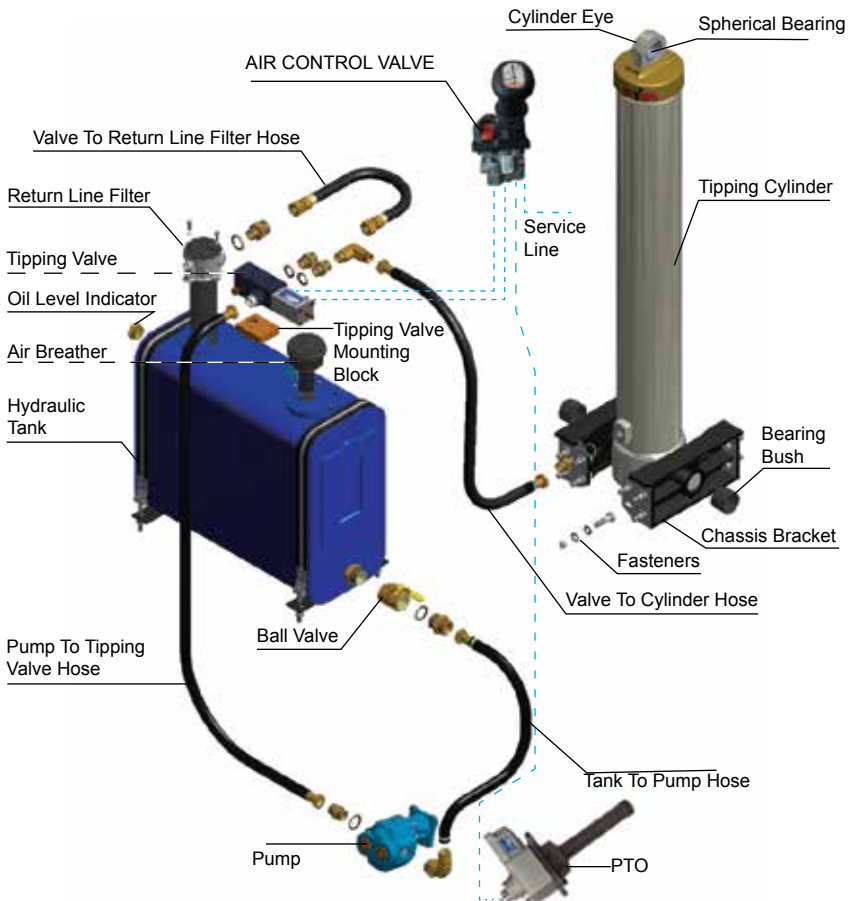
## WARNING :

- ***Applying side load and dynamic forces to any cylinder is dangerous.***
- ***Working under an unsupported body is a danger to life.***

# HYDRAULIC TIPPING SYSTEM

Hyva Tipping System comprises of following hydraulic components to provide highest level of tipping efficiency.

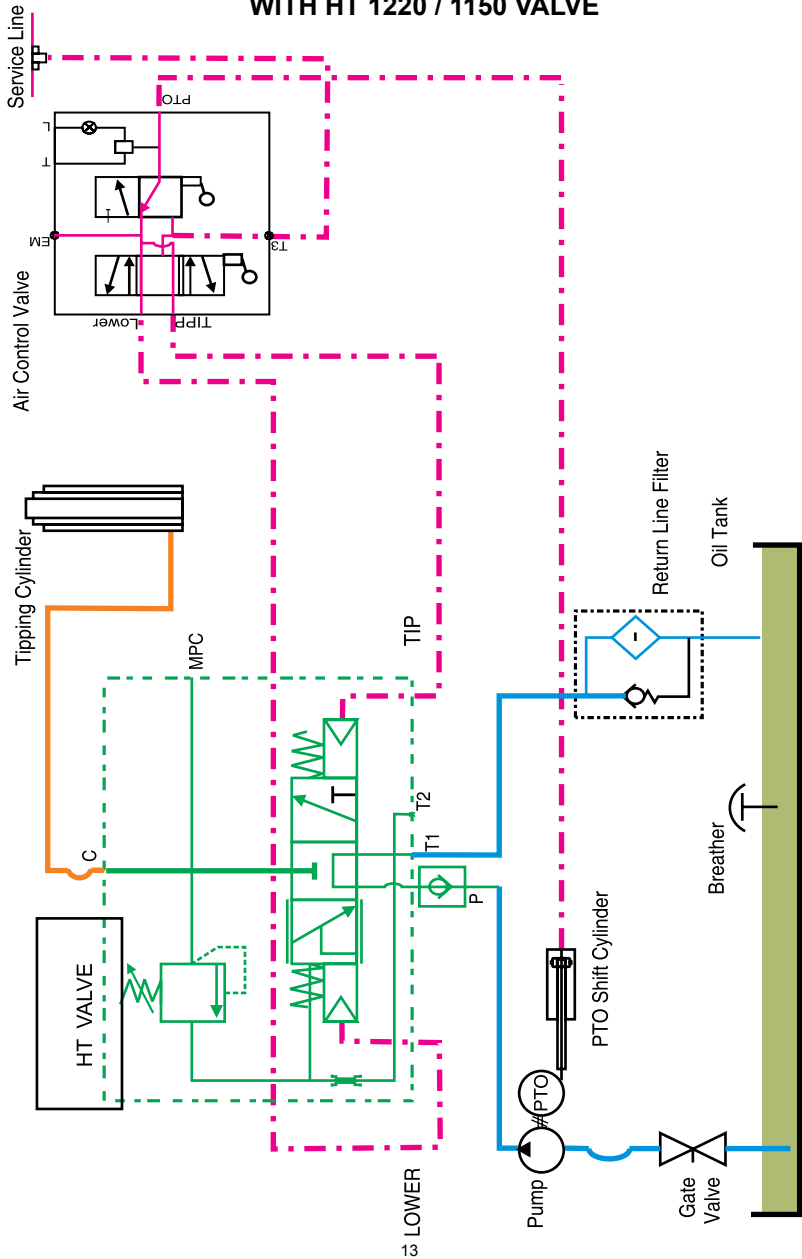
- HYDRAULIC TANK
- TIPPING VALVE (HT Valve 1220 or HT Valve 1150)
- AIR CONTROL VALVE
- GEAR PUMP
- POWER TAKE-OFF (PTO)
- HYDRAULIC CYLINDER - TIPPING CYLINDER



**HYVA – Tipping Diagram**

# HYDRAULIC & PNEUMATIC CIRCUIT DIAGRAM

## HYDRAULIC & PNEUMATIC CIRCUIT DIAGRAM WITH HT 1220 / 1150 VALVE



## P.T.O

**P.T.O:** A P.T.O (Power Take Off) is an auxillary gear box mounted on the transmission. Its function is to transmit the power from rotation of the engine.

**Hyva Supplies the following P.T.Os :**

- I. Side mounted P.T.O.** : 1. G600 /G750 V1 Type (Remote Drive)  
2. G600 /G750 V2 Type (Direct mounting)
- II. Rear mounted P.T.O.** : 1. Dual Block P.T.O.  
2. Mono Block P.T.O.

### III. P.T.O. Operation

**IMPORTANT : When engaging and disengaging the PTO, always press the clutch pedal!**

### Working Temperature and Load conditions

The temperature depends on the way the PTO is used and it is recommended to keep it between the following values.

**Short duration (less than 15 minutes) max. 120°C, long duration (more than 15 minutes) max. 100°C.**

The PTO temperature is affected by various factors; it is possible to reduce overheating by:

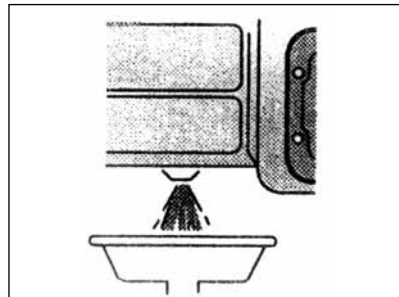
- Changing the oil more often in case of heavy duty system.
- When the PTO is side mounted, ensuring that the gear backlash is accurately checked.
- When the PTO is rear mounted, considering to provide the PTO with a supplementary lubrication kit.

### IV. PTO Installation

#### a. Side mounted PTO installation :

- Empty or reduce the gearbox oil level, check cleanliness. If oil is dirty or contaminated it should be replaced. (Pict. 1)

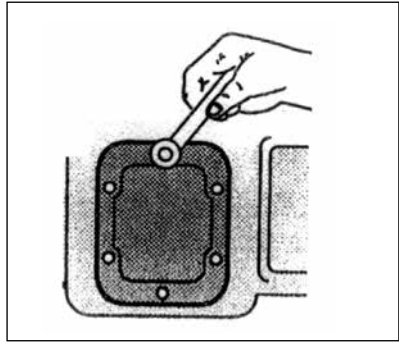
**Notice :** In some applications (for example automatic Allison Gearbox) it is not necessary to empty gearbox. Always check gearbox service manual.



Picture. 1

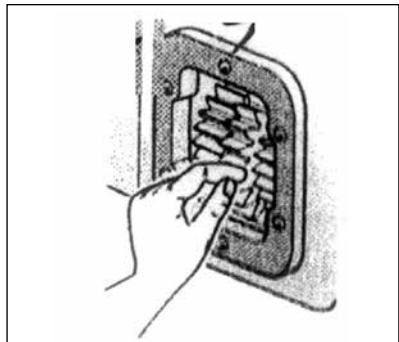
## P.T.O

- Remove gearbox aperture cover and accurately clean the gearbox aperture surface (Pict. 2)



Picture. 2

- Check gearbox gear teeth and the gear backlash (Pict. 3)
- Open the PTO package. Use PTO specific mounting kit and if necessary spacers.
- Studs for mounting onto the gearbox :
  - Accurately check that the holes in the gearbox are threaded. Be careful that studs do not interfere with gears.



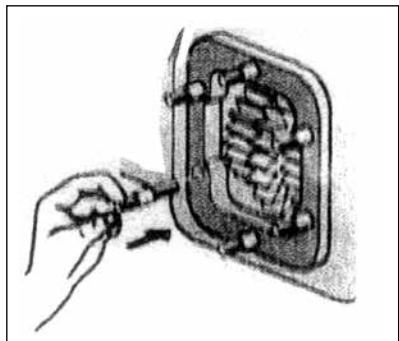
Picture. 3

- Fit the studs. (Pict. 4) shows a typical mounting example.

Backlash between gear tooth and spacer insertion:

To get backlash of 0.15 mm, add 0.4 mm spacer between PTO and gearbox, as necessary.

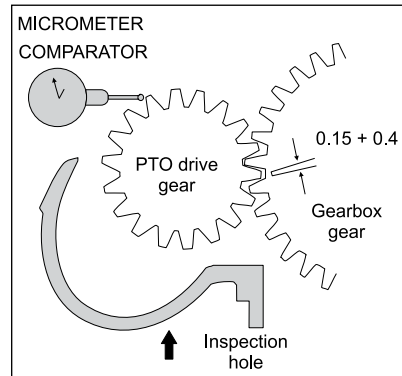
Backlash checking can be carried out in two ways.



Picture. 4

## P.T.O

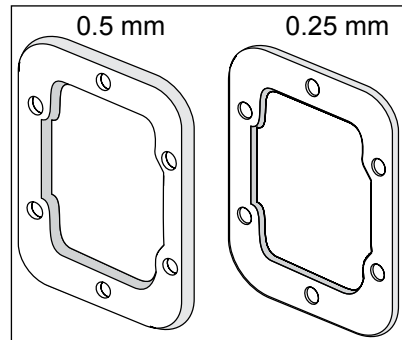
- In case of PTOs equipped with inspection plug, check by hand, (rocking the gear to get the “feel” for gear backlash) or by means of a dial gauge (Pict. 5). The use of a dial gauge is recommended as it is much more accurate.
- In case of PTOs without inspection plug, adjustment is carried out in stages. The PTO has to be checked against the transmission flange by adding spacers until there is no backlash. After that, another 0.5 mm spacer should be added and the nuts tightened.



Picture. 5

Recommendations on seal and spacer use.

- Remember that once the nuts have been tightened, the seal thickness reduces, resulting in a similar backlash reduction. The backlash therefore has to be checked even after tightening.
- Available seals (Pict. 6) have a thickness of 0.5 and 0.25 mm (special series).
- When a spacer is fitted, use a gasket to ensure tightness (at least one on both sides).
- In order to avoid the seals sticking to each other, use grease. **NEVER use adhesive fluid when the PTO mounting kit requires special gasket. USE adhesive fluid only when the PTO mounting kit DOESN'T involve any gasket.**



Picture. 6



## P.T.O

Once the suitable thickness has been determined, tighten the nuts with a torque wrench (see tightening torque table)

**Note :** Once the nuts have been tightened, the backlash has to be rechecked and if necessary the shiming operation may be repeated.

When the installation operation has been completed, fill the gearbox with oil (Pict.7)

**Note :** In case of applications with separate lubrication (for example on Allison transmission) an external tube kit is needed to be fitted.

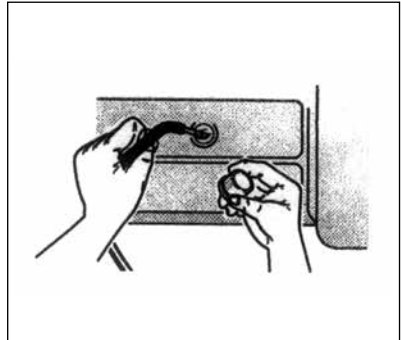
After installing operations, proceed with the checks.

### b. Rear mounted PTO installation :

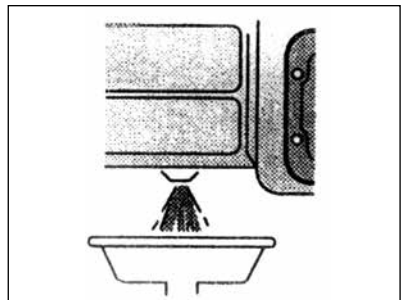
- Empty or reduce the gearbox oil level, check cleanliness. If oil is dirty or contaminated it should be replaced. (Pict. 8).

**Note :** In some applications (for example automatic Allison gearbox) it is not necessary to empty gearbox.

- Remove gearbox aperture cover and accurately clean the gearbox aperture surface (Pict. 9)
- If a shaft kit is provided for the application, follow mounting instructions given below.



Picture. 7



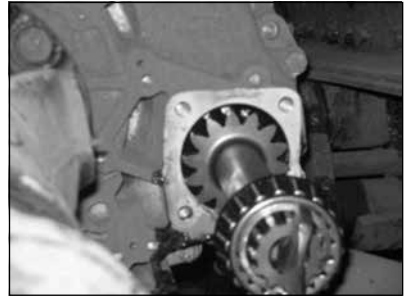
Picture. 8



## P.T.O

### Mounting instructions :

First insert quill shaft in gear box



Picture. 9

Then fit the quill shaft bearing cone with the help of proper tool. Add shims if required (Note: - After fitment of bearing cone, the cone surface and gearbox surface should be uniform)

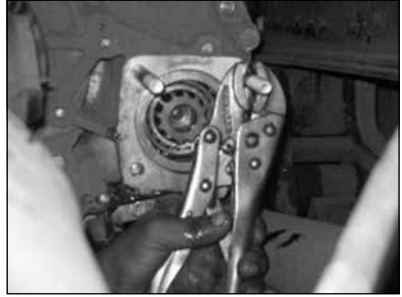


Picture. 10

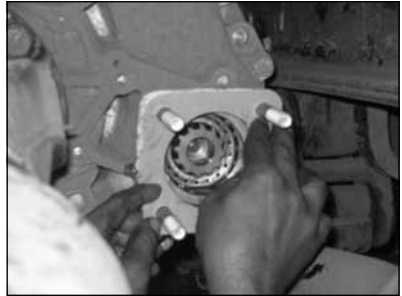
## P.T.O

Fit PTO mounting studs with help of monkey plier

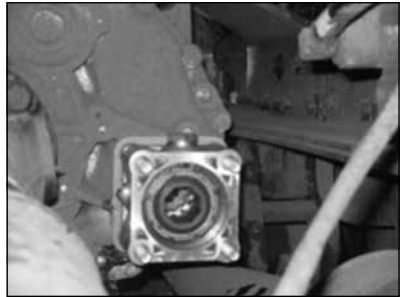
It is recommended to lock studs or bolts with locking fluid. (see tightening torque table)



Install PTO packing on gear box surface



Fit ZF Mono block PTO in installed studs



Fit Gear Pump packing on PTO

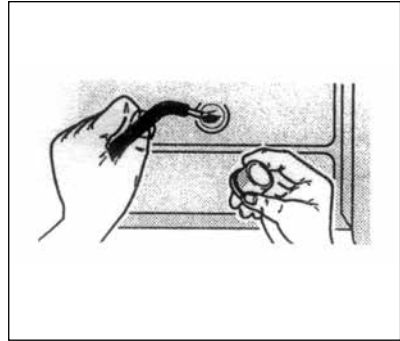


## P.T.O

Then install Pump on PTO and tighten with nut along with spring washer

**Note :** In case of a connection to an ISO flange pump: if the oil seal is fitted to the pump, then the pump must be fitted to the gearbox before filling with oil.

- When the fitting operation is complete, refill gearbox with oil (Pict.11) **Note :** In case of application with separate lubrication, a supplementary lubrication kit should be fitted.
- When installation is completed, proceed with the checks (see 'After Installation checks' on next page)



Picture. 11

## P.T.O

### V. AFTER INSTALLATION CHECKS. :

Once the installation phase is complete, the following checks are recommended.

Engagement / disengagement check	Performance soon after engine start. If a clash is heard, this may be due to one of the following: <ul style="list-style-type: none"><li>- Clutch not working properly</li><li>- There's no or insufficient air pressure.</li></ul>
Oil level check	Carry out an oil check when the engine is still cold and top up if necessary.
Oil Leak	Check to be carried out under all the working conditions, with PTO engaged and gear in neutral position.  In case of a side mounted PTO, an excessive noise may mean a wrong backlash according the following: <ul style="list-style-type: none"><li>- High pitched noise; backlash is too tight</li><li>- Rattle noise; excessive backlash.</li></ul>
Tightening bolts check	Normally bolts tend to loosen because of the seal setting. It is recommended that all bolts and nuts are checked after a few hours of work checking the tightening by means of a torque wrench. With side mounted PTO's, recheck the backlash after tightening.

## TORQUE SPECIFICATIONS

### Torque Specifications for Fasteners

Sr. No.	Description	Fastener Size	Torque Specification
1	Chassis Brackets/Lifting Brackets	M16	200Nm
2	Tipping Valve Mounting Bolts	M8	30Nm
3	Pump Mounting Bolts	M12	75Nm
4	Pump Mounting Studs	M12	30Nm
5	Attachment plate Bolt	M 12	122Nm
6	Attachment plate Bolt	M 14	195Nm
7	Stabiliser pin locking bolt	M 104	51Nm

### Torque Specification For Hydraulic Fittings

Sr. No.	Description	Fastener Size	Torque Specification
1	Adaptor Fitting (Steel)	3/4" BSP	50Nm
2	Adaptor Fitting (Steel)	1" BSP	70Nm
3	Adaptor Fitting (Steel)	1*1/4" BSP	115Nm
4	Hose Swivel Nut	3/4" BSP	115Nm
5	Hose Swivel Nut	1" BSP	140Nm
6	Hose Swivel Nut	1*1/4" BSP	190Nm
7	Hose Swivel Nut	1*1/2" BSP	260Nm
8	Hose Swivel Nut	1*3/16" UNF ORFS	120Nm
9	Hose Swivel Nut	1*7/16" UNF ORFS	150Nm
10	Seamless Tube Swivel Nut	M30x2	125Nm
11	Air Connector	1/8" BSP	5Nm

## GEAR PUMP

Gear Pump specifications	52 cc	82 cc	92 cc
Displacement per revolution	51.88 cc	81.61 cc	91.56cc
Maximum peak pressure	230 Bar	230 Bar	230 Bar
Maximum intermittent pressure	220 Bar	220 Bar	220 Bar
Maximum Continuous pressure	190 Bar	190 Bar	190 Bar
Oil temperature range	-25°C to 110°C	-25°C to 110°C	-25°C to 110°C
Inlet pressure range in Bar (abs)	0.7 - 3.0	0.7 - 3.0	0.7 - 3.0

### Hyva Gear Pump

Gear pump is a mechanical device which converts mechanical energy into hydraulic energy. It consists of two gears with external teeth meshing with each other.

- Gear pumps are self priming type. These are compact in size, less moving parts and therefore less wear and tear.

**Note:**

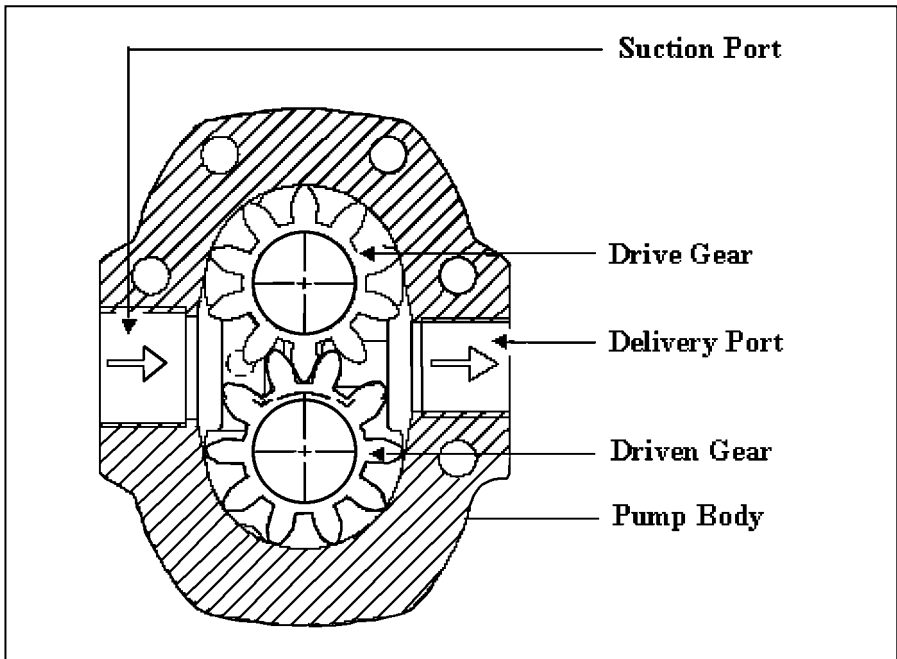
*82/92 denotes the displacement of oil in cc per rev i.e. 82.cc pump runs at 1000 rpm capacity will be 82 lts/min*

We recommend operating tipper application at correct engine RPM as per PTO ratio of that particular pump housing and gears. Revving up the engine beyond recommended speed can lead to pump failure or excessive wear and tear of the pump.

**Note :** Recommended engine speed for normal operation is 1000 to 1200 rpm.

# GEAR PUMP

## Basic principle of Gear Pump

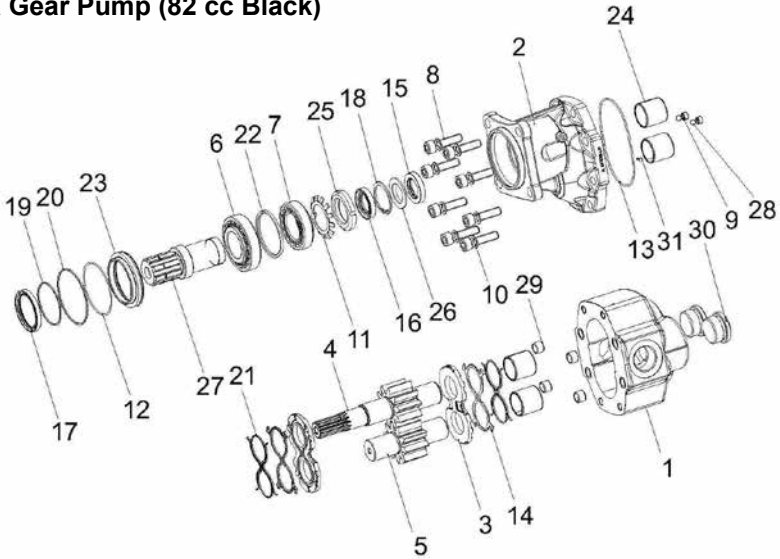


One of the two gearwheels is driven from outside (Drive Gear) and drives the other gearwheel (Driven Gear). With the right hand rotation of the top gearwheel (consider fig.) oil is sucked from the LHS port (Pump suction). Oil trapped in between the gear teeth and the pump body travels along the periphery of the Pump body towards the RHS port (Pump delivery). As the teeth and the side of the gears are closely sealed against the Pump body and the Thrust Plates, pressure builds up against the resistance to the oil flow at the delivery port.



# GEAR PUMP

## Hyva Gear Pump (82 cc Black)



SL.	Descriiion	Qty.	SL.	Description	Qty.
1	Body	1	17	Shaft Seal	1
2	Front Cover	1	18	Circlip	1
3	Thrust plate Brite	2	19	Locking ring	1
4	Drive Shaft	1	20	Locking ring	1
5	Driven Gear	1	21	Back-up ring	2
6	Roller Bearing	1	22	Spacer	2
7	Roller Bearing	1	23	Shaft seal mounting ring	1
8	Screw	8	24	Sleeve bearing	4
9	Dowel 1/8"	2	25	Threaded locking ring	1
10	Washer	8	26	Back-up washer plastic	1
11	Lock washer	1	27	Support Shaft	1
12	OR-seal	1	28	Ball	2
13	'O' Ring	1	29	Steel bushes	4
14	Seal	2	30	Steel plug	2
15	Shaft Seal	1	31	Protection plug	1
16	Shaft Seal	1			

## GEAR PUMP

### HYVA GEAR PUMP OVERHAULING PROCEDURE :

Please follow the steps mentioned below:

- Remove the pump from vehicle and place it on a clean table
- Loosen all allen bolts by using suitable allen key
- Tap the flange area and remove the cover of the pump
- Slowly remove the O-ring from groove of cover plate. Check and replace, if necessary
- Remove the oil seal from pump shaft. Check the condition and replace, if necessary
- Remove the top thrust plate. Also, remove the thrust plate seal and anti extrusion ring
- Remove the set of drive and driven gear
- Follow the above instruction for removing the bottom thrust plate
- Check clearance between housing and gear teeth. The clearance should not be more than 0.005".
- Check and replace the seal and backup ring, if necessary
- Clean each part thoroughly and assemble back in reverse sequence of dismantling pump
- Check the backlash of gears
- Bolt tightening torque - 20 Nm

### TO BLEED THE SYSTEM :

The Hyva Gear pumps, as well as the Hyva cylinders do not have a bleeder screw. After installation of tipping system some components can have some amount of air trapped inside. Therefore it becomes necessary to bleed the system. To bleed the system, follow instructions given below.

- Loosen the pressure hose of the pump a little so that the air in the suction hose and the pump can escape and the system will be filled up with oil.
- Loosen the pressure hose and the cylinder hose a little. Run the pump at a low speed and put the tipping valve in "Tip" position. After a short while once the air escapes from the system, the connections must be tightened.
- As the piston of the cylinder is closed, only a little air remains between the stages. This will "mix-up" with the oil after a few tips and will escape via the oil tank.

## GEAR PUMP

- If air remains in the system after 8-10 tips the position of the suction hose must be checked and the connections must be tightened. If the temperature is high or the oil is thick, one must wait longer before bleeding a second time.
- Top up the oil tank as oil has now entered the cylinder, hoses and oil filter.
- Check the working pressure and check that the pump is operating properly. If it is too noisy or if there are shocks in the hoses, air may still be there in the system and the pump is facing cavitation. Bleed the system.
- Check the working pressure. Check and ensure that the complete hydraulic system works properly (Working pressure - 170 bar for FLASH series cylinders and 190 bar for ALPHA series cylinders).

# HYVA TIPPING VALVE

## GENERAL MOUNTING INFORMATION

- The tipping valve is mounted on oil tank through valve mounting block. To prevent the valve housing deformation the mounting plate surface or block must be completely flat.
- Before mounting the valve, remove the plug underneath the valve and use the O-ring between valve return line opening and valve block.
- Recommended torque for tipping valve mounting allen bolts is 45 Nm.

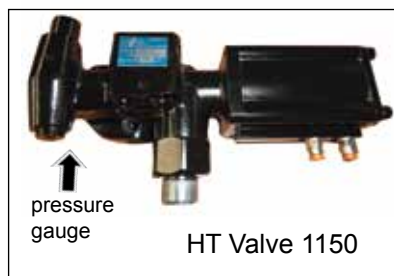
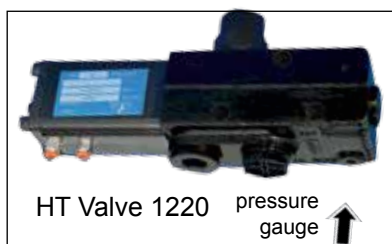
## DISMANTLING TIPS

- The Valve must be dismantled in a clean area and using the correct tools.
- If a fault has been developed which can be traced to the valve it is possible to replace the internal seals and O-Rings.
- All parts should be thoroughly cleaned before reassembly.

## PRESSURE CHECKING POINTS

**Note :** System working pressure - 170 bar for FLASH series cylinders and 190 bar for ALPHA series cylinders.

- Hyva recommends that total hydraulic circuits must be tested on completion of fitting as per following:
  - Make sure that the body is fully lowered and the PTO is disengaged.
  - Connect a pressure gauge to the point shown on the figure.
- Note :** Connector thread size 1/4 BSP for HT valve.
- Engage the P.T.O. and tip the body fully. Hold the lever at tipping condition until the oil get relieves to tank.
- Check for leaks in the system and read the pressure gauge.



# AIR CONTROL FOR P.T.O. / VALVE

## GENERAL INFORMATION

- The air control for P.T.O./Valve with automatic P.T.O. disengagement is a three way operated, variable air control (for P.T.O. engagement, tipping and lowering operation).
- When used with a compatible tipping valve with proportional lowering, the proportional movement of the air control lever can regulate the speed of descent of the body.
- **Hyva** Air controls are easy to mount in the cabin.
- The functions of **Hyva** air controls are clearly indicated with symbol.



## MOUNTING OF THE AIR CONTROL

- When air control is mounted next to the driver's seat, a strong support should be used.
- Ensure using rubber grommets to protect air tubes and to prevent entry of dust and water inside cabin.
- For trouble free operational life of the entire pneumatic system, the condensed water in the air tank should be regularly drained.
- Also make sure that the air tubes are not too close to sharp objects, moving parts exhaust and compressor lines, should not get too stretched.
- Please take precaution to protect pneumatic lines while doing welding in nearby area.

# RETURN LINE FILTER

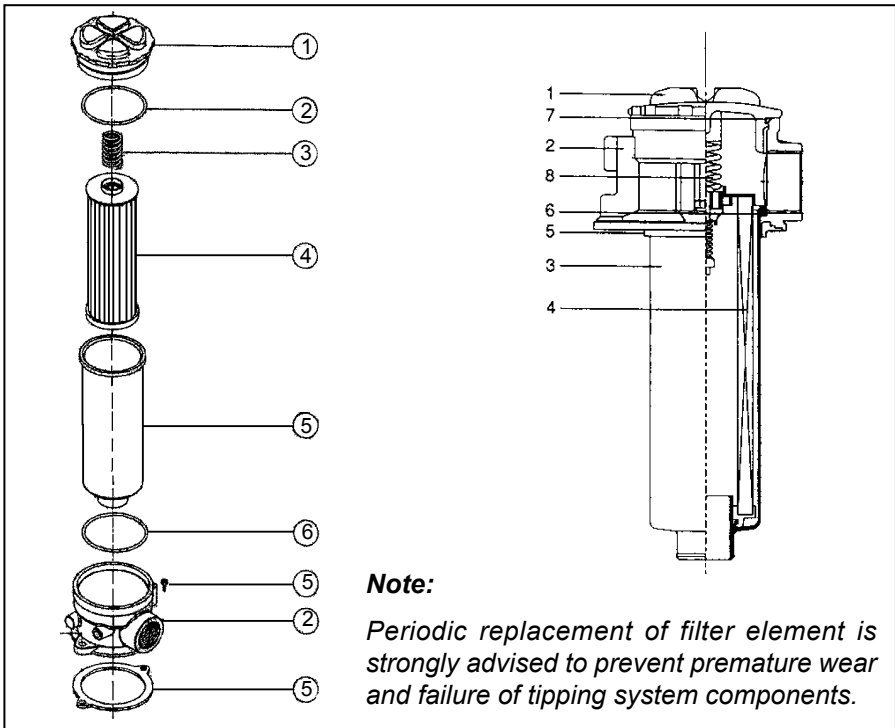
## RETURN LINE FILTER ASSEMBLY

Return line filter assembly is located on top of the hydraulic oil tank & adjacent to tipping valve. Oil from cylinder on its return path, (Cylinder Tipper Valve) flows to the tank through Return line filter.

The function of RLF assembly is to remove contamination from the hydraulic oil on its way back to the tank. (Rating 25 Microns)

It consists the following Parts

- |                               |                |
|-------------------------------|----------------|
| 1. Cover                      | 5. Flange Seal |
| 2. Aluminum Body              | 6. 'O' Ring    |
| 3. Flange Pipe                | 7. 'O' Ring    |
| 4. Return Line Filter Element | 8. Spring      |



**Note:**

*Periodic replacement of filter element is strongly advised to prevent premature wear and failure of tipping system components.*

**NOTE :** Filter element must be replaced as per the recommendation given in periodic check list.

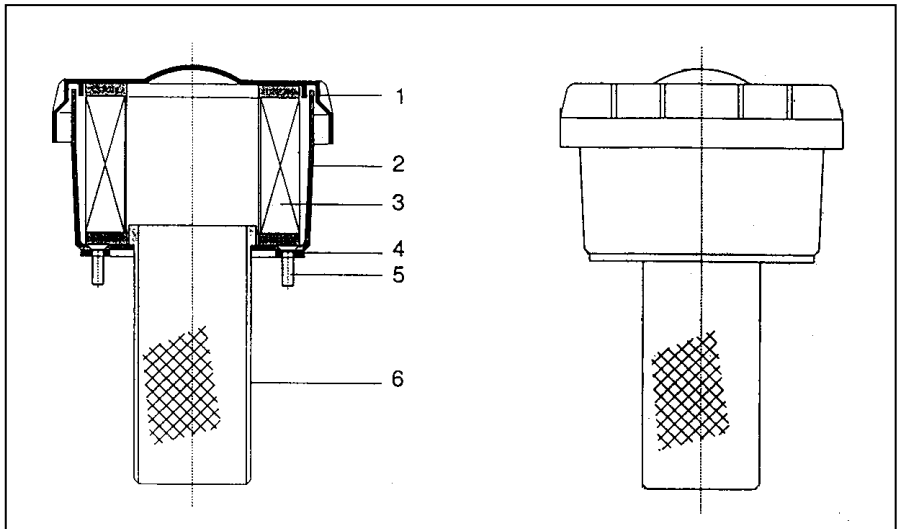
## AIR BREATHER FILTER

### Breather Assembly

As the name indicates, this helps the Hydraulic oil tank to 'Breathe in' or 'Breathe out' air, in order to maintain the atmospheric pressure inside tank, even when there is lower level of oil (in tipped condition) or higher level of oil (due to lowering down or heat generation in the system), in order to prevent any kind of deformation of tank. A Breather filter element of 10-micron filtration capacity ensures entry of dust and foreign particle – free air inside hydraulic tank.

It consists of the following parts

1. Cover
2. Housing
3. Breather Filter Element
4. Seal
5. Screw
6. Sleeve



**Note :**

*Breather Element must be replaced periodically as per the recommendations.*


# CYLINDER NOMENCLATURE

## HYVA Cylinder Nomenclature

To identify the Type and Part number look for the Cylinder name Plate, which is located above the Trunnion & below the oil Port of the Cylinder. Make sure about all the parameters before placing an order for Assembly or Spare Parts.

In Front End Tipping Systems used generally in India, Hyva is using two types of Cylinders, i.e. FE & FC. (Find herewith the Nomenclature for Front End Cylinder with Cover - FC)

## CYLINDER NOMENCLATURE



Eye with trunnion FE      Cover with Trunnion FC

FE	129	-	3	-	03640	-	001A	-	K1529	-	HC
FC	129	-	3	-	04270	-	000A	-	K0343	-	HC

↓

Type of Cylinder

↓

Diameter of first stage

↓

No. of stages

↓

Stroke Length

↓

Position of oil inlet

↓

K Mounting dimension in mm

↓

Hard Chrome

**NOTE :** Stroke Length: Distance travelled between close to open length by cylinder eye or cover trunnion.



# CYLINDER REPAIR INSTRUCTIONS

## FC & FE CYLINDERS REPAIR INSTRUCTIONS

### Introduction

**Hyva** cylinders contain a small number of components, which are subject to wear. Therefore it is sometimes necessary to dismantle the cylinder and replace the worn out parts like seal kit.

Depending on the load requirements, either of the following types of cylinders are incorporated in system :

- |              |             |              |
|--------------|-------------|--------------|
| 1) FE/FC110  | 2) FE/FC129 | 3) FE/FC 149 |
| 4) FE/FC 169 | 5) FE/FC191 |              |

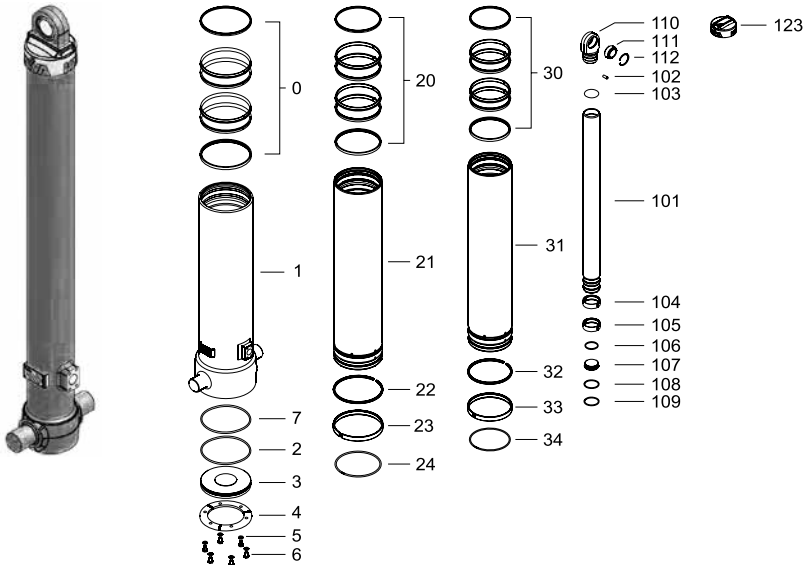
Repair of **Hyva** cylinder should be carried out always in accordance with instructions given below.

1. Before dismantling any **Hyva** cylinders always check the name plate for type of Cylinder, which is primary requirement in ordering right parts.
2. Remove the Cylinder from the chassis prior to dismantling and always place it horizontally on a clean and dust free place.

Only in case of FC type of cylinder it is possible to leave the outer cover attached to the body.

# CYLINDER REPAIR INSTRUCTIONS

## HYVA Cylinder FE 129



### SPARE PART LIST

POS.	DESCRIPTION	QTY.
0	Packset FI 149	01
1	Base 149	01
2	Seal Bottom Plate 149	01
3	Bottom Plate 149	01
4	Locking Plate 149	03
5	Spring Washer M8 Set	03
6	Bolt M8x1.25x20 Set	03
7	Liftring FI 149	01
20	Packset FI 129	01
21	Stage 129	01
22	Outer Stopping FI 129	02
23	Slider FI 129	01
24	Liftring FI 129	01
30	Packset FI 110	01
31	Stage 110	01
32	Outer Stopping FI 110	02
33	Slider FI 110	01
34	Liftring FI 110	01

POS.	DESCRIPTION	QTY.
101	Piston S 091	01
102	Pin Round Head Grooved 6X15 Mm	01
103	O-Ring Piston Top 091	01
104	Outer Stopping FI 091	02
105	Slider FI 091 (2x1/2)	01
106	Inner Stopping FI 091	01
107	Bottom Plate Piston 091 Raised	01
108	O-Ring Piston Bottom 091	01
109	Circlip 78 Din 472 (82.5X2.5)	01
110	Piston Eye Sph. 091 Greased	01
111	Spherical Eye D.50 Do	01
112	Circlip 75 Ge 50 Do Din 472	01
123	DUST COVER FE 129 YELLOW	01

**SEAL KIT COMPLETE** : Consists of all Packsets with packset grease and 'O' rings and pin (Pos. 102)

## CYLINDER REPAIR INSTRUCTIONS

### Dismantling and Assembly of FE Cylinder:

#### Dismantling Procedure :

Lay the cylinder flat on a clean bench with the oil inlet facing downwards. Collect the waste oil.



Remove the bottom locking plate bolts (6nos.) using appropriate spanner.



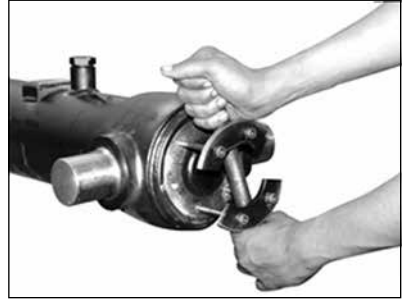
Remove all the three locking plates



## CYLINDER REPAIR INSTRUCTIONS

Bottom plates can be removed by either of the following methods.

A) Attach two Lock Plates as shown and pullout the base plate evenly.



B) Use Puller to Pullout Bottom plate



## CYLINDER REPAIR INSTRUCTIONS

Remove the Piston Rivet with the help of chisel



Properly cover all the stages with cotton cloth and then start grinding of piston eye welding



After completion of grinding start unscrew the piston eye with help of Nylon mallet



## CYLINDER REPAIR INSTRUCTIONS

Push the Piston little inside to expose the Snap Ring in the next stage.



Remove the snap ring using a thin screwdriver.

**\*CAUTION:**  
Removing the snap ring carefully as it may jump out of groove.



Push the Piston towards the bottom such that both the sliders are exposed.



Remove the Piston sliders carefully



## CYLINDER REPAIR INSTRUCTIONS

Pull out the Piston from cylinder bottom side

Caution: Remove carefully to avoid damage to the stage or personnel injury.



Push the Second Stage until the Snap Ring of the subsequent Stage is exposed with the help of nylon mallet.



Remove the snap ring using a thin screwdriver.



Push the Second Stage from top. Use Nylon Mallet and Hammer.



## CYLINDER REPAIR INSTRUCTIONS

Push the 2nd stage towards the bottom such that both the sliders are exposed



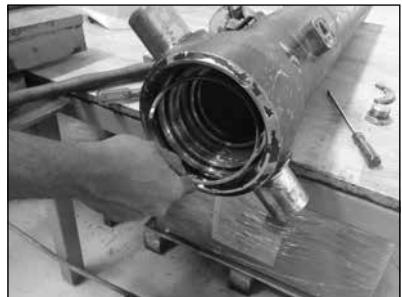
Pull out 2nd stage from bottom side



Push the 1st Stage until the Snap Ring of the subsequent Stage is exposed with the help of nylon mallet. (applicable for MK3, MK4, MK5 and Alpha series Cylinders)



Remove the snap ring using a thin screwdriver.





## CYLINDER REPAIR INSTRUCTIONS

Push the 1st stage towards the bottom such that both the sliders are exposed



Remove 1st stage sliders carefully



Pull out 1st stage from base tube

### **Caution**

The dismantled stages must be placed on a clean surface to prevent scratches and damages.



# CYLINDER REPAIR INSTRUCTIONS

## Assembly of Cylinder-FE

For procedure for assembling is in the reverse order of dismantling procedure. Follow the instructions given below : Slide the first stage in to the base tube up to the extent that only the slider groves are out. Place

the sliders in their respective groves with sufficient grease and push until the sliders are in. Follow the same procedure for inserting the 2nd Stage. Insert the Piston from bottom of the cylinder, push all the way towards top until the Slider groves are only exposed. Place the sliders in their respective groves with sufficient grease and push until the sliders are in. Push each stage slightly inside to place the Snap rings in the respective snap ring groves. There can be some resistance for the stage while passing through the pack set, which is normal. Place the Cylinder bottom plate followed by lock plates. Tighten the lock plate with spring

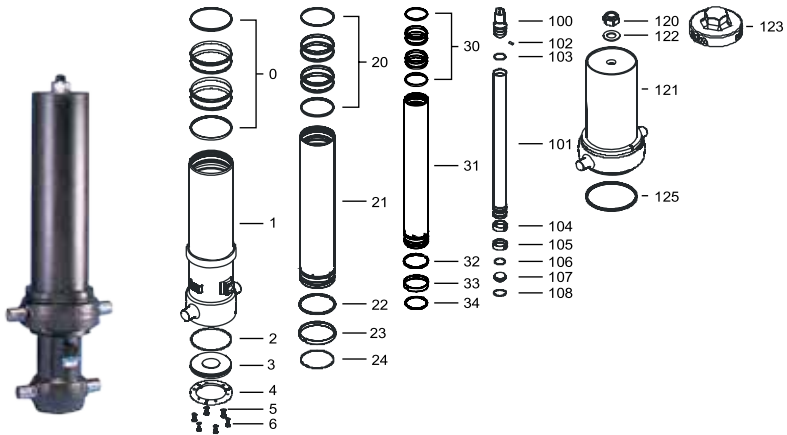
Washer and bolt (Never forget to apply Loctite ® 243 on the locking bolts.)

## Removing FC Cylinder from the Chassis:

- Before attempting to remove the Cylinder, place the Air control lever in a lowering position so that the residue oil in the cylinder is drained out in the hydraulic oil tank.
- Remove Pressure hose connected to the cylinder and allow the balance oil to drain.
- Disconnect one of the Cylinder mounting bracket and Body lifting bracket (same side) from their respective position by removing bracket bolts.
- Secure the Cylinder with rope or a sling so that the cylinder does not topple over.
- Now remove the disconnected brackets.
- Using adequate manpower, remove the cylinder from the chassis.
- Lay the cylinder on the workbench for the repairs. Secure cylinder in a bench vice whenever required during the course of repairs.

# CYLINDER REPAIR INSTRUCTIONS

## HYVA Cylinder FC 129



Pos	Description	Qty.
0	PACKSET 149	01
1	BASE 149	01
2	SEAL BOTTOM PLATE 149	01
3	BOTTOM PLATE 149	01
4	LOCKING PLATE 149	03
5	SPRING WASHER M8 SET	03
6	BOLT M8 X 1.25 X 20 SET	03
20	PACKSET 129	01
21	STAGE 129	01
22	OUTER STOP RING FL129	02
23	SLIDER 129 (2 X 1/2)	01
24	LIFT RING 129	01
30	PACKSET 110	01
31	STAGE 110	01
32	OUTER STOP RING FL110	02
33	SLIDER 110 (2 X 1/2)	01
34	LIFTRING 110	01

Pos	Description	Qty.
103	O-RING PISTON TOP 091	01
104	OUTER STOP RING FL 091	02
105	SLIDER 091 (2 X 1/2)	01
106	O-RING PISTON BOTTOM 091	01
107	BOTTOM PLATE PISTON 091	01
108	SNAP RING FOR PISTON 091	01
120	TOPNUT M48x3	01
121	COVER 219	01
122	WASHER M48	01
123	DUST COVER FOR COVER 219	01
125	O-RING COVER D219	01
Seal kit complete:	Seal kit complete: consists of all packsets with packset grease, O-rings and Pin (pos.102)	

## CYLINDER REPAIR INSTRUCTIONS

### Dismantling and assembly of FC Cylinder

Loosen the FC Cylinder cover securing Self locking Nut with appropriate spanner by holding the piston head as shown.



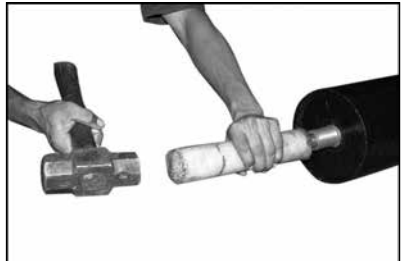
Unscrew the Nylock Nut completely



Remove the Flat washer.



Tap the Piston head with Nylon Mallet and Hammer carefully for not damaging the Piston threads.



## CYLINDER REPAIR INSTRUCTIONS

Separate Cylinder from Cover carefully....



....and remove.



Lay the Cylinder flat on a clean bench with the oil inlet facing downwards. Collect the waste oil. The subsequent steps for dismantling procedure are the same as those for dismantling procedure or FE cylinder.

# CYLINDER REPAIR INSTRUCTIONS

## Assembly of FC Cylinder

For assembling the FC Cylinder follow reverse order of dismantling procedure. Follow the instructions given as follows :

- Slide the first stage into the base tube up to the extent that only the slider grooves are out. Place the sliders in their respective grooves with sufficient grease and push until the sliders are in.
- Follow the same procedure for inserting the 2nd Stage and also for piston rod.
- Push each stage slightly inside to place the snap rings in the respective snap ring grooves starting from pushing Piston rod.
- There can be some resistance for the stage while passing through the pack set, which is normal.
- Place the Cylinder bottom plate followed by lock plates. Tighten the lock plate with spring washer and bolt (Never forget to apply thread sealant on the locking bolts).
- Assemble the cover and tighten the top nut fully.

## Pack set dismantling and assembly in FE & FC Cylinders:

Remove Wear rings from all the stages including Base tube, in the following manner. Remove Wiper (-Seal) using a blunt screwdriver. Starting with 4th Wear Ring...

### Dismantling Pack set:

#### General Instructions

The seal kit for each stage is called as Pack set for that stage. Pack Set consists of Seal, Wear Rings and Wiper (In FLASH Cylinders-Wiper Seal). Pack set for all the stages along with

Base 'O' Ring makes a Complete Pack Set.

Remove Wipers, Wear Rings and Seals from the internal grooves at the top of each stage carefully.

Check all the stages for physical parameters. (i.e. Straightness, ovalness and damages to internal or external surface)

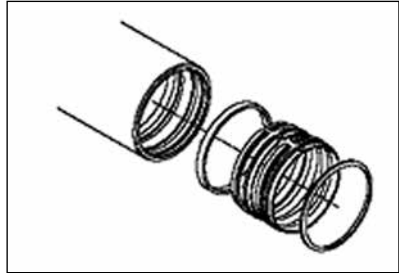
Clean each stage thoroughly, apply sufficient grease to the pack sets and the grooves.

While changing a new pack set to each stage, Start with Seal (Grove 1, starting from inside) followed by Wear rings (Grove 2) & (Grove 3) and the Wiper (Grove 4).

Ensure correct sequence and proper seating of each pack set component in its groove. Incorrect fitting can lead to failure.

## CYLINDER REPAIR INSTRUCTIONS

### Dismantling Pack set:



Remove Wiper (Seal) using a blunt screwdriver.



Remove Wear rings from all the stages including base tube, in the following manner.

Starting with 4th Wear Ring...



Then 3rd wear ring

Then 2nd wear ring



## CYLINDER REPAIR INSTRUCTIONS

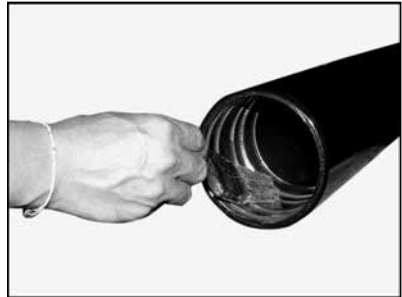
And finally the 1st Wear Ring



Remove Stage Seal using a blunt Screwdriver.



Clean all the stages thoroughly.  
Apply grease in the pack set grooves  
as you take them for assembly.



Insert Stage Seal in the innermost  
grove from top.





## CYLINDER REPAIR INSTRUCTIONS

Insert innermost 1st Wear ring in the 2nd groove from inside.



Insert 2nd Wear ring in the same groove (of the first Wear ring) as shown.



A view of Base tube after assembly of first pair of Wear rings.



Assemble 3rd wear ring in the third groove and finally the 4th Wear Ring.



## CYLINDER REPAIR INSTRUCTIONS

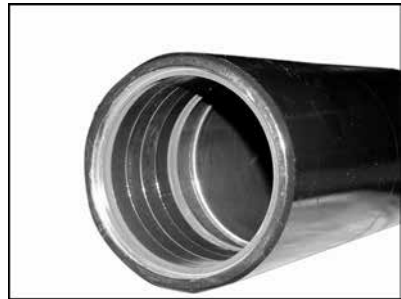
Assemble Wiper in the 4th groove from inside



Inner view of Base tube after the Pack set assembly.

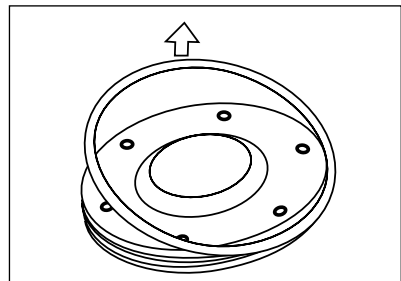


Replace old 'O' Ring with a new one after cleaning the Base plate peripheral groove.



**Note:**

Repeat the same procedure to dismantled and assemble respective Pack sets in all the stages. Also note that this procedure is more or less same for all FE, FC, UCB and to certain extent UBEE Cylinders.



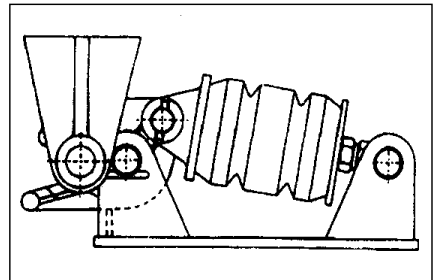
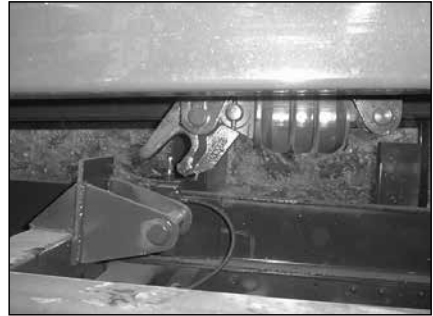
## HYFIX BODY CLAMPS

This is a unique feature of hyva tipping system.

- Hyfix clamp mounted underneath the body, stops rattling of the empty tipper body on the chassis and thus prevents damage to the chassis, structural part and sub-frame and reduce the noise nuisance.
- This hyfix clamp is a revolutionary solution for continuous tipper problem of chassis receiving enormous hammering from the tipper body caused by potholes and bumps on the road.
- Hyfix ensures a fixed connection between tipper body chassis. The continuous bolt and nut, depending on where hyfix is fitted and the dimensions of the tipper body can adjust the compression load in the power block. The compression load can vary from 250 to 1600 kgs.

### WELDING OF THE HYFIX

- The hyfix to be fully supported and welded over the entire surface before the compression load is set, so that no bending moment will arise on the power block and locking.
- Also the Hyfix bracket has to be fully welded.



### DISMANTLING THE HYFIX

- Open the Hyfix with hollow steel bar and remove the setting pin.
- While setting pin is removed and the Hyfix closes, there is a possibility of clamping between the power block and the hook.
- Greasing points should be properly greased at regular intervals.
- Condition of power block and compression rod must be checked twice a year.

## HOSES AND ADAPTERS

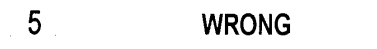
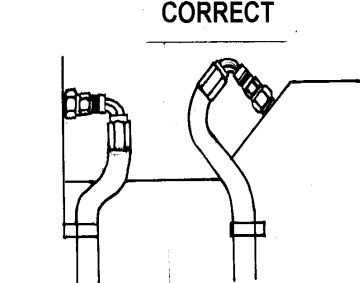
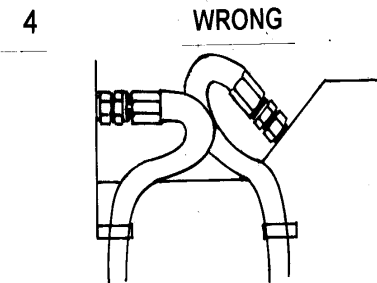
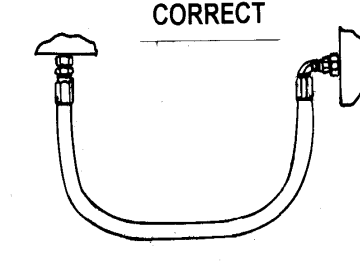
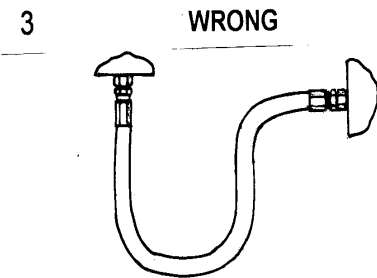
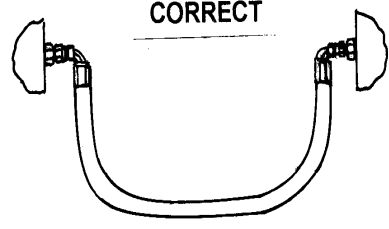
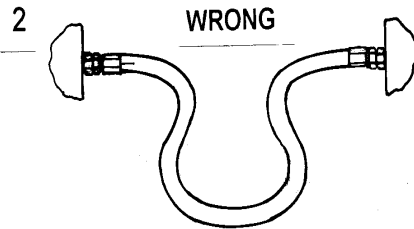
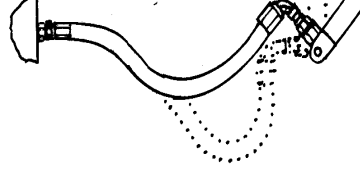
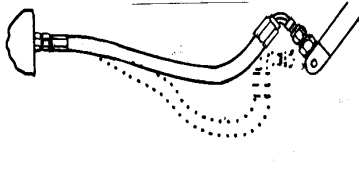
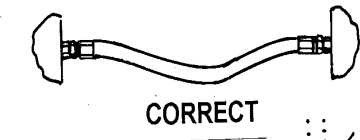
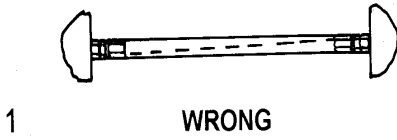
### SUCTION & HIGH PRESSURE HOSES

Make sure the proper hose orientation in order to ensure (a) Same is not getting rubbed with any object (b) there is no twist (c) Hose is not bent too sharply.

- The mounting torque of the hose clamp must be 6 Nm
- Take care the hoses do not come in contact with hot or moving parts like the exhaust or drive shaft.
- Use Nylon Tape to seal the threads of elbows and hose pillars without O-ring, do not use Nylon Tape in combination with elbows or hose pillars with O-ring

Please use Hyva hoses only for replacement whenever required in order to ensure longer and safe life of hydraulic components.

# HOSE ORIENTATION



## MK5 Vs ALPHA SERIES FE CYLINDERS

FE-SERIES (Regular / Mk 5)		FE SERIES (Alpha FL2)	
Sr.No.	PART NO.	DESCRIPTION	PART NO.
		DESCRIPTION	DESCRIPTION
01	71533165	FE-110-3-03205-009A-K1399-HC	70533165
02	71533165S	FE-110-3-02635-009A-K1399-HC	-
03	71554167	FE 129-3-03145-009A-K1399-HD5-HC	70534167
04	71554181	FE 129-3-03400-001A-K1449-HD5-HC	70534181
05	71554201	FE 129-3-03640-001A-K1529-HD5-HC	70534211
06	71554221	FE 129-3-03880-001A-K1609-HD5-HC	70534221
07	71554257	FE 129-3-04270-011A-K1739-HD5-HC	70534257
08	71555201	FE 149-3-03620-001A-K1529-HD5-HC	70535201
09	71555227	FE 149-3-03860-009A-K1644-HD5-HC	70535211
10	71555257	FE 149-3-04250-001A-K1739-HD5-HC	70535257
11	71555261	FE 149-4-04185-001A-K1364-HD5-HC	70535251
12	71555301	FE 149-4-04525-009A-K1484-HD5-HC	70535295
13	71556299	FE 169-4-04500-009A-K1479-HD5-HC	70536291
14	71556321	FE 169-4-04820-001A-K1524-HD5-HC	70536321
15	71556391	FE 169-4-05140-001A-K1604-HD5-HC	70536371
16	71556413	FE 169-5-05220-001A-K1359-HD5-HC	70536391
17	71556455	FE 169-5-05780-009A-K1524-HD5-HC	70536473
18	71557321	FE 191-4-04790-011A-K1527-HD5-HC	70537369
19	71557491	FE 191-5-06010-011A-K1527-HD5-HC	70537531
20	71557411	FE 191-5-05185-011A-K1362-HD5-HC	70537411
			FE A110-3-03150-009-K1400-HD-HC
			FE A129-3-03145-009-K1399-HD-HC
			FE A129-3-03395-001-K1450-HD-HC
			FE A129-3-03635-001-K1530-HD-HC
			FE A129-3-03845-001-K1600-HD-HC
			FE A129-3-04235-001-K1730-HD-HC
			FE A149-3-03620-001-K1530-HD-HC
			FE A149-3-03830-009-K1645-HD-HC
			FE A149-3-04220-001-K1730HD-HC
			FE A149-4-04185-001-K1365-HD-HC
			FE A149-4-04525-009-K1485-HD-HC
			FE A169-4-04505-001-K1449HD-HC
			FE A169-4-04825-001-K1529-HD-HC
			FE A169-4-05105-001-K1599-HD-HC
			FE A169-5-05225-001-K1364-HD-HC
			FE A169-5-05780-009-K1529-HD-HC
			FE A191-4-04805-011-K1532-HD-HC
			FE A191-5-06025-011-K1532-HD-HC
			FE A191-5-05200-011-K1367-HD-HC

## MK5 Vs ALPHA SERIES FC CYLINDERS

FC-SERIES (Regular / Mk 5)		FC SERIES (Alpha FL2)	
Sr.No.	PART NO.	DESCRIPTION	PART NO.
		DESCRIPTION	DESCRIPTION
01	71503161S	FC-110-3-02635-000A-K0343-HC	70513155
02	71503161	FC-110-3-03205-000A-K0343-HC	70513161
03	71504180	FC 129-3-03460-000A-K0343	70514181
04	-	DOSENT EXIST	70514211
05	71524251	FC 129-3-04270-000A-K0343-HD5-HC	70514251
06	71524201	FC 129-3-03640-000A-K0343-HD5-HC	70514201
07	71525293	FC 149-4-04525-070A-K0343-HD5-HC	70515343
08	71525221	FC 149-3-03860-000A-K0343-HD5-HC	70515221
09	71525261	FC 149-4-04185-000A-K0343-HD5-HC	70515261
10	71526261	FC 169-4-04160-000A-K0343-HD5-HC	70516261
11	71526291	FC 169-4-04500-000A-K0343-HD5-HC	70516281
12	71526321	FC 169-4-04820-000A-K0343-HD5-HC	70516321
13	-	DOSENT EXIST	70516351
14	71527593	FC 191-5-07060-014A-K1050-HD5-HC	70517593
15	71527581	FC 191-5-07060-000A-K0343-HD5-HC	70517581
16	71527491	FC 191-5-06010-000A-K0343-HD5-HC	70517491
17	71527751	FC191-5-08130-000A-K0343-HD5-HC	70517701
18	71527991	FC 191-5-09030-004B-K0343-HD5-HC	70517991
19	71528491	FC 214-5-05980-000B-K0343-HD5-HC	70518491
20	71528581	FC 214-5-07030-000B-K0343-HD5-HC	70518581

## FAULT DIAGNOSIS

Type of Failure	Cause of failure	Remedy
1 TIPPING CYLINDER		
Cylinder Bent	Tipping on uneven ground	Tipping should always be carried on even ground.
	Running the vehicle with body not resting on sub frame completely	Move the tipper when the body is completely rest on subframe
	Vehicle toppling in an accident	Check tipping is carried on even surfaces. Check body condition and body alignment w.r.t to Sub frame and chassis.
Cylinder Bulge	Pressure relief valve setting tampered for Max permissible pressure (refer page no. 27)	Replace pressure relief valve
	Pressure relief valve not working properly	Replace pressure relief valve
	Cylinder Stage bulged near stop ring groove. Vehicle jerked while unloading the material.	Check oil quality and replace if necessary.
	Cylinder internal component failure	Replace damaged parts. Check operating practices. Avoid jerking or moving vehicle to and fro while unloading the material.
Cylinder Scoring	O/H cylinder and replace damaged components	O/H cylinder and replace damaged components
	Check cylinder mounting dimensions	Check cylinder mounting dimensions. Cylinder to be mounted in centre of body headboard on top side and centre of the sub frame on bottom side.
	Check maximum play between the brackets and the trunnion is 2mm on each side.	Check maximum play between the brackets and the trunnion is 2mm on each side.
	Check spacers are fitted on both side of piston eye and maximum play of 1.5 mm is maintained between bkt and cylinder eye spacer.	Check spacers are fitted on both side of piston eye and maximum play of 1.5 mm is maintained between bkt and cylinder eye spacer.
	Check operating practices. Tipping should always be carried on even ground.	Check operating practices. Tipping should always be carried on even ground.



# FAULT DIAGNOSIS

Type of Failure	Cause of failure	Remedy
<b>TIPPING CYLINDER (contd.)</b>		
Cylinder Scoring	Scoring in the axis of trunnion due to side load	<p>Avoid unauthorised body extension.</p> <p>Check body for misalignment/deformation and realign/repair if necessary.</p> <p>Check Rr hinge bracket, bushes and pin for excess wear.</p> <p>Replace if necessary.</p> <p>Check load material stuck inside the body. Cleanup stuck material regularly.</p> <p>Vehicle jerked while unloading the material. Check operating practices. Avoid jerking or moving vehicle to and fro while unloading the material.</p>
	Scoring due to damaged external surface (Electrical spark/ external hitting) of Cylinder stages	O/H cylinder and replace damaged components. Cover the cylinder while doing welding near cylinder.
	Sliders Broken inside the cylinder due to side load	O/H cylinder and replace damaged components. Tipping should always be carried on even ground.
	Wrong Fitment of seal	Replace complete seal kit.
	Seals damaged due to scoring of cylinder stages	O/H cylinder replace damage parts alongwith seal kit
Oil Leakage from Cylinder Stages	Cylinder subjected to continuous load	<p>Replace seal kit. Vehicle should be parked with body resting on sub frame or on the body props. Maintain K-value as mentioned on Cylinder identification plate.</p> <p>Check if PTO is continuously engaged. Rectify PTO connection.</p>
Oil Leakage from Cylinder Stages	High oil temperature	<p>Use correct grade of oil in hydraulic system</p> <p>Check Pressure relief valve working properly, replace if pressure found less than 130 bar.</p>
	Contaminated oil	Check oil quality and replace, if necessary.

## FAULT DIAGNOSIS

Type of Failure	Cause of failure	Remedy
<b>TIPPING CYLINDER (contd.)</b>		
Oil Leakage from Cylinder bottom plate	Poor Quality of Seal	Replace bottom plate seal.
	Cylinder subjected to continuous load	K-value should be maintained as mentioned on cylinder identification plate
Piston coming out	Jerky operation	Check operating practices. Avoid jerking or moving vehicle to and fro while unloading the material. Replace damaged parts.
	Poor locking of piston eye	Check Piston eye threads and welded joint condition
Cylinder Base tube Crack	Crack on trunnion side due to side load	Replace base tube. Check cylinder mounting dimensions. Cylinder to be mounted in centre of body headboard on top side and centre of the sub frame on bottom side.
<b>2 TIPPING VALVE</b>		
Oil Leakage from Tipping valve	Worn out seal kit	Replace seal kit
	Scoring inside tipping valve	Maintenance schedule should be followed.
	Oil leakage between valve and valve mounting block	Replace tipping valve if body or spool found scored/ deformed.
		Ensure proper fitment of sealing 'O' ring between tipping valve and valve mounting block.
Malfunctioning of Tipping Valve	Check oil quality and replace if necessary.	
	O/H tipping valve replace seal kit.	
	Replace tipping valve if body or spool found scored/ deformed.	
Low operating Pressure	Check air pressure at tipping valve air inlet ports to be minimum 6 Kg/cm <sup>2</sup> .	
	Pressure relief valve defective	Replace pressure relief valve. Check maintenance schedule is followed.

# FAULT DIAGNOSIS

Type of Failure	Cause of failure	Remedy
<b>TIPPING VALVE (contd)</b>		
Load body coming down in Hold/Neutral position	Non return valve fitted on tipping valve pump port defective	Clean non return valve and replace if necessary
	Internal leakage in control valve	Replace Seal kit
Replace tipping valve if body or spool found scored/ deformed.		
Check Pressure relief valve if partially opened. Replace if pressure found less than 130 bar.		
<b>3 HYDRAULIC PUMP</b>		
Pump not working properly/ insufficient oil flow	Thrust plate / pump housing worn out	Replace damaged parts. Pump should be operate at max. 1200 engine R.P.M.
		Check hydraulic oil quality. Check maintenance schedule is followed.
		Ensure correct grade of oil is used in hydraulic system
		Check and top up Hydraulic oil level
Pump not working properly/ insufficient oil flow	Seal kit damaged / melted	Check if vehicle is run with PTO engaged. Rectify PTO connection.
		O/H Pump, replace damaged parts.
		Use correct grade of oil in hydraulic system
		Check if vehicle is run with PTO engaged. Rectify PTO connection.
Oil Leakage from Pump weep hole	Seal Kit defective	Check and top up Hydraulic oil level
		Ensure gate valve is in open position while operating pump.
<b>HYDRAULIC PUMP (contd)</b>		
		Replace seal kit.

## FAULT DIAGNOSIS

Type of Failure	Cause of failure	Remedy
Pump Crack	High maximum operating pressure	Replace pump.
		Check Maximum working pressure of the system. Max 170 Bar Replace pressure relief valve if necessary. Check Mounting Studs and Bolts for tightness.
Pump Shaft Broken	System pressure high	Replace pressure relief valve.
	Internal components seized	Check oil quality and replace if necessary. Use correct grade of oil in hydraulic system Check for Hydraulic oil level
<b>4 AIR CONTROL VALVE</b>		
Air leakage from air control valve	Improper sealing joint between air control valve and adaptor	Rectify air leakage from sealing joint.
	Air control valve defective	Replace Air Control Valve
Air Leakage from air control valve while tipping	Defective tipping valve seal kit	Check and replace tipping valve seal kit
	Air control valve defective	Check maintenance schedule is followed. Replace Air control valve
Air control valve lever/ knob broken	Forceful operation of air control valve	Check driver operating practice. Lift the ACV knob and then operate the lever.
Oil in air control valve	Tipping valve seal kit defective	Check and replace tipping valve seal kit.
		Check maintenance schedule is followed.
Less air pressure output from tip, low and PTO ports	Air pressure supply below 6 Kg/cm <sup>2</sup>	Ensure air pressure supply from chassis is min 7-8 bar.

## FAULT DIAGNOSIS

Type of Failure	Cause of failure	Remedy
5 POWER TAKE OFF (PTO)  Noise while engaging	Insufficient air pressure	Ensure air pressure supply from chassis is min 7-8 bar.
	Clutch not disengaging completely	Check clutch for complete disengaging.
	High engine idling R.P.M	Adjust engine idling R.P.M
	PTO operating air cylinder sticky	Check for proper working of air cylinder. Replace if necessary.
	PTO air cylinder travel insufficient	Adjust air cylinder stroke for complete engagement of PTO
	Pneumatic operated piston inside PTO not working properly	Check PTO internal parts. Replace damaged parts.
<b>POWER TAKE OFF (PTO) (contd)</b>		
Noise while engaging	Gear teeth worn out	Replace worn out PTO gear. Check gear box countershaft respective gear.
		Ensure air pressure supply from chassis is min 7-8 bar.
		Check clutch for complete disengaging.
		Check driver practice for PTO engaging at higher engine R.P.M. Suggested to engage PTO at engine idling R.P.M.
PTO not working	Low air pressure	Ensure air pressure supply from chassis is min 7-8 bar.
		Check air supply from air control valve to PTO
PTO continuously engaged	Continuous air supply to PTO	Rectify air connection, ensure correct operation of Air control valve
	PTO operating air cylinder stuck up	Replace Air cylinder
	Pneumatic operated piston inside PTO not working properly	Check PTO internal parts, replace necessary parts
Noise in PTO in engaged position	Gear teeth broken	Replace damaged gear. Ensure correct gear backlash of 0.2mm max.

## FAULT DIAGNOSIS

Type of Failure	Cause of failure	Remedy
Oil leakage from PTO	Defective sealing between PTO and Gear box joint	Rectify leakage from sealing joint.
	PTO Housing crack	Replace PTO housing.
		Check PTO mounting studs and bolts for tightness.
<b>6 OIL TANK</b>		
Oil Leakage from oil tank	Defective sealing between accessories and oil tank	Rectify leakage from sealing joints
	Leakage from welded joint	Check tightness of mounting bolts, oil level indicator, adaptors
		Reweld defective joint.
Oil throwing from Tank (Breather filter/ return line filter)	Oil level too high	Ensure correct hydraulic oil level
	Clogged Filters	Replace filters
<b>7 HYDRAULIC HOSES</b>		
Oil leakage from Hose	Incorrect sealing between hose and adaptors	Replace Sealing joints (Dowty seals, 'O' Rings)
		Replace hose.
	Oil leakage from hose crimping	Remove Sharp hose bend very near to crimping area.
		Check for twisting of hose due to wrong fitment.
		Replace hose if damaged. Ensure hose is not rubbing with other parts of vehicle.
Oil leakage due to external damages		

# FAULT DIAGNOSIS

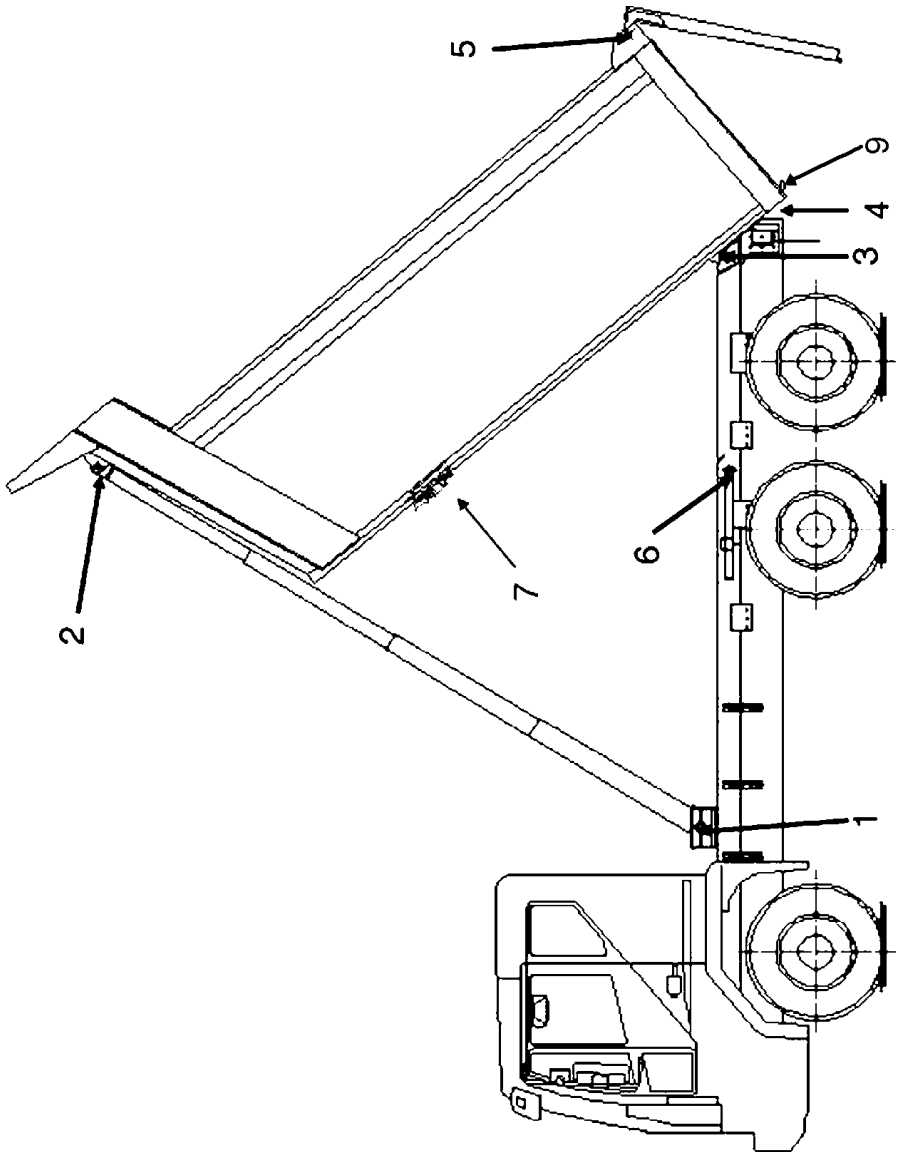
Type of Failure	Cause of failure	Remedy
<b>8 TIPPER BODY</b>		
Sub frame Cracked	Crack due to loose mounting bolts	Reweld & tighten mounting bolts as per specified torque.
	Crack due to improper loading pattern	Tipper should not overloaded. Check if the tipper is used for specified application.
	Crack due to poor welded joints	Reweld the joint.
	Crack due to accident	Repair / replace sub frame
	Crack due to over tightening of Pivot bolts	Pivot bolts should be tighten as per instruction.
Sub frame Bend	Sub Frame bend due to Accident	Replace sub frame
Cylinder Cradle Bend	Cradle bend due to cylinder fouling to cradle	Check tipper body tipping angle should not more than 56 ° Adjust gap between cylinder and cradle. Check rear hinge pin and locking bolt
<b>TIPPER BODY (contd)</b>		
Cylinder Cradle Welding crack	Crack due to poor welded joints	Reweld the cradle joint
	Crack due to improper loading pattern	Tipper should not overloaded. Check if the tipper is used for specified application.
Rear Hinge shaft/ Pin worn out	Shaft /Pin worn-out due to lack of lubrication	Replace rear hinge pin & shaft in necessary. Follow lubrication schedule.
Body Floor Damaged	Body floor damaged due to Rock (Standard body used for rock application)	Ensure tipper usage specified application.
	Body floor damaged due to Accident	Repair Body floor

# FAULT DIAGNOSIS

Type of Failure	Cause of failure	Remedy
Body head board fouling with oil tank	Body head board deform due to wrong application (STD body used for rock application)	Ensure tipper usage specified application.
	Head board fouling due to less gap in between tank and head board	Check tipper body rear hinge bracket is welded in correct position
Side Board Bulge	Side board bulge due to Accident (Toppling)	Realign/repair the side board
	Side board bulge due to improper loading pattern	Ensure loading and operating practice as recommended.
Tail Door Bend	Tail Door bend due to Accident	Repair or replace Tail door
	Tail Door bend due to improper locking mechanism	Realign tail door. Ensure tail door locking mechanism working properly
	Tail Door bend due to over loading	Realign tail door. Tipper should not overloaded.



# GREASING LAYOUT



## GREASING POINTS

- 1 Cylinder mounting bracket greasing - Weekly



- 2 Piston eye greasing - Weekly

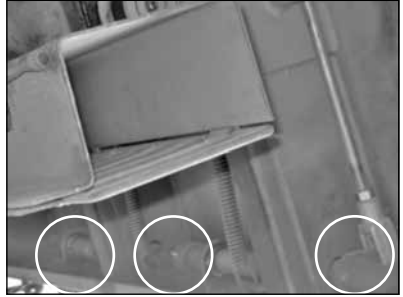


- 3 Rear Hinge greasing - 2 points - Weekly (Mining Trucks-Daily)

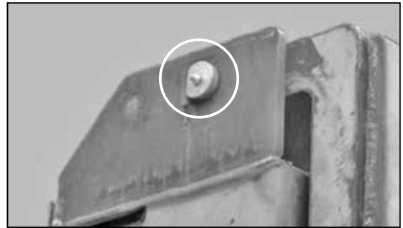


## GREASING POINTS

- 4 Tail Door Locking Mechanism greasing - 3 points. Weekly



- 5 Tail door hinge - 2 points - Weekly

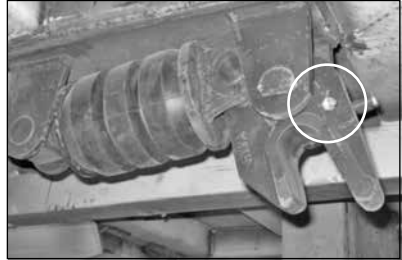


- 6 Body prop - 1Point - Weekly

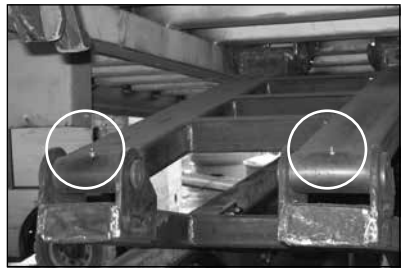


## GREASING POINTS

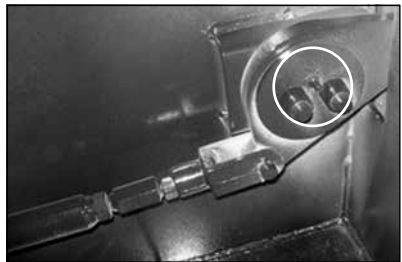
- 7 Hyfix assy. greasing - 1 point - Weekly



- 8 Stabiliser assy. greasing - 6. points - Weekly (All Rock Bodies on Mining Trucks)



- 9 Side locking tail door mechanism - 2 Points - Weekly



## SPECIFIC DENSITIES

### APPROX. SPECIFIC DENSITIES

Material	Kg / Cu. M.	Material	Kg/Cu. M.
Ashes and cinders (wet)	1015-1330	Gravel and sand (dry)	1460-1728
Ashes and cinders (dry)	780-1030	Lime paste	1150-2000
Asphalt (pitch)	2128	Lime Powder	500
Asphalt (massive)	2394	Limestone burnt	775-1000
Asphalt (tar)	1878-2510	Marl	2300-2600
Barley in bulk	1729-1928	Molding sand	1446-1596
Bone meal	700-1100	Oats	415-515
Brick (loose)	1263-1662	Ore	2095-2560
Brick (stacked)	1480-1995	Potatoes	650-700
Brick (general)	630	Pebbles	1350-2000
Cement (loose)	1446	Rubble (broken stone)	1530-1730
Cement (natural)	897	Sand (wet)	1660
Clay (wet)	1760	Sand (dry)	1330
Clay (dy)	1015	Slag and cinders	1263-1660
Coal (anthracite)	897	Snow	80-800
Coke Grit	400-548	Stone (broken, coarse)	1662
Coke	360-615	Stone (broken, fine)	1197-1462
Concrete (wet)	2377	Stone (Grinded)	1600
Concrete (dry)	1240	Sugar in bulk	797-880
Corn and rye	765	Sulphur	1930-2070
Earth (wet)	1600-1800	Super phosphate	1000-1200
Earth (dry)	1200	Town refuse	498
Fertilizer	1030	Wheat	765
Flour of corn	400-500	Wood chips	200
Flour	600-731	Wooden logs deal	320
Garbage	680	Wooden logs oak	420
Gravel	1680	Wooden logs beech	400
Gravel and sand (wet)	1928	Woodwool	50

# WARRANTY GUIDELINES

## WARRANTY GUIDELINES

Warranty N.A. = Warranty Not applicable

Sr. #	Component Description	Type of failure	Reason	Action	Remarks
1	Tipping Cylinder	Cylinder bent	<ul style="list-style-type: none"> <li>• Tipping on uneven ground.</li> <li>• Running of vehicle by keeping body in tipping condition</li> <li>• Vehicle toppling in an accident</li> </ul>	<p>Warranty N.A. Warranty N.A. Warranty N.A.</p>	
		Cylinder Bulge	<ul style="list-style-type: none"> <li>• Tipping Valve set pressure is tampered</li> <li>• Pressure relief valve is malfunctioning.</li> <li>• Sticky spool of tipping valve.</li> <li>• Lowering operation is too fast.</li> <li>• Choked filter</li> </ul>	<p>Warranty N.A. Warranty applicable Warranty applicable Warranty N.A. Warranty N.A.</p>	<p>If Maintenance schedules are followed. If Maintenance schedules are followed</p>
		Cylinder Scoring	<ul style="list-style-type: none"> <li>• Scoring on stages due to slider scoring.</li> <li>• Scoring in the axis of trunnion due to side load.</li> <li>• Scoring due to stop ring dislocation and groove deformation.</li> <li>• Welding spatter and spark jumping due to earthing through cylinder.</li> </ul>	<p>Warranty applicable Warranty N.A. Warranty applicable Warranty N.A.</p>	<p>If maintenance schedules are followed and correct grade of oil is used. Provided correct grade of oil is used &amp; Maintenance schedules are followed.</p>
		Oil leakages from stages	<ul style="list-style-type: none"> <li>• Premature failure of seal</li> <li>• Excess Load</li> <li>• Body extension</li> <li>• Operational abuse</li> <li>• High Oil Temperature due to more number of tipplings.</li> <li>• High Oil temperature due to continuous PTO engagement.</li> <li>• Contaminated oil.</li> <li>• Welding spatter on seal running area.</li> </ul>	<p>Warranty applicable Warranty N.A. Warranty N.A. Warranty N.A. Warranty N.A. Warranty N.A. Warranty N.A. Warranty N.A.</p>	<p>Unauthorized body extension will waive-off all types of warranty claims.</p>

# WARRANTY GUIDELINES

## WARRANTY GUIDELINES (Contd..)

Warranty N.A. = Warranty Not applicable

Sr. #	Component Description	Type of failure	Reason	Action	Remarks
		Oil leakage from cylinder bottom plate	<ul style="list-style-type: none"> <li>Premature failure of seal</li> </ul>	Warranty applicable	
		Piston coming out	<ul style="list-style-type: none"> <li>Jerky operation by pushing backward after unloading.</li> </ul>	Warranty N.A.	
		Cylinder base tube crack	<ul style="list-style-type: none"> <li>Crack is on trunion side due to side loads.</li> <li>Crack is on all around trunion.</li> </ul>	Warranty N.A.	
		Cylinder Stuck	<ul style="list-style-type: none"> <li>Sliders over riding</li> </ul>	Warranty applicable	
2	Tipping Valve	Oil leakage	<ul style="list-style-type: none"> <li>Premature failure of seal.</li> </ul>	Warranty applicable	
		Malfunctioning of valve	<ul style="list-style-type: none"> <li>Sticky spool</li> </ul>	Warranty applicable	Provided maintenance schedules are followed.
		High operating pressure.	<ul style="list-style-type: none"> <li>Pressure relief valve tampered.</li> </ul>	Warranty N.A.	
		Working pressure is too low.	<ul style="list-style-type: none"> <li>Low system pressure as relief valve malfunctioning</li> </ul>	Warranty applicable	
3	Hydraulic pump	Pump fails	<ul style="list-style-type: none"> <li>Relief valve set pressure is tampered</li> <li>No hydraulic oil in the tank</li> <li>Pump operated without opening ball valve.</li> <li>External damage due to hit by external object.</li> <li>Correct grade of oil is not used.</li> <li>Thrust plate &amp; housing wear out due to excess raving of engine rpm.</li> </ul>	Warranty N.A. Warranty N.A. Warranty N.A. Warranty N.A.	Warranty N.A. Warranty N.A.

# WARRANTY GUIDELINES

## WARRANTY GUIDELINES

Warranty N.A. = Warranty Not applicable

Sr. #	Component Description	Type of failure	Reason	Action	Remarks
		Pump leakage	<ul style="list-style-type: none"> <li>Pump reversing procedure not followed</li> <li>Oil contamination levels are high</li> </ul>	Warranty N.A. Warranty N.A.	
		Pump drive shaft broken	<ul style="list-style-type: none"> <li>Manufacturing defect</li> <li>System pressure relief is tampered.</li> <li>Entry of foreign particles.</li> </ul>	Warranty applicable Warranty N.A. Warranty N.A.	
		Thrust plate & wear out of pump housing	<ul style="list-style-type: none"> <li>Excess Raving up of engine</li> <li>Oil contamination</li> </ul>	Warranty N.A. Warranty N.A.	
4	Tipper sub-frame	Sub frame crack	<ul style="list-style-type: none"> <li>Crack develop due to not tightening mounting bolts.</li> <li>Crack due to improper loading pattern.</li> <li>Crack develops near welding joints under normal working conditions.</li> <li>Cracks due to accident to vehicle</li> <li>Twist is due to accident</li> </ul>	Warranty N.A. Warranty N.A. Warranty N.A. Warranty N.A. Warranty N.A.	
5	Hydraulic Hoses	Sub frame twisted Oil leakage	<ul style="list-style-type: none"> <li>Leakage from crimping</li> <li>Burst age of hose.</li> <li>Twisting due to wrong fitment</li> <li>External damage due to rubbing / hitting</li> </ul>	Warranty applicable Warranty applicable Warranty N.A. Warranty N.A.	

**Note:** Warranty is not applicable under following conditions.

1. Wrong application / usage of tipper.
2. Unauthorized body extension.
3. Abusive operating practices.
4. Recommended maintenance schedules not followed.



**Record of Service / Repairs performed**

Date	Particulars of Repair	Hyva authorised Representative Sign.

# VEHICLE PARTICULARS

Model.....

Chassis No. ....

Body Type .....

Body Sr. No. ....

Date of sale .....

Owner's name .....

Address .....

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