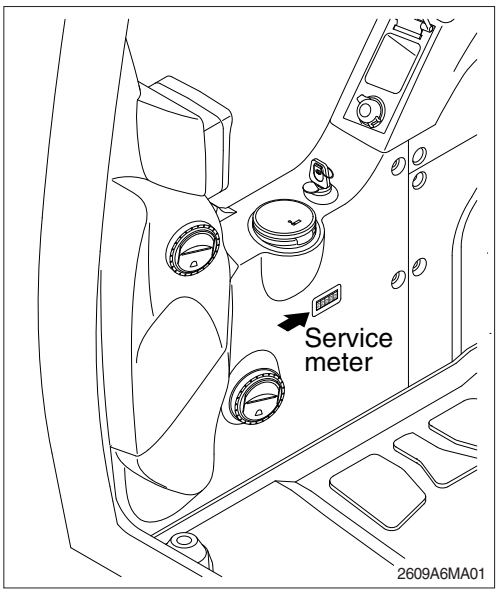
1. INSTRUCTION

1) INTERVAL OF MAINTENANCE



(1) You may inspect and service the machine by the period as described at page 6-11 based on hour meter at control panel.

(2) Shorten the interval of inspect and service depending on site condition. (such as dusty area, quarry, sea shore and etc.)

(3) Practice the entire related details at the same time when the service interval is doubled.
For example, in case of 100hours, carry out all the maintenance「Each 100hours, each 50 hours and daily service」 at the same time.

2) PRECAUTION

(1) Start to maintenance after you have the full knowledge of machine.

(2) The monitor installed on this machine does not entirely guarantee the condition of the machine.
Daily inspection should be performed according to clause 4, maintenance check list.

(3) Engine and hydraulic components have been preset in the factory.
Do not allow unauthorized personnel to reset them.

(4) Drain the used oil and coolant in a container and handle according to the method of handling for industrial waste to meet with regulations of each province or country.

⚠ Hot oil and hot components can cause personal injury. Do not allow hot oil or hot components to contact skin.

△ Accumulated grease and oil on the machine is a fire hazard. Remove this debris with steam cleaning or high pressure water, at least every 1000 hours.

△ Inspect the engine compartment for any trash build up. Remove any trash build up from the engine compartment.

(5) Ask to your local dealer or HD hyundai Construction Equipment for the maintenance advice if unknown.

3) PROPER MAINTENANCE

(1) Replace and repair of parts

It is required to replace the wearable and consumable parts such as bucket tooth, side cutter, filter and etc., regularly.

Replace damaged or worn parts at proper time to keep the performance of machine.

(2) Use genuine parts.

(3) Use the recommended oil.

(4) Remove the dust or water around the inlet of oil tank before supplying oil.

(5) Drain oil when the temperature of oil is warm.

(6) Do not repair anything while operating the engine.

Stop the engine when you fill the oil.

(7) Relieve hydraulic system of the pressure before repairing the hydraulic system.

(8) Confirm if the cluster is in the normal condition after completion of service.

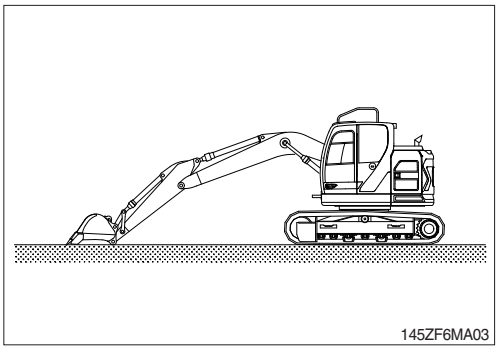
(9) For more detail information of maintenance, please contact local HD Hyundai Construction Equipment dealer.

※ **Be sure to start the maintenance after fully understand the chapter 1, safety hints.**

4) RELIEVING THE PRESSURE IN THE HYDRAULIC SYSTEM

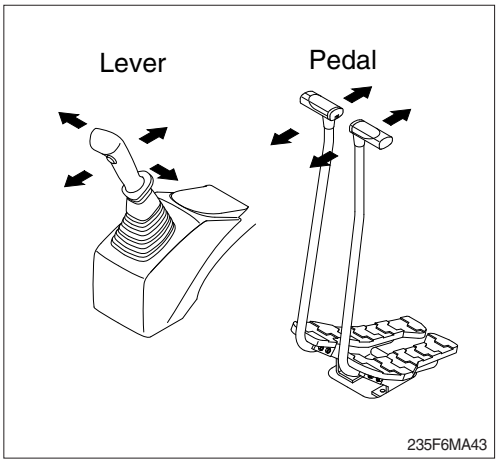
※ **Spouting of oil can cause the accident when loosening the cap or hose right after the operating of machine as the machine or oil is on the high pressure on the condition.**
Be sure to relieve the pressure in the system before repairing hydraulic system.

(1) Place machine in parking position, and stop the engine.

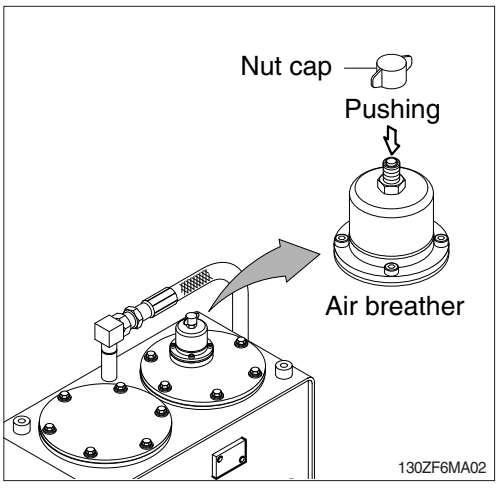


(2) Set the safety lever completely in the release position, operate the control levers and pedals fully to the front, rear, left and right, to release the pressure in the hydraulic circuit.

※ **This does not completely release the pressure, so when serving hydraulic component, loosen the connections slowly and do not stand in the direction where the oil spurt out.**



(3) Remove the nut cap and relieve the pressure in the tank by pushing the top of the rod.



5) PRECAUTION WHEN INSTALLING HYDRAULIC HOSES OR PIPES

(1) Be particularly careful that the joint of hose, pipe and functioning item are not damaged. Avoid contamination.

(2) Assemble after cleaning the hose, pipe and joint of functioning item.

(3) Use genuine parts.

(4) Do not assemble the hose in the condition of twisted or sharp radius.

(5) Keep the specified tighten torque.

6) PERIODICAL REPLACEMENT OF SAFETY PARTS

(1) It is desirable to do periodic maintenance the machine for using the machine safely for a long time.
However, recommend to replace regularly the parts related safety not only safety but maintain satisfied performance.

(2) These parts can cause the disaster of life and material as the quality changes by passing time and it is worn, diluted, and gets fatigued by using repeatedly.
These are the parts which the operator can not judge the remained lifetime of them by visual inspection.

(3) Repair or replace if an abnormality of these parts is found even before the recommended replacement interval.

<table>
<tr><th colspan="3">Periodical replacement of safety parts</th><th>Interval</th></tr>
<tr><td colspan="2" rowspan="2">Engine</td><td>Fuel hose (tank-engine)</td><td rowspan="2">Every
2 years</td></tr>
<tr><td>Heater hose
(heater-engine)</td></tr>
<tr><td rowspan="6">Hydraulic system</td><td rowspan="3">Main circuit</td><td>Pump suction hose</td><td rowspan="3">Every
2 years</td></tr>
<tr><td>Pump delivery hose</td></tr>
<tr><td>Swing hose</td></tr>
<tr><td rowspan="3">Working device</td><td>Boom cylinder line hose</td><td rowspan="3">Every
2 years</td></tr>
<tr><td>Arm cylinder line hose</td></tr>
<tr><td>Bucket cylinder line hose</td></tr>
</table>

※1. Replace O-ring and gasket at the same time when replacing the hose.

2. Replace clamp at the same time if the hose clamp is cracked when checking and replacing the hose.

2. TIGHTENING TORQUE

Use following table for unspecified torque.

1) BOLT AND NUT

(1) Coarse thread

Bolt size	8.8T		10.9T		12.9T	
	kgf · m	lbf · ft	kgf · m	lbf · ft	kgf · m	lbf · ft
M 6×1.0	0.8 ~ 1.2	5.8 ~ 8.6	1.2 ~ 1.8	8.7 ~ 13.0	1.5 ~ 2.1	10.9 ~ 15.1
M 8×1.25	2.0 ~ 3.0	14.5 ~ 21.6	2.8 ~ 4.2	20.3 ~ 30.4	3.4 ~ 5.0	24.6 ~ 36.1
M10×1.5	4.0 ~ 6.0	29.0 ~ 43.3	5.6 ~ 8.4	40.5 ~ 60.8	6.8 ~ 10.0	49.2 ~ 72.3
M12×1.75	6.8 ~ 10.2	50.0 ~ 73.7	9.6 ~ 14.4	69.5 ~ 104	12.3 ~ 16.5	89.0 ~ 119
M14×2.0	10.9 ~ 16.3	78.9 ~ 117	16.3 ~ 21.9	118 ~ 158	19.5 ~ 26.3	141 ~ 190
M16×2.0	17.9 ~ 24.1	130 ~ 174	25.1 ~ 33.9	182 ~ 245	30.2 ~ 40.8	141 ~ 295
M18×2.5	24.8 ~ 33.4	180 ~ 241	34.8 ~ 47.0	252 ~ 340	41.8 ~ 56.4	302 ~ 407
M20×2.5	34.9 ~ 47.1	253 ~ 340	49.1 ~ 66.3	355 ~ 479	58.9 ~ 79.5	426 ~ 575
M22×2.5	46.8 ~ 63.2	339 ~ 457	65.8 ~ 88.8	476 ~ 642	78.9 ~ 106	570 ~ 766
M24×3.0	60.2 ~ 81.4	436 ~ 588	84.6 ~ 114	612 ~ 824	102 ~ 137	738 ~ 991
M30×3.5	120 ~161	868 ~ 1164	168 ~ 227	1216 ~ 1641	202 ~ 272	1461 ~ 1967

(2) Fine thread

Bolt size	8.8T		10.9T		12.9T	
	kgf · m	lbf · ft	kgf · m	lbf · ft	kgf · m	lbf · ft
M 8×1.0	2.1 ~ 3.1	15.2 ~ 22.4	3.0 ~ 4.4	21.7 ~ 31.8	3.6 ~ 5.4	26.1 ~ 39.0
M10×1.25	4.2 ~ 6.2	30.4 ~ 44.9	5.9 ~ 8.7	42.7 ~ 62.9	7.0 ~ 10.4	50.1 ~ 75.2
M12×1.25	7.3 ~ 10.9	52.8 ~ 78.8	10.3 ~ 15.3	74.5 ~ 110	13.1 ~ 17.7	94.8 ~ 128
M14×1.5	12.4 ~ 16.6	89.7 ~ 120	17.4 ~ 23.4	126 ~ 169	20.8 ~ 28.0	151 ~ 202
M16×1.5	18.7 ~ 25.3	136 ~ 182	26.3 ~ 35.5	191 ~ 256	31.6 ~ 42.6	229 ~ 308
M18×1.5	27.1 ~ 36.5	196 ~ 264	38.0 ~ 51.4	275 ~ 371	45.7 ~ 61.7	331 ~ 446
M20×1.5	37.7 ~ 50.9	273 ~ 368	53.1 ~ 71.7	384 ~ 518	63.6 ~ 86.0	460 ~ 622
M22×1.5	51.2 ~ 69.2	370 ~ 500	72.0 ~ 97.2	521 ~ 703	86.4 ~ 116	625 ~ 839
M24×2.0	64.1 ~ 86.5	464 ~ 625	90.1 ~ 121	652 ~ 875	108 ~ 146	782 ~ 1056
M30×2.0	129 ~ 174	933 ~ 1258	181 ~ 245	1310 ~ 1772	217 ~ 294	1570 ~ 2126

2) PIPE AND HOSE (FLARE type)

Thread size (PF)	Width across flat (mm)	kgf · m	lbf · ft
1/4"	19	4	28.9
3/8"	22	5	36.2
1/2"	27	9.5	68.7
3/4"	36	18	130
1"	41	21	152
1-1/4"	50	35	253

3) PIPE AND HOSE (ORFS type)

Thread size (UNF)	Width across flat (mm)	kgf · m	lbf · ft
9/16-18	19	4	28.9
11/16-16	22	5	36.2
13/16-16	27	9.5	68.7
1-3/16-12	36	18	130
1-7/16-12	41	21	152
1-11/16-12	50	35	253

4) FITTING

Thread size	Width across flat (mm)	kgf · m	lbf · ft
1/4"	19	4	28.9
3/8"	22	5	36.2
1/2"	27	9.5	68.7
3/4"	36	18	130
1"	41	21	152
1-1/4"	50	35	253

5) TIGHTENING TORQUE OF MAJOR COMPONENT

No.	Descriptions		Bolt size	Torque	
				kgf · m	lbf · ft
1	Engine	Engine mounting bolt (engine-bracket, FR)	M12 × 1.75	12.8 ± 3.0	92.6 ± 21.7
2		Engine mounting bolt (engine-bracket, RR)	M12 × 1.75	12.8 ± 3.0	92.6 ± 21.7
3		Engine mounting bolt (bracket-frame, FR)	M16 × 2.0	29.7 ± 4.5	215 ± 32.5
4		Engine mounting bolt (bracket-frame, RR)	M16 × 2.0	29.7 ± 4.5	215 ± 32.5
5		Fuel tank mounting bolt	M20 × 2.5	57.8 ± 5.8	418 ± 42.0
6		Radiator mounting bolt	M16 × 2.0	29.7 ± 4.5	215 ± 32.5
7		Coupling mounting socket bolt	M18 × 2.5	32.0 ± 1.6	231 ± 11.6
		Coupling mounting clamp bolt	M16 × 2.0	11.0 ± 1.0	79.6 ± 7.2
8	Hydraulic system	Main pump housing mounting bolt	M10 × 1.5	6.9 ± 1.4	49.9 ± 10.1
9		Main pump mounting socket bolt	M16 × 2.0	35.6 ± 7.1	257 ± 5.1
10		Main control valve mounting bolt	M12 × 1.75	12.2 ± 1.3	88.2 ± 9.4
11		Hydraulic oil tank mounting bolt	M20 × 2.5	57.8 ± 5.8	418 ± 42.0
12		Turning joint mounting bolt, nut	M14 × 2.0	19.6 ± 2.9	142 ± 21.0
13	Power train system	Swing motor mounting bolt	M16 × 2.0	29.6 ± 3.2	214 ± 23.1
14		Swing bearing upper part mounting bolt	M18 × 2.5	41.3 ± 4.0	299 ± 28.9
15		Swing bearing lower part mounting bolt	M16 × 2.0	29.7 ± 3.0	215 ± 21.7
16		Travel motor mounting bolt	M16 × 2.0	23 ± 2.5	166 ± 18.1
17		Sprocket mounting bolt	M16 × 2.0	29.7 ± 3.0	215 ± 21.7
18	Under carriage	Carrier roller mounting bolt, nut	M16 × 2.0	29.7 ± 3.0	215 ± 21.7
19		Track roller mounting bolt	M16 × 2.0	29.7 ± 3.0	215 ± 21.7
20		Track tension cylinder mounting bolt	M16 × 2.0	29.7 ± 3.0	215 ± 21.7
21		Track shoe mounting bolt, nut	M16 × 1.5	25.5 ± 2.5	184± 18.1
22		Track guard mounting bolt	M16 × 2.0	29.6 ± 3.2	214± 23.1
23	Others	Counterweight mounting bolt	M36 × 3.0	308 ± 46	2228 ± 333
24		Cab mounting bolt	M12 × 1.75	12.8 ± 3.0	92.6 ± 21.7
25		Operator's seat mounting bolt	M 8 × 1.25	4.05 ± 0.8	29.3 ± 5.8

※ For tightening torque of engine and hydraulic components, see engine maintenance guide and service manual.

3. FUEL, COOLANT AND LUBRICANTS

1) NEW MACHINE

New machine used and filled with following lubricants.

Description	Specification
Engine oil (API CJ-4, ACEA-E9)	SAE 15W-40, ★SAE 5W-40
Hydraulic oil	HD Hyundai Construction Equipment genuine long life (ISO VG 32, VG 46, VG 68) Conventional hydraulic oil (ISO VG 15★) HD Hyundai Construction Equipment Bio Hydraulic Oil (HBHO, ISO VG 46)
Swing and travel reduction gear	SAE 80W-90 (API GL-5)
Grease	Lithium base grease NLGI No. 2
Fuel	ASTM D975-No. 2, Ultra low sulfur diesel
Coolant	Mixture of 50% ethylene glycol base antifreeze and 50% water. Mixture of 60% ethylene glycol base antifreeze and 40% water.★

SAE : Society of Automotive Engineers
API : American Petroleum Institute
ISO : International Organization for Standardization
NLGI : National Lubricating Grease Institute
ASTM : American Society of Testing and Material

Ultra low sulfur diesel
- sulfur content ≤ 15 ppm

★Cold region
Russia, CIS, Mongolia

2) RECOMMENDED OILS

HD Hyundai Construction Equipment genuine lubricating oils have been developed to offer the best performance and service life for your equipment. These oils have been tested according to the specifications of HD Hyundai Construction Equipment and, therefore, will meet the highest safety and quality requirements. We recommend that you use only HD Hyundai Construction Equipment genuine lubricating oils and grease officially approved by HD Hyundai Construction Equipment.

Service point	Kind of fluid	Capacity ℓ (U.S. gal)	Ambient temperature ℃ (°F) -50 (-58) -30 (-22) -20 (-4) -10 (14) 0 (32) 10 (50) 20 (68) 30 (86) 40 (104)
Engine oil pan	Engine oil	8.0 (2.1)	★SAE 0W-40 ★SAE 5W-40 SAE 10W-30 SAE 10W-40 SAE 15W-40
Swing drive	Gear oil	Type1 : 3.5 (0.9) Type2 : 2.5 (0.7)	★SAE 75W-90
Final drive		2.3×2 (0.6×2)	SAE 80W-90
Hydraulic tank	Hydraulic oil	Tank: 96 (25.4) System: 160 (42.3)	★ISO VG 15 ISO VG 32 ISO VG 46, HBHO VG 46★3 ISO VG 68
Fuel tank	Diesel fuel★1	240 (63.4)	★ASTM D975 NO.1 ASTM D975 NO.2
Fitting (Grease nipple)	Grease	As required	★NLGI NO.1 NLGI NO.2
Radiator (Reservoir tank)	Mixture of antifreeze and soft water★2	20 (5.3)	Ethylene glycol base permanent type (50 : 50) ★Ethylene glycol base permanent type (60 : 40)

SAE : Society of Automotive Engineers
API : American Petroleum Institute
ISO : International Organization for Standardization
NLGI : National Lubricating Grease Institute
ASTM : American Society of Testing and Materia

★ : Cold region (Russia, CIS, Mongolia)
★1 : Ultra low sulfur diesel
- sulfur content ≤ 15 ppm

★2 : Soft water
City water or distilled water

★3 : HD Hyundai Construction Equipment Bio Hydraulic Oil

※ Using any lubricating oils other than HD Hyundai Construction Equipment genuine products may lead to a deterioration of performance and cause damage to major components.

※ Do not mix HD Hyundai Construction Equipment genuine oil with any other lubricating oil as it may result in damage to the systems of major components.

※ Do not use any engine oil other than that specified above, as it may clog the diesel particulate filter(DPF).

※ For HD Hyundai Construction Equipment genuine lubricating oils and grease for use in regions with extremely low temperatures, please contact HD Hyundai Construction Equipment dealers.

4. MAINTENANCE CHECK LIST

1) DAILY SERVICE BEFORE STARTING

Check items	Service	Page
Visual check		
Fuel tank	Check, Refill	6-26
Hydraulic oil level	Check, Add	6-33
Engine oil level	Check, Add	6-18
Coolant level	Check, Add	6-20
Control panel & pilot lamp	Check, Clean	6-43
Prefilter (water, element)	Check, Drain, Clean	6-27
Fan belt tension and damage	Check, Adjust	6-24
Attachment pin and bushing	Lubricate	6-41
· Boom cylinder tube end		
· Boom foot		
· Boom cylinder rod end		
· Arm cylinder tube end		
· Arm cylinder rod end		
· Boom + Arm connecting		
· Bucket cylinder tube end		

2) EVERY 50 HOURS SERVICE

Check items	Service	Page
Fuel tank (water, sediment)	Drain	6-26
Track tension	Check, Adjust	6-38
Swing reduction gear oil	Check, Add	6-36
Bucket linkage and blade pin	Lubricate	6-42
· Bucket cylinder rod end		
· Bucket + Arm connecting		
· Bucket control link + Arm		
· Bucket control rod		
· Bucket link connecting		
· Dozer blade cylinder (rod end, tube end)		
· Dozer blade pivot pin		

3) INITIAL 50 HOURS SERVICE

Check items	Service	Page
Bolts & Nuts · Sprocket mounting bolts · Travel motor mounting bolts · Swing motor mounting bolts · Swing bearing mounting bolts · Engine mounting bolts · Counterweight mounting bolts · Turning joint locating bolts · Track shoe mounting bolts and nuts · Hydraulic pump mounting bolts	Check, Tight	6-8

4) EVERY 200 HOURS SERVICE

Check items	Service	Page
★ Return filter	Replace	6-34
★ Pilot line filter	Replace	6-35
★ Drain filter cartridge	Replace	6-35

★ Replace 3 filters for continuous hydraulic breaker operation only.

5) INITIAL 250 HOURS SERVICE

Check items	Service	Page
Engine oil	Change	6-18, 19
Engine oil filter	Replace	6-18, 19
Prefilter (element)	Replace	6-27
Fuel filter element	Replace	6-28
Pilot line filter element	Replace	6-35
Hydraulic oil return filter	Replace	6-34
Drain filter cartridge	Replace	6-35
Swing reduction gear oil	Change	6-36
Swing reduction gear grease (swing motor type 2)	Check, Add	6-36
Travel reduction gear oil	Change	6-37

※ Service the above items only for the new machine, and thereafter keep the normal service interval.

6) EVERY 250 HOURS SERVICE

Check items	Service	Page
Battery (voltage)	Check, Clean	6-43
Swing bearing grease	Lubricate	6-36
Aircon & heater fresh air filter	Check, Clean	6-46
Bolts & Nuts	Check, Tight	6-8
· Sprocket mounting bolts		
· Travel motor mounting bolts		
· Swing motor mounting bolts		
· Swing bearing mounting bolts		
· Engine mounting bolts		
· Counterweight mounting bolts		
· Turning joint locating bolts		
· Track shoe mounting bolts and nuts		
· Hydraulic pump mounting bolts		
Attachment pins	Lubricate	6-42
· Boom cylinder tube end		
· Boom foot		
· Boom cylinder rod end		
· Arm cylinder tube end		
· Arm cylinder rod end		
· Boom + Arm connecting		
· Bucket cylinder tube end		

7) EVERY 500 HOURS SERVICE

Check items	Service	Page
★Engine oil	Change	6-18, 19
★Engine oil filter	Replace	6-18, 19
Radiator, oil cooler and charge air cooler	Check, Clean	6-23
Prefilter (element)	Replace	6-27
Fuel filter (element)	Replace	6-28
Air cleaner element (primary) ★1	Check, Clean	6-25

★ Use ultra low sulfur fuel only. Ultra low sulfur fuel : Sulfur content ≤ 15 ppm

★1 When working in dusty environments, more frequent cleaning is high recommended.

8) EVERY 1000 HOURS SERVICE

Check items	Service	Page
Air breather element	Replace	6-35
Travel motor reduction gear oil	Change	6-37
Swing reduction gear oil	Change	6-36
Swing reduction gear grease (swing motor type 2)	Check, Add	6-36
Grease in swing gear and pinion	Change	6-37
Hydraulic oil return filter	Replace	6-34
Drain filter cartridge	Replace	6-35
Pilot line filter element	Replace	6-35

9) EVERY 1500 HOURS SERVICE

Check items	Service	Page
Crankcase breather filter	Replace	6-31

10) EVERY 2000 HOURS SERVICE

Check items	Service	Page
Coolant	Change	6-20, 21, 22, 23
Hydraulic oil★1	Change	6-33-1
HBHO★2	Change	6-33-1
Hydraulic tank suction strainer	Check, Clean	6-34
Air cleaner element (primary, safety)★3	Replace	6-25
RCV lever	Check, Lubricate	6-38
Hoses, fittings, clamps (fuel, coolant, hydraulic)	Check, Retighten, Replace	-

★1 Conventional hydraulic oil

★2 If do not want to change HBHO (HD Hyundai Construction Equipment Bio Hydraulic Oil, ISO VG 46) every 2000 hours, contact HD Hyundai Construction Equipment dealer and ask about SAMPLING.

★3 When working in dusty environments, more frequent replacing is highly recommended.

※Change oil every 600 hours of continuous hydraulic breaker operation.

11) EVERY 3000 HOURS SERVICE

Check items	Service	Page
Fan belt	Replace	6-24
Diesel particular filter	Clean	6-30
Oxygen sensor	Replace	6-32

12) EVERY 4000 HOURS SERVICE

Check items	Service	Page
Fuel tank air breather filter	Replace	6-30

13) EVERY 5000 HOURS SERVICE

Check items	Service	Page
Hydraulic oil *4	Change	6-33-1

*4 HD Hyundai Construction Equipment genuine long life hydraulic oil

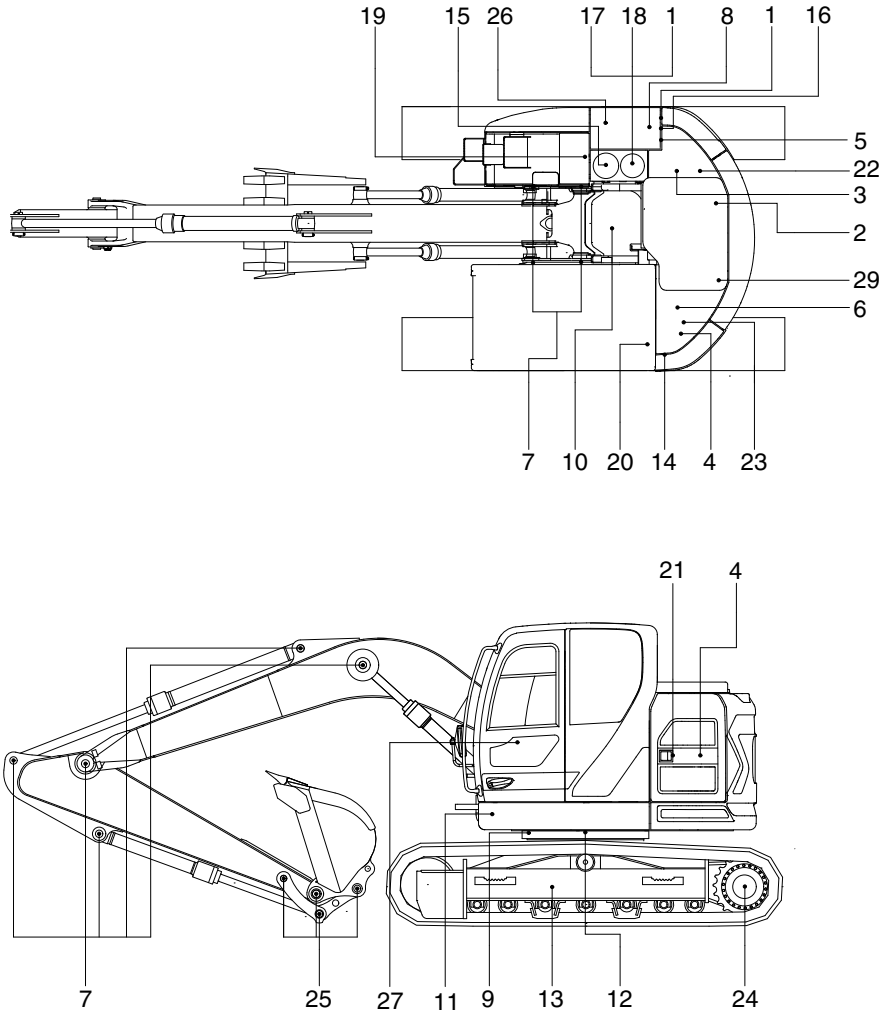
※ **Change oil every 1000 hours of continuous hydraulic breaker operation.**

14) WHEN REQUIRED

Whenever you have trouble in the machine, you must perform the service of related items, system by system.

Check items	Service	Page
Fuel system		
· Fuel tank	Drain or Clean	6-25
· Prefilter	Clean or Replace	6-26
· Fuel filter element	Replace	6-27
Engine lubrication system		
· Engine oil	Change	6-18, 19
· Engine oil filter	Replace	6-18, 19
Engine cooling system		
· Coolant	Add or Change	6-20, 21, 22, 23
· Radiator	Clean or Flush	6-20, 21, 22, 23
· Charge air cooler	Check	6-23
Engine air system		
· Air cleaner element (primary)	Clean, Replace	6-25
· Air cleaner element (safety)	Replace	6-25
Hydraulic system		
· Hydraulic oil	Add or Change	6-33, 33-1
· Return filter	Replace	6-34
· Drain line filter	Replace	6-35
· Pilot line filter	Replace	6-35
· Air breather element	Replace	6-35
· Suction strainer	Clean	6-34
Under carriage		
· Track tension	Check, Adjust	6-38
Bucket		
· Tooth	Replace	6-40
· Side cutter	Replace	6-40
· Linkage	Adjust	6-39
· Bucket assy	Replace	6-39
Air conditioner and heater		
· Fresh air filter	Clean, Replace	6-46
· Recirculation filter	Clean, Replace	6-46

5. MAINTENANCE CHART



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Caution

1. Service intervals are based on the hour meter reading.
2. The number of each item shows the lubrication point on the machine.
3. Stop engine while filling oil, and use no open flames.

Service interval	No.	Description	Service action	Oil symbol	Capacity ℓ (U.S.gal)	Service points No.
10 Hours or daily	1	Hydraulic oil level	Check, Add	HO	96 (25.4)	1
	2	Engine oil level	Check, Add	EO	8.0 (2.1)	1
	4	Radiator coolant	Check, Add	C	20.0 (5.3)	1
	5	Prefilter (water, element)	Check, Drain, Clean	-	-	1
	6	Fan belt tension and damage	Check, Adjust	-	-	1
	8	Fuel tank	Check, Refill	DF	240 (63.4)	1
50 Hours or weekly	8	Fuel tank (water, sediment)	Check, Drain	-	-	1
	10	Swing reduction gear oil	Check, Add	GO	see page 6-36	1
	13	Track tension	Check, Adjust	PGL	-	2
	25	Bucket linkage & blade pins	Check, Add	PGL	-	12
Initial 50 Hours	7	Attachment pins	Check, Add	PGL	-	11/14★3

Service interval	No.	Description	Service action	Oil symbol	Capacity ℓ (U.S.gal)	Service points No.
250 Hours	7	Attachment pins	Check, Add	PGL	-	11/14★4
	9	Swing bearing grease	Check, Add	PGL	-	3
	14	Battery (voltage)	Check, Clean	-	-	1
	20	Aircon and heater fresh air filter	Check, Clean	-	-	1
Initial 250 Hours	2	Engine oil	Change	EO	8.0 (2.1)	1
	3	Engine oil filter	Replace	-	-	1
	5	Prefilter (element)	Replace	-	-	1
	10	Swing reduction gear oil	Change	GO	see page 6-36	1
	11	Swing reduction gear grease (type 2)	Check ,Add	PGL	see page 6-36	1
	15	Hydraulic oil return filter	Replace	-	-	1
	16	Drain filter cartridge	Replace	-	-	1
	19	Pilot line filter element	Replace	-	-	1
	22	Fuel filter element	Replace	-	-	1
	24	Travel reduction gear oil	Change	GO	2.3 (0.6)	2
500 Hours	2	Engine oil	Change	EO	8.0 (2.1)	1
	3	Engine oil filter	Replace	-	-	1
	5	Prefilter (element)	Replace	-	-	1
	21	Air cleaner element (primary)	Check, Clean	-	-	1
	22	Fuel filter element	Replace	-	-	1
	23	Radiator, oil cooler, charge air cooler	Check, Clean	-	-	3
Initial 500 Hours	28	Aircon & heater recirculation filter	Replace	-	-	1
1000 Hours	10	Swing reduction gear oil	Change	GO	see page 6-36	1
	11	Swing reduction gear grease (type 2)	Check ,Add	PGL	see page 6-36	1
	12	Swing gear and pinion grease	Change	PGL	4.3 kg (9.4 lb)	1
	15	Hydraulic oil return filter	Replace	-	-	1
	16	Drain filter cartridge	Replace	-	-	1
	17	Air breather element	Replace	-	-	1
	19	Pilot line filter element	Replace	-	-	1
	24	Travel reduction gear oil	Change	GO	2.3 (0.6)	2
1500 Hours	29	Crankcase breather filter	Replace	-	-	1
2000 Hours	1	Hydraulic oil★1	Change	HO	96 (25.4)	1
	1	Hydraulic oil (HBHO★2)	Change	-	96 (25.4)	1
	4	Radiator coolant	Change	C	20 (5.3)	1
	18	Hydraulic oil suction strainer	Check, Clean	-	-	1
	21	Air cleaner element (primary, safety)	Replace	-	-	2
	27	RCV lever	Check, Lubricate	-	-	2
	-	Hoses, fittings, clamps (fuel, coolant, hydraulic)	Check, Retighten, Replace	-	-	1
3000 Hours	6	Fan belt	Replace	-	-	1
	28	Diesel particular filter	Clean	-	-	1
	28	Oxygen sensor	Replace	-	-	1
4000 Hours	26	Fuel tank air breather filter	Replace	-	-	1
5000 Hours	1	Hydraulic oil★3	Change	HO	96 (25.4)	1
As required	20	Aircon & heater fresh filter	Replace	-	-	1
		Aircon & heater recirculation filter	Clean, Replace	-	-	1
	21	Air cleaner element (primary)	Clean, Replace	-	-	1
		Air cleaner element (safety)	Replace	-	-	1

★1 Conventional hydraulic oil ★2 HD Hyundai Construction Equipment Bio Hydraulic Oil

★3 HD Hyundai Construction Equipment genuine long life ★4 Adjust boom

※ Oil symbol : Please refer to the recommended lubricants for specification.

DF : Diesel fuel GO : Gear oil HO : Hydraulic oil C : Coolant
PGL : Grease EO : Engine oil DEF : DEF/AdBlue®

1) CHECK ENGINE OIL LEVEL

Check the oil level with the machine on a flat ground before starting engine.

(1) Pull out the dipstick and wipe with a clean cloth.

(2) Check the oil level by inserting the dipstick completely into the hole and pulling out again.

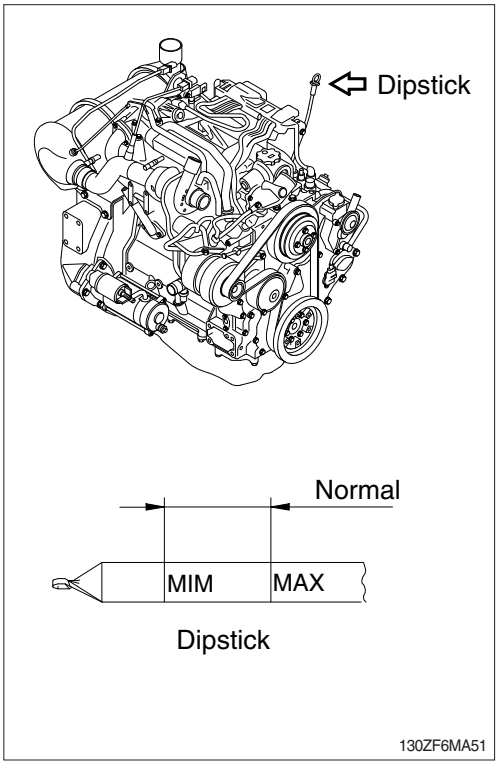
(3) If oil level is LOW, add oil and then check again.

※ **If the oil is contaminated or diluted, change the oil regardless of the regular change interval.**

※ **Check oil level after engine has been stopped for 10 minutes.**

⚠ **Do not operate unless the oil level is in the normal range.**

※ **Keep all parts clean from contaminants. Contaminants may cause rapid wear and shortened component life.**



2) REPLACEMENT OF ENGINE OIL AND OIL FILTER

※ **The engine oil service reset procedure must be completed after the engine oil, and filter have been changed. Refer to the page 3-9 for more information.**

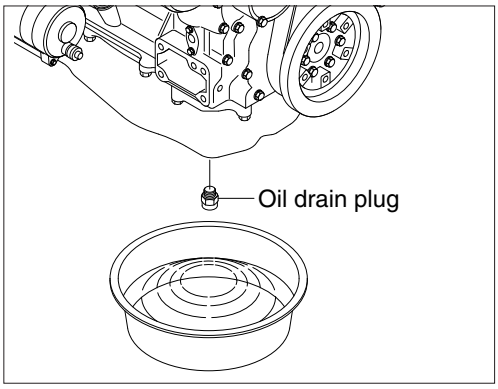
※ **Do not drain the engine lubricating oil when the engine is cold. As the engine lubricating oil cools, suspended waste particles settle on the bottom of the oil pan.**

(1) Warm up the engine.

(2) Remove the oil drain plug. Drain the oil immediately to be sure all the oil and suspended contaminants are removed from the engine.

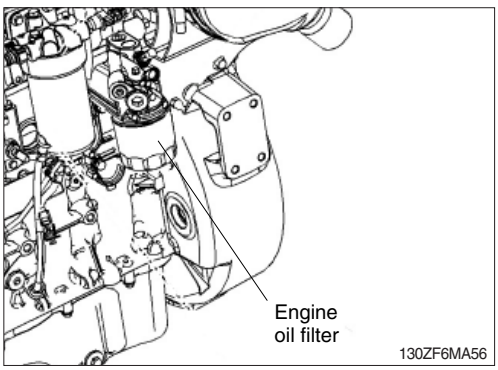
※ **A drain pan with a capacity of 20 liters (5.0 U.S. gallons) will be adequate.**

※ **Disposal of the waste oil in accordance with local regulations.**



(3) Clean around the filter head, remove the filter by the filter wrench and clean the O-ring surface.

※ **The O-ring can stick on the filter head. Be sure it is removed before installing the new filter.**



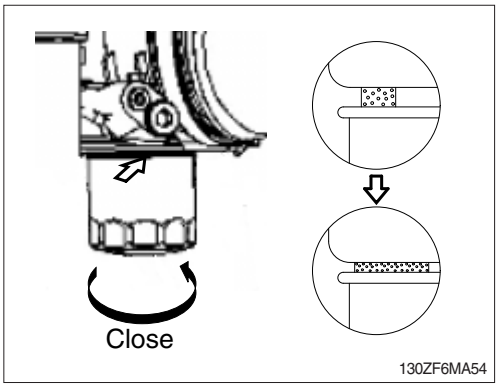
(4) Apply a light film of lubricating oil to the O-ring sealing surface before installing the new oil filter.

※ **Do not fill the oil filter with oil before installing them. This oil would not be filtered and could be contaminated. Contaminated oil can cause accelerated wear to engine components or engine damage..**

(5) Install the new oil filter. Spin on the oil filter until the O-ring contacts the sealing surface.
Then rotate the oil filter 3/4 of a full turn by hand only. Remove the container and disposal of the waste oil in accordance with local regulations.

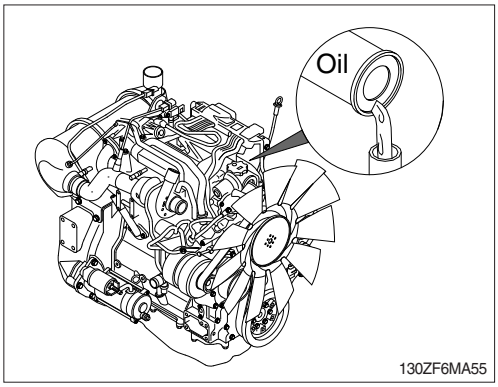
※ **Mechanical over-tightening may distort the threads or damage the filter element seal.**

· Install the filter as specified by the filter manufacturer.

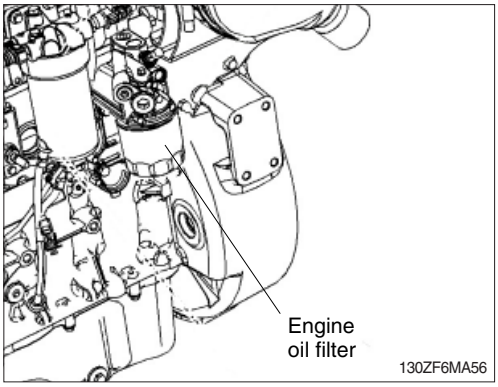


(6) After the oil has drained, the oil drain plug should be cleaned and installed. If necessary, replace the O-ring seal.
- Tightening torque : 3.5 kgf·m (25 lbf·ft)

(7) Fill the engine with clean oil to the proper level.
· Quantity : 8.5 ℓ (2.2 U.S.gallons)



(8) Operate the engine at low idle and inspect for leaks at the filters and the drain plug.
Shut the engine off and check the oil level with the dipstick. Allow 10 minutes for oil to drain down before checking.

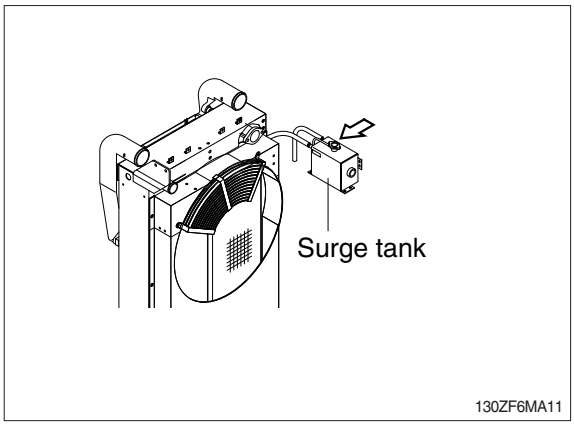


3) CHECK COOLANT

(1) Check if the level of coolant in surge tank is suficient.

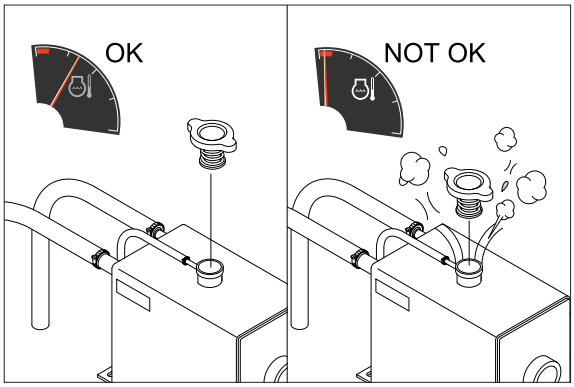
(2) Add the mixture of antifreeze and water after removing the cap of the surge tank if coolant is not sufficient.

(3) Replace gasket of surge tank cap when it is damaged.



⚠ Hot coolant can spray out if surge tank cap is removed while engine is hot. Remove the cap after the engine has cooled down.

※ Do not add cold coolant to a hot engine ;engine castings can be damaged. Allow the engine to cool to below 50 °C (120 °F) before adding coolant.

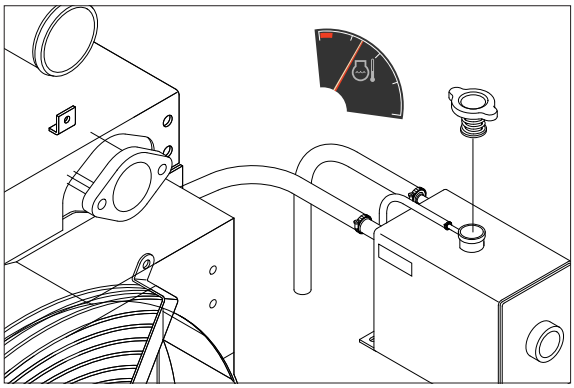


4) FLUSHING AND REFILLING OF RADIATOR

(1) Change coolant

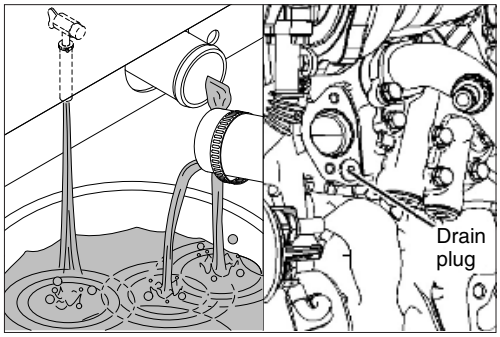
⚠ Avoid prolonged and repeated skin contact with used antifreeze. Such prolonged repeated contact can cause skin disorders or other bodily injury.
Avoid excessive contact-wash thoroughly after contact.
Keep out of reach of children.

※ Protect the environment : Handling and disposal of used antifreeze can be subject to federal, state, and local law regulation.
Use authorized waste disposal facilities, including civic amenity sites and garages providing authorized facilities for the receipt of used antifreeze.
If in doubt, contact your local authorities for guidance as to proper handling of used antifreeze.



⚠ **Wait until the temperature is below 50 ˚C (122 ˚F) before removing the coolant system pressure cap.**
Failure to do so can cause personal injury from heated coolant spray.
Drain the cooling system by opening the drain cock on the radiator and opening the drain plug on the bottom of the engine oil cooler housing.
A drain pan with a capacity of 40 liters (10.6 U.S. gallons) will be adequate.

·Tightening torque
- Drain cock : 2.0±0.4 kgf·m (14.5±2.9 lbf·ft)
- Drain plug (engine) : 5.1 kgf·m (37 lbf·ft)



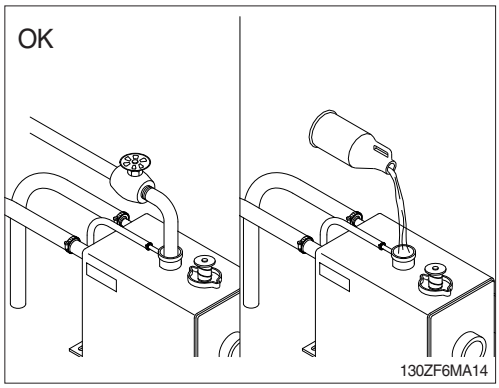
130ZF6MA15

(2) Flushing of cooling system

① Fill the system with a mixture of sodium carbonate and water (or a commercially available equivalent).

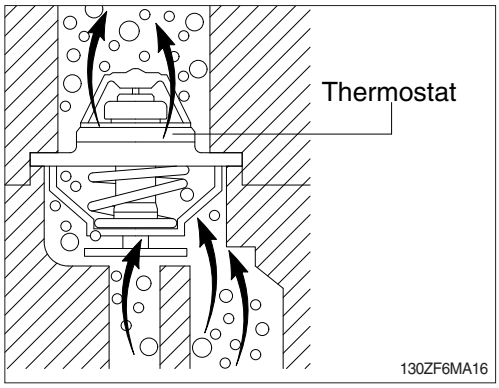
※ **Use 0.5kg (1.0 pound) of sodium carbonate for every 23 liters (6.0 U.S. gallons) of water.**

※ **Do not install the surge tank cap. The engine is to be operated without the cap for this process.**



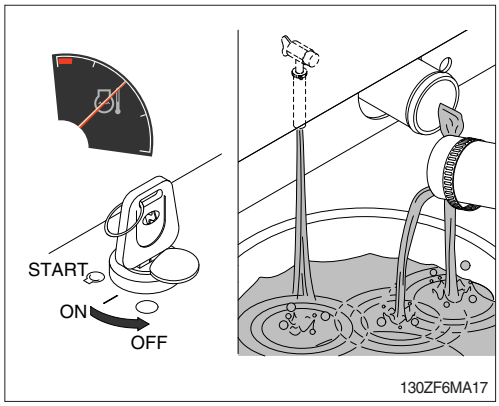
130ZF6MA14

※ **During filling, air must be vented from the engine coolant passages.**
The system must be filled slowly to prevent air locks or serious engine damage can result. Wait 2 to 3 minutes to allow air to be vented, then add mixture to bring the level to the top.



130ZF6MA16

② Operate the engine for 5 minutes with the coolant temperature above 49 to 66 ℃ (120 to 150 ℉). Shut the engine off, and drain the cooling system.

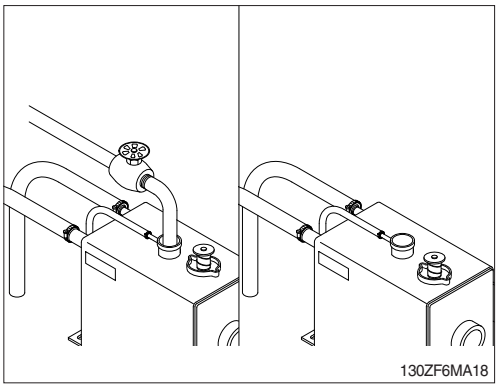


130ZF6MA17

③ Fill the cooling system with clean water.

※ **Be sure to vent the engine and aftercooler for complete filling.**

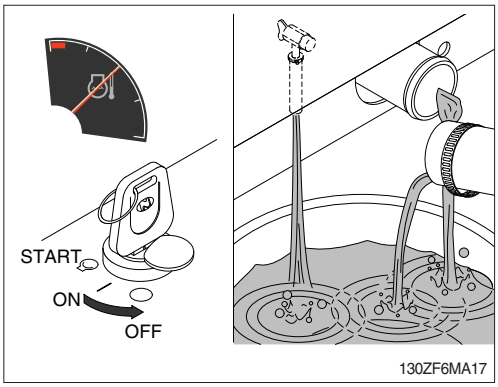
※ **Do not install the surge tank cap or the new coolant filter.**



④ Operate the engine for 5 minutes with the coolant temperature above 49 to 66 °C (120 to 150 °F).

Shut the engine off, and drain the cooling system.

※ **If the water being drained is still dirty, the system must be flushed again until the water is clean.**

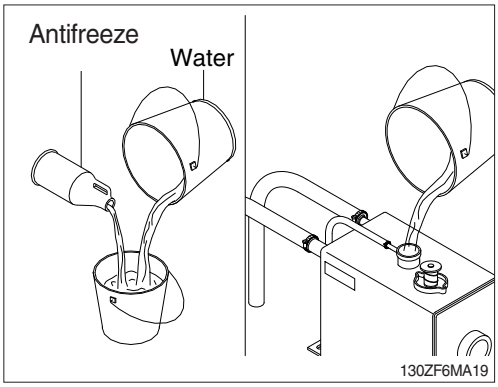


(3) Cooling system filling

① Use a mixture of 50 percent soft water and 50 percent ethylene glycol antifreeze to fill the cooling system. Refer to the page 6-10.

※ **Use the correct amount of DCA4 corrosion inhibitor to protect the cooling system.**

※ **Do not use hard water such as river water or well water.**

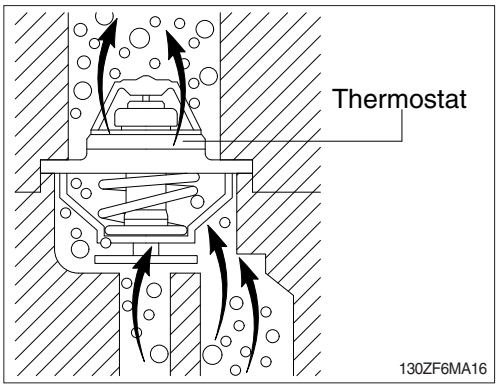


② The system has a maximum fill rate of 5 liters (1.3 U.S. gallons) per minute.

Do not exceed this fill rate.

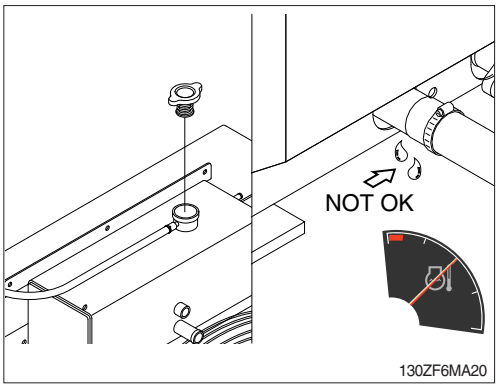
※ **The system must be filled slowly to prevent air locks.**

During filling, air must be vented from the engine coolant passage.



③ Install the pressure cap. Operate the engine until it reaches a temperature 49 to 66 °C (120 to 150 °F), and check for coolant leaks.
Check the coolant level again to make sure the system is full of coolant.

※ **If the gasket of the surge tank cap is damaged, discard the old filler cap and install a new cap.**

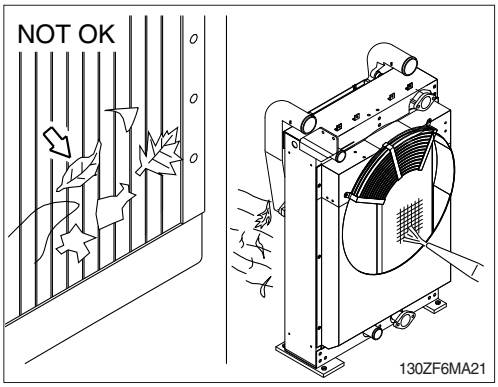


5) CLEAN RADIATOR AND OIL COOLER

Check, and if necessary, clean and dry outside of radiator and oil cooler. After working in a dusty place, clean radiator more frequently.

(1) Visually inspect the radiator for clogged radiator fins.

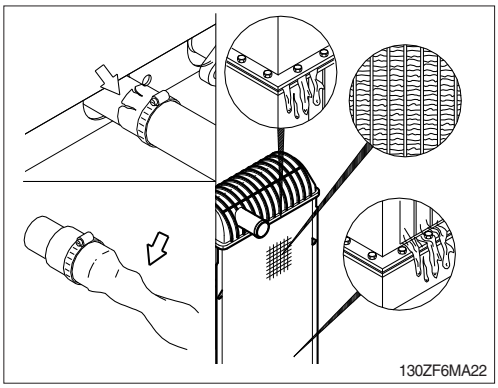
(2) Use 550 kPa (80 psi) air pressure to blow the dirt and debris from the fins.
Blow the air in the opposite direction of the fan air flow.



(3) Visually inspect the radiator for bent or broken fins.

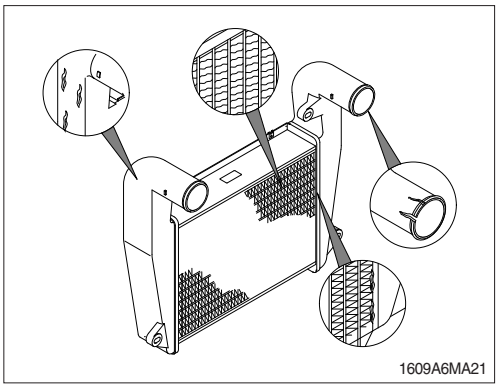
※ **If the radiator must be replaced due to bent or broken fins which can cause the engine to overheat, refer to the manufacturer's replacement procedures.**

(4) Visually inspect the radiator for core leaks.



6) CHECK CHARGE AIR COOLER

Inspect the charge air cooler for dirt and debris blocking the fins. Check for cracks, holes, or other damage. If damage is found, please contact HD Hyundai Construction Equipment distributor.



7) FAN BELT

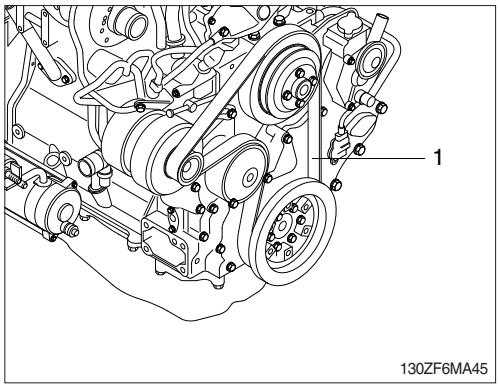
(1) To maximize the engine performance, inspect the belt (1) for wear and for cracking. Replace the belt if the belt is worn or damaged.

(2) Inspect the belt for cracks, splits, glazing, grease, displacement of the cord and evidence of fluid contamination.

(3) The belt must be replaced if the following conditions are present.

① The belt has a crack in more than one rib.

② More than one section of the belt is displaced in one rib of a maximum length of 50.8 mm (2 inch).

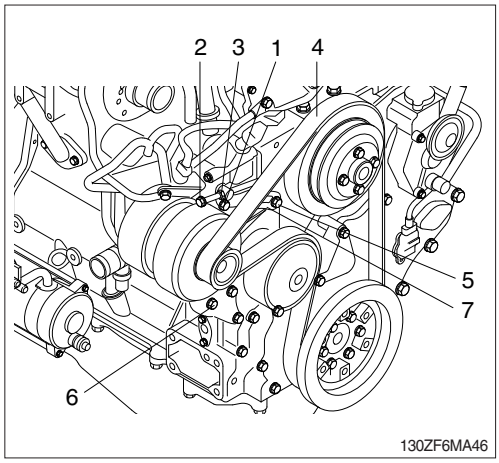


8) REPLAECMENT OF FAN BELT

(1) Loosen bolt (5) and loosen nut and bolt (6). Also, loosen nut and bolt (1).

(2) Loosen nut (3) and turn screw (2) counter clockwise. Turn the screw (2) in order to give clearance to remove the belt (4).

(3) Remove belt (4) and visually check all pulleys that the belt operates. Ensure that all pulleys are clean and free from damage. Ensure that the pulleys rotate freely. Replace any component that is damaged.

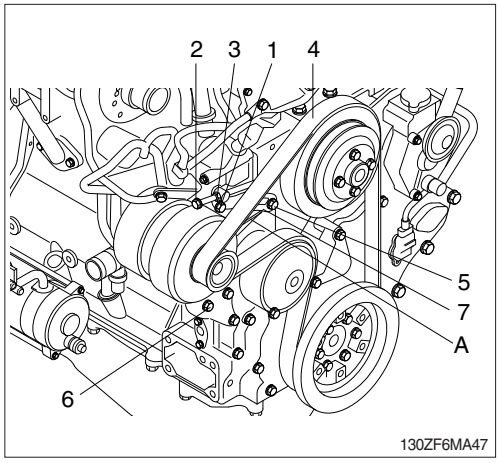


(4) Install the new belt, use belt configuration (A). Visually check that the belt is correctly aligned.

(5) Turn the screw (2) clockwise in order to tension the belt. Ensure that the link adjuster (7) is at the maximum extension, refer to illustration 46 .

(6) Tighten bolt (5), nut, and bolt (6) and tighten nut and bolt (1). Tighten these nuts and bolts to 5.1 kgf·m (37 lbf·ft).

(7) Rotate bolt (2) counter clockwise two complete revolutions and tighten nut (3) to 3.1 kgf·m (37 lbf·ft).



9) INSPECTION OF COOLING FAN

⚠ Personal injury can result from a fan blade failure. Never pull or pry on the fan. This can damage the fan blade and cause fan failure.

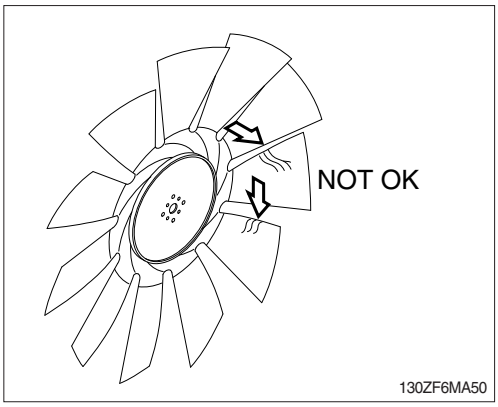
※ Rotate the crankshaft by using the engine barring gear.

※ A visual inspection of the cooling fan is required daily.

Check for cracks, loose rivets, and bent or loose blades.

Check the fan to make sure it is securely mounted. Tighten the capscrews if necessary.

Replace any fan that is damaged.



10) CLEANING OF AIR CLEANER

(1) Primary element

① Turn the cover to the counterclockwise and remove the element.

② Clean the inside of the body.

③ Clean the element with pressurized air.

· Remove the dust inside of the element by the pressurized air (below 3 kgf/cm², 40 psi) forward and backward equally.

④ Inspect for cracks or damage of element by putting a light bulb inside of the element.

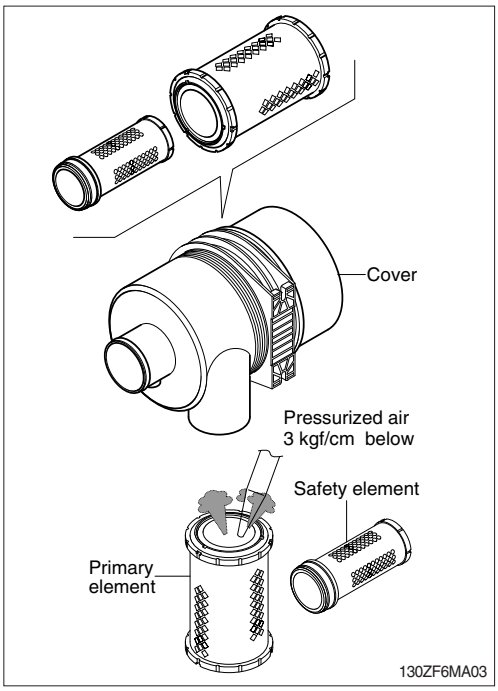
⑤ Insert element and turn the cover to the right.

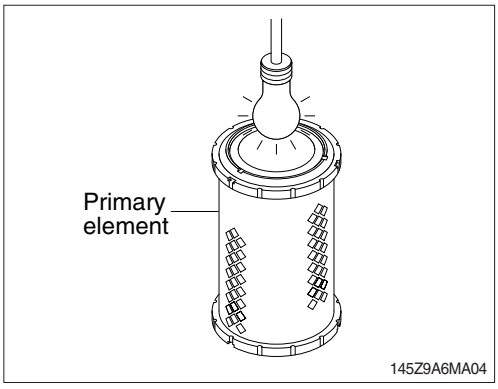
※ Replace the primary element after 4 times cleanings.

(2) Safety element

※ Replace the safety element only when the primary element is cleaned for the 4 times.

※ Always replace the safety element. Never attempt to reuse the safety element by cleaning the element.





11) FUEL TANK

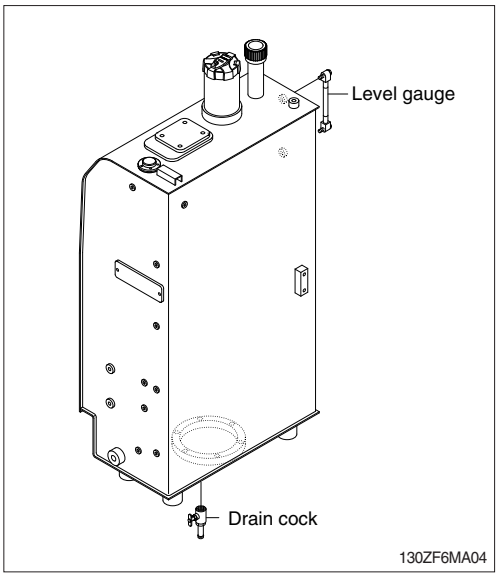
(1) Fill fuel fully when system the operation to minimize water condensation, and check it with fuel gauge before starting the machine.

(2) Drain the water and sediment in the fuel tank by opening the drain cock.

※ **Be sure to LOCK the cap of fuel tank.**

※ **Remove the strainer of the fuel tank and clean it if contaminated.**

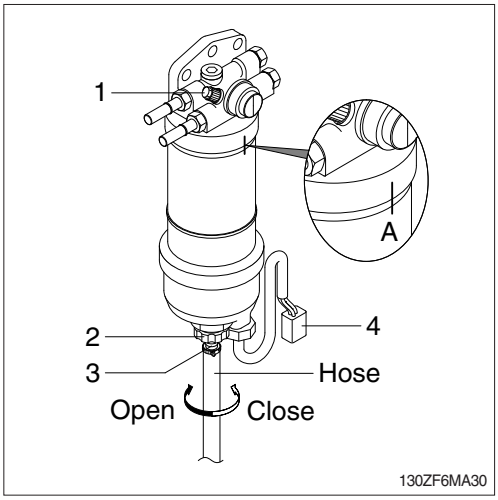
⚠ **Stop the engine when refueling.**
All lights and flames shall be kept at a safe distance while refueling.



12) REPLACEMENT OF PREFILTER (WITH WATER SEPARATOR)

※ **Inspect or drain the collection bowl of water daily and replace the element every 500 hours.**

(1) Remove the element



① Place a suitable container under the water separator in order to catch any fuel that might spill. Clean up any spilled fuel. Clean the outside body of the filter assembly.

② Make a temporary mark (A) across the filter before the assembly is removed.

③ Install a suitable hose onto drain (3). Open the drain valve (2). Rotate the drain valve counterclockwise. Two full turns are required.
Loosen vent screw (1).

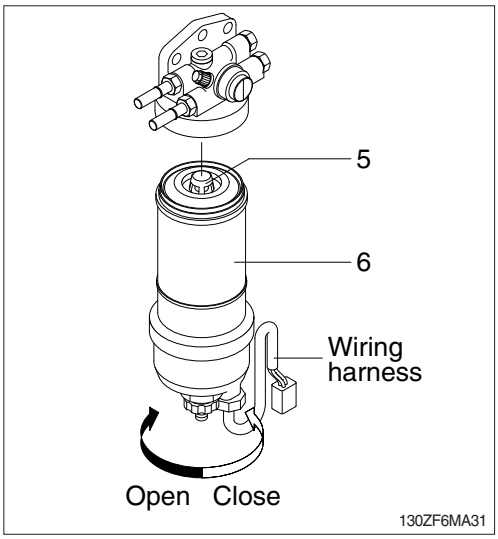
※ **Two complete rotations of the drain valve will release the drain valve from the filter element.**

④ Allow the fuel to drain into the container. Remove the hose and install the drain valve into the filter element.
Engage the threads of the drain valve into the filter element. Do not secure the drain valve.

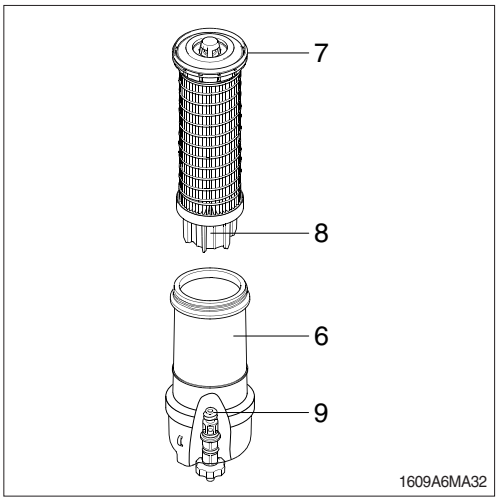
⑤ Tighten the vent screw (1) securely. Remove the wiring harness from connection (4).

⑥ Using a suitable tool, remove the filter bowl (6). Rotate the filter assembly counterclockwise in order to remove the filter assembly. Use a suitable tool in order to remove the filter assembly.

⑦ Rotate the filter element counterclockwise and remove the filter element (5). Clean the filter bowl.



(2) Install the element



① Locate the thread in the filter element (8) onto the threads (9). Spin on the element. Do not tighten.

② Lubricate the O-ring seal (7) with clean engine oil.

※ **Do not fill the bowl with fuel before the assembly is installed.**

③ Do not use a tool in order to install the filter assembly. Tighten the filter bowl (6) by hand.
Install the filter bowl (6) and align with your temporary marks (A).

④ Tighten the drain valve (2) securely. Remove the container and dispose of the fuel in a safe place.

※ **The fuel filter element must be replaced at the same time as the prefilter element.**

13) REPLACEMENT OF FUEL FILTER

(1) Remove the element

① Place a suitable container under the fuel filter in order to catch any fuel that might spill. Clean up any spilled fuel. Clean the outside body of the filter assembly.

② Make a temporary mark (A) across the filter before the assembly is removed. Install a suitable hose onto drain (4). Open the drain valve (3). Rotate the drain valve counterclockwise. Two full turns are required. Loosen vent screw (1).

※ Two complete rotations of the drain valve will release the drain valve from the filter element.

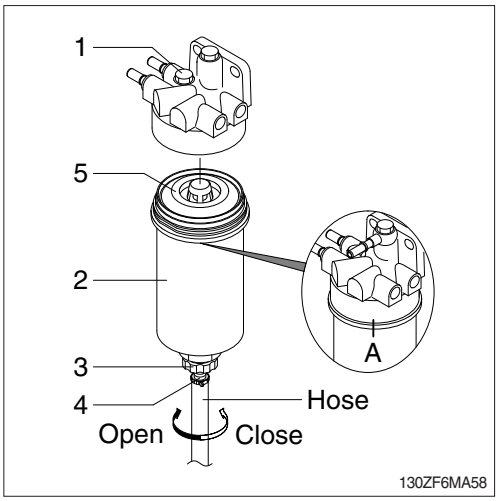
③ Allow the fuel to drain into the container. Remove the hose and install the drain valve into the filter element.

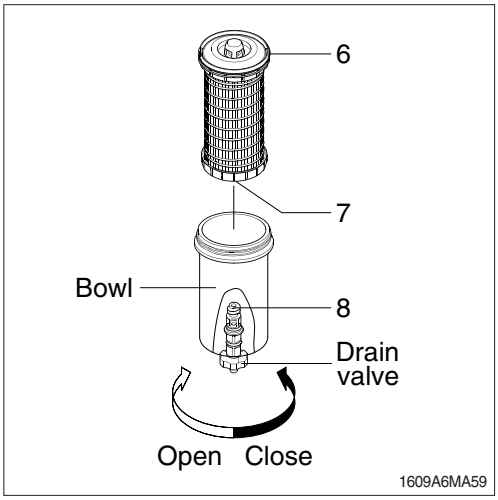
Engage the threads of the drain valve into the filter element. Do not secure the drain valve.

④ Tighten the vent screw (1) securely.

⑤ Remove the filter bowl (2). Rotate the filter assembly counterclockwise in order to remove the assembly. Use a suitable tool in order to remove the filter bowl.

⑥ Rotate the filter element (5) counterclockwise and remove the filter element. Clean the filter bowl.





(2) Install the element

① Locate the thread (7) in the filter element (5) onto the threads (8). Spin on the element. Do not tighten.

② Lubricate the O-ring seal (6) with clean engine oil.

Do NOT fill the filter bowl (2) with fuel before the filter assembly is installed.

③ Do not use a tool in order to install the filter assembly. Tighten the assembly by hand.

Install the filter bowl (2) and align with your temporary marks.

④ Tighten the drain valve (3).

※ The prefilter element must be replaced at the same time as the fuel filter element.

14) BLEEDING THE FUEL SYSTEM

※ If air enters the fuel system, the air must be purged from the fuel system before the engine can be started. Air can enter the fuel system when the following events occur.

- The fuel tank is empty or the fuel tank has been partially drained.
- The low-pressure fuel lines are disconnected.
- A leak exists in the low-pressure fuel system.
- The fuel filter has been replaced.

Use the following procedures in order to remove air from the fuel system.

(1) Ensure that the fuel system is in working order.

(2) Loosen fuel supply line vent screw on the secondary fuel filter.

(3) Operate the hand priming pump. Count the number of operations of the pump. After approximately 80 depression of the pump stop.

※ As the fuel system is primed, the pressure will increase within the fuel system and this increase in pressure can be felt during priming.

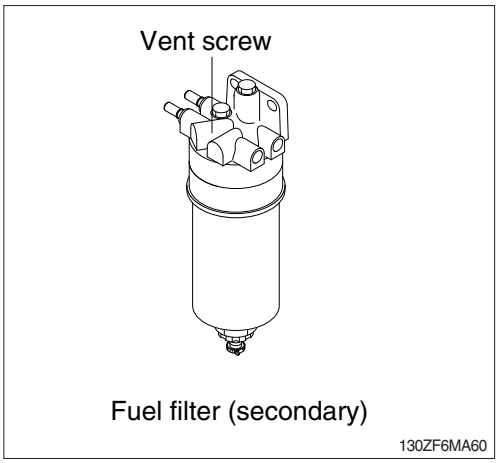
(4) Tighten the vent screw to a torque 25.4 kgf·cm (22.1 lbf·in).

(5) The fuel system should now be primed and the engine should be able to start.

(6) Operate the engine starter and crank the engine. After the engine has started, operate the engine at low idle for a minimum of 5 minutes. Ensure that the fuel system is free from leaks.

※ Operating the engine for this period will help ensure that the fuel system is free of air.
Do not loosen the high-pressure fuel lines in order to purge air from the fuel system. This procedure is not required.

⚠ After the engine has stopped, you must wait for 10 minutes in order to allow the fuel pressure to be purged from the high-pressure fuel lines before any service or repair is performed on the engine fuel lines. The fuel pump, high-pressure fuel lines, and fuel rail contain very high-pressure fuel. Do not loosen any fittings while the engine is running. Personal injury and property damage can result.



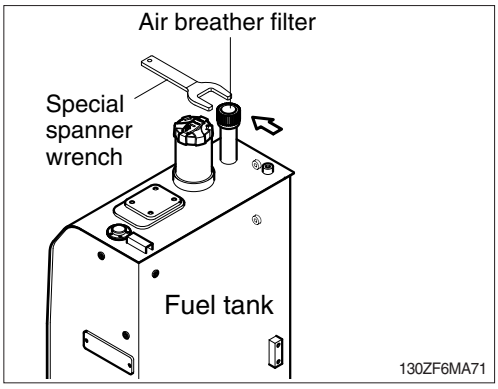
Fuel filter (secondary)
130ZF6MA60

15) REPLACEMENT OF AIR BREATHER FILTER

(1) Stop the engine.

(2) Remove the air breather filter using the special spanner wrench and dispose it in accordance with environmental regulations.

(3) Replace the filter with new one.
· Tightening torque : 0.95±0.05 kgf · m
(6.9±0.4 lbf · ft)

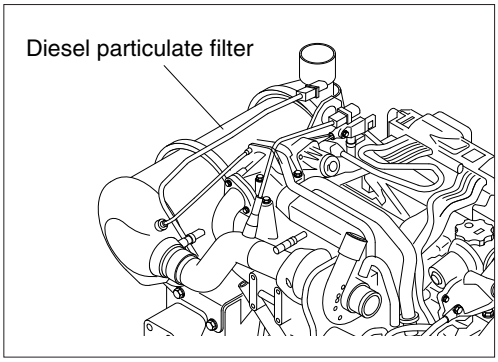


16) CLEANING OF DPF

⚠ **The muffler and diesel particulate filter will become extremely hot during engine operation. A hot muffler and diesel particulate filter can cause serious burns. Allow adequate cooling time before working on or near the muffle and diesel particulate filter.**

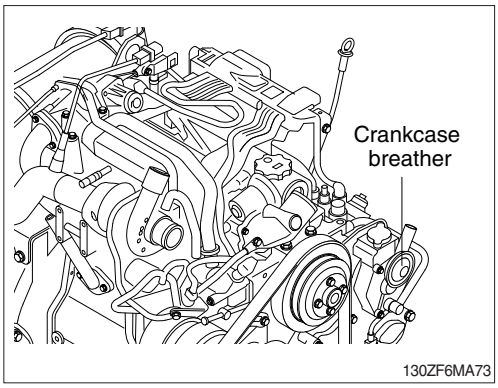
※ **The cleaning of the DPF is required every 3000 hours machine operation in order to remove soot. Contact your near dealer for servicing.**

※ **DPF : Diesel Particulate Filter**



17) CRANKCASE BREATHER FILTER

※ Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.



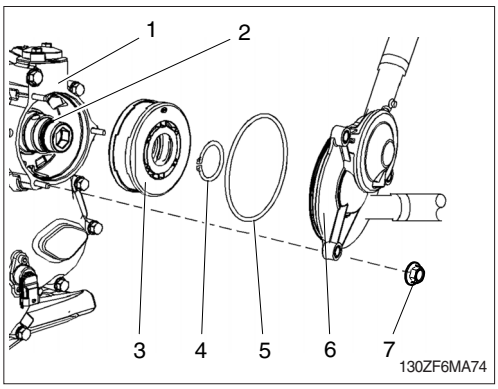
(1) The crankcase breather is a very important component in order to keep your engine emissions compliant.

- The filter element within the crankcase breather must be serviced at the prescribed service interval.
- The correct filter element must be installed before the engine is operated.
- The installation of the filter element is very important.
- The quality of the filter element that is installed is very important.
- The filter element protects the engine from excessive quantities of oil from entering the induction system. The filter element also protects the engine aftertreatment system.

※ Excessive quantities of oil that enter the induction system of the engine can rapidly increase the engine speed without control.

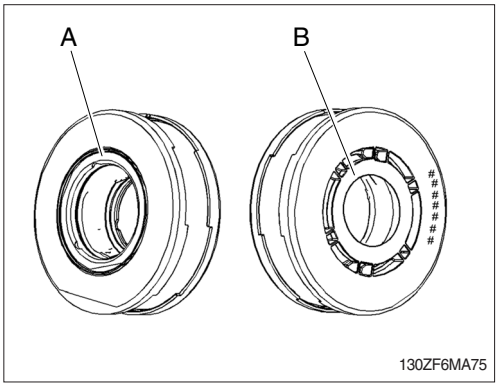
(2) Remove breather element

① If necessary, remove breather pipes on cover (6).
② Remove nuts (7) and remove cover (6) from housing (1).
③ Remove circlip (4) and remove the breather element (3) and discard.
④ Remove the O-ring seal (5) from the cover.



(3) Install breather element

① Install a new O-ring seal (5) onto the cover (6).
※ The breather element must have the correct orientation before installation. Diameter (A) is visibly larger than diameter (B).
② Install diameter (A) of the breather element (3) onto the shaft (2). When correctly installed the part number of the breather element will be visible.
③ Install circlip (4) and cover (6). Install nuts (7) and tighten to 2.5 kfg·m (18 lbf·ft). If necessary, install breather pipes to cover.

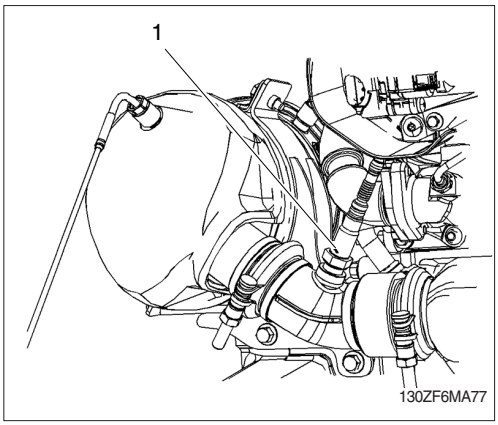


18) REPLACEMENT OF OXYGEN SENSOR

The oxygen sensor must be replaced at 3000 machine operation hours.

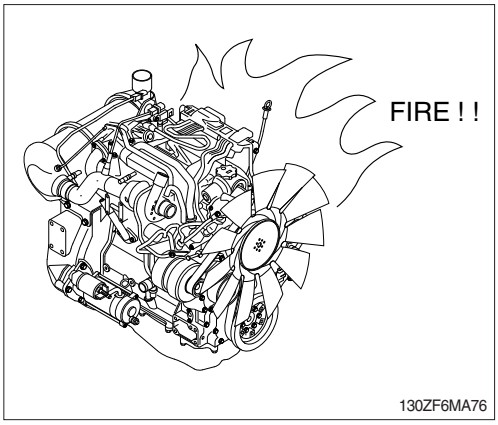
※ **The electronic service tool will be required in order to perform a reset after a new oxygen sensor (1) is installed.**

※ **Contact your near dealer for servicing.**



19) LEAKAGE OF FUEL

⚠ **Be careful and clean the fuel hose, injection pump, fuel filter and other connections as the leakage from these part can cause fire.**



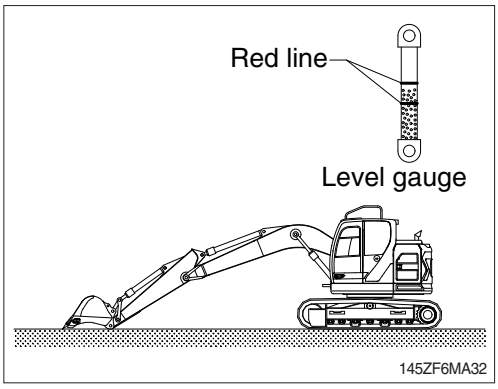
20) HYDRAULIC OIL CHECK

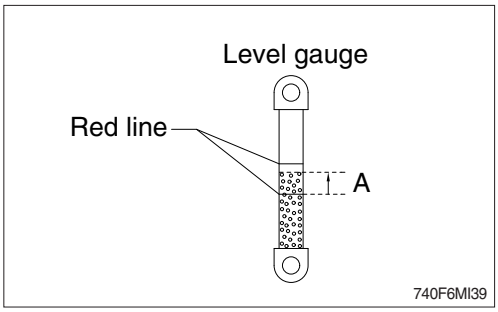
(1) Position the machine as shown in the illustration on the right. Then stop engine.

(2) Check the oil level at the level gauge of hydraulic oil tank.

(3) The oil level is normal if the oil is between the red lines. The oil level depends on the temperature of the hydraulic oil. Refer to the height (A) in the below table to check the level gauge.

Temperature		Height A	
℃	°F	mm	inch
0	32	15	0.6
10	50	25	1.0
20	68	30	1.2
30	86	35	1.4
40	104	40	1.6





※ Refer to page 3-24 for checking the temperature of the hydraulic oil.

※ Add the hydraulic oil, if necessary.

21) FILLING HYDRAULIC OIL

(1) Stop the engine to the position of level check.

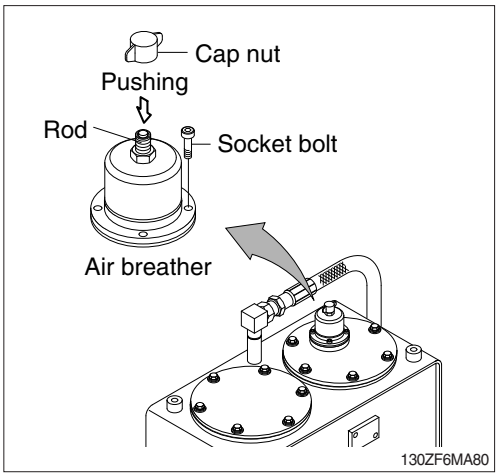
(2) Remove the cap nut and relieve the pressure in the tank by pushing the top of the rod.

(3) Loosen the socket bolts and remove the air breather on the hydraulic oil tank and fill the oil to the specified level.

· Tightening torque : 1.0±0.1 kgf · m
(7.2±0.7 lbf · ft)

(4) Start engine after filling and operate the work equipment several times.

(5) Check the oil level at the level check position after engine stops.



22) CHANGE HYDRAULIC OIL

(1) Lower the bucket on the ground pulling the arm and bucket cylinder to the maximum.

(2) Remove the cap nut and relieve the pressure in the tank by pushing the top of the rod.

(3) Remove the cover.
· Tightening torque : 6.9±1.4 kgf · m
(50±10 lbf · ft)

(4) Prepare a suitable container.

(5) To drain the oil open the drain valve at the bottom of the oil tank.

(6) Fill proper amount of recommended oil.

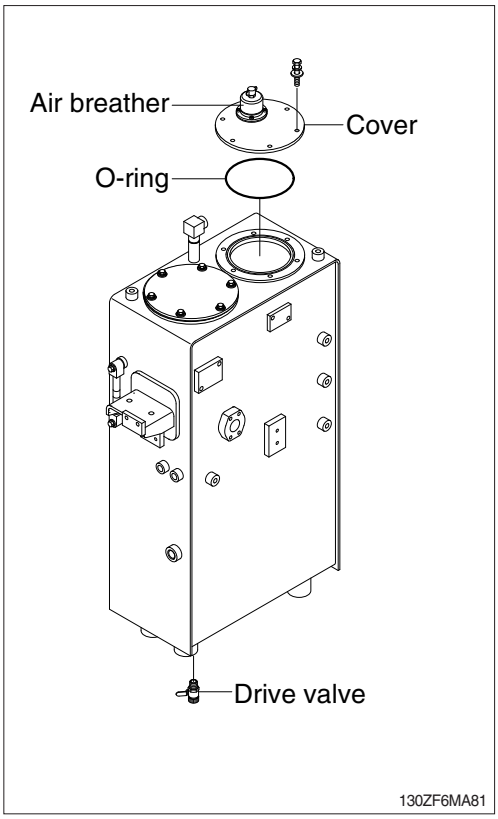
(7) Put the breather in the right position.

(8) Bleed air hydraulic pump loosen the air breather at top of hydraulic pump assembly.

(9) Start engine and run continually. Release the air by full stroke of each control lever.

※ Incase of injecting HBHO (HD Hyundai Construction Equipment Bio Hydraulic Oil) to machines that have formerly used different hydraulic oil, the proportion of residual oil must not exceed 2 %

※ Do not mix any other Bio oil, use only HBHO as bio oil.
If changing to Bio oil, contact HD Hyundai Construction Equipment dealer.



23) CLEAN SUCTION STRAINER

Clean suction strainer as follows paying attention to the cause to be kept during oil filling.

(1) Remove the cover on the top of the oil tank.
· Tightening torque : 6.9±1.4 kgf · m
(50±10 lbf · ft)

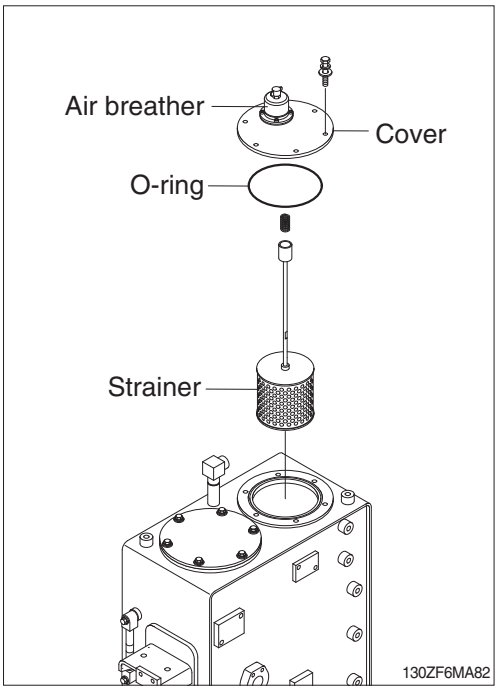
(2) Pull out the strainer in the tank.

(3) Wash the foreign material on the suction strainer with gasoline or cleaning oil.

(4) Replace the suction strainer if it is damaged.

(5) Assemble with reverse order of disassembly.
Be sure to install a new O-ring and reinsert in the oil tank.

※ **Loosen the bolt slowly at the cover can be spring out by the spring when removing it.**



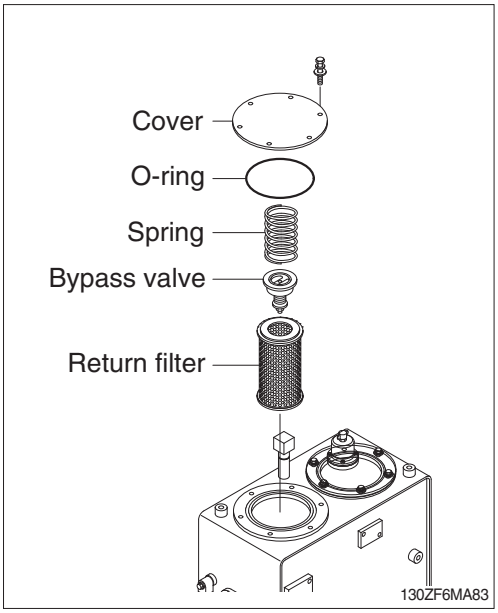
24) REPLACEMENT OF RETURN FILTER

Replace as follows paying attention to the cause to be kept during the replacement.

(1) Remove the cover.
· Tightening torque : 6.9±1.4 kgf · m
(50±10 lbf · ft)

(2) Remove the spring, by-pass valve, and return filter in the tank.

(3) Replace the filter element with new one.



25) REPLACEMENT OF ELEMENT IN HYDRAULIC TANK BREATHER

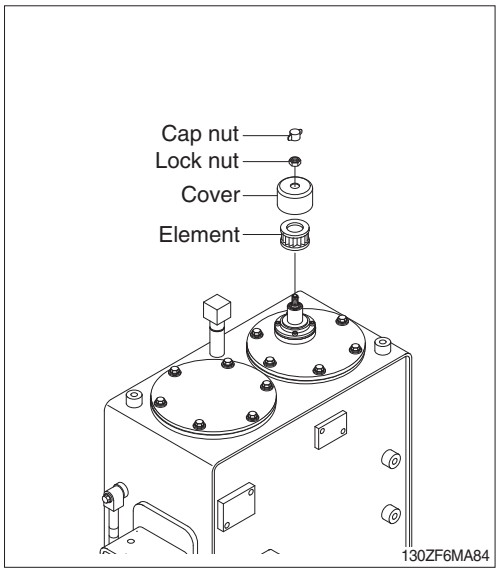
(1) Remove the cap nut and relieve the pressure in the tank by pushing the top of the rod.

(2) Loosen the nut and remove the cover.

(3) Pull out the filter element.

(4) Replace the filter element new one.

(5) Reassemble by reverse order of disassembly.
· Lock nut tightening torque : 0.4~0.5 kgf · m
(2.9~3.6 lbf · ft)

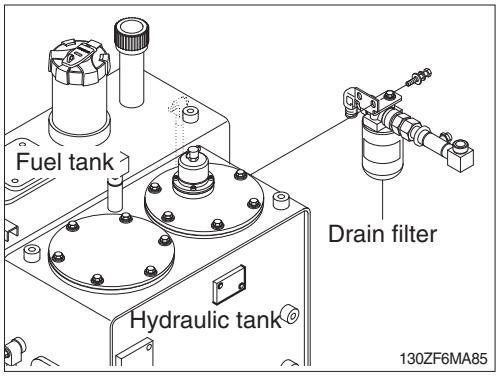


26) REPLACE OF DRAIN FILTER CARTRIDGE

Clean the dust around filter and replace with new one after removing the cartridge.

※ **Tighten about 2/3 turn more after the gasket of cartridge contacts seal side of filter head for mounting.**

※ **Change cartridge after initial 1000 hours of operation. Thereafter, change cartridge every 1000 hours.**



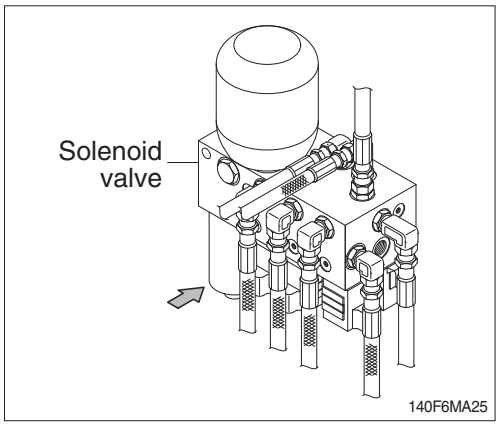
27) REPLACE OF PILOT LINE FILTER

(1) Loosen the nut positioned on the filter body.

(2) Pull out the filter element and clean filter housing.

(3) Install the new element and tighten using specified torque.

※ **Change cartridge after initial 1000 hours of operation. Thereafter, change cartridge every 1000 hours.**

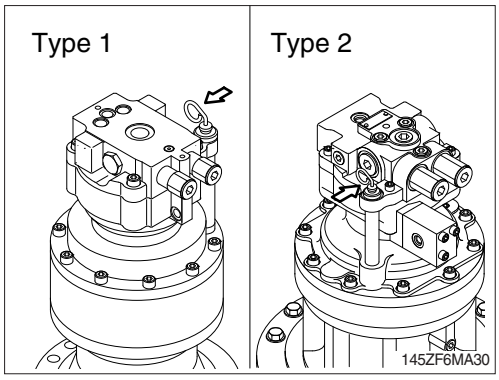


28) CHECK THE SWING REDUCTION GEAR OIL

(1) Pull out the dipstick and clean it.

(2) Insert it again.

(3) Pull out one more time to check the oil level and fill the oil if the level is not sufficient.



29) CHANGE SWING REDUCTION GEAR OIL

(1) Raise the temperature of oil by swinging the machine before replace the oil and park the machine on the flat ground.

(2) Prepare a proper container.

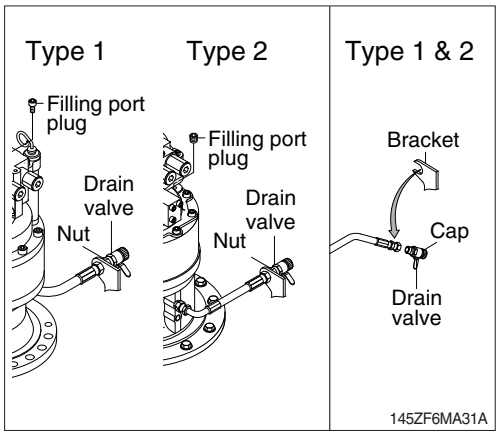
(3) Loosen the nut and take off the hose from the bracket.

(4) Remove the cap and open the drain valve.

(5) Clean around the valve and close the drain valve and cap.

(6) Fit the hose on the bracket and tighten the nut firmly.

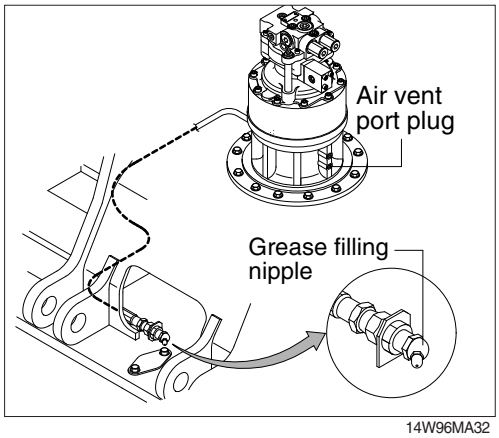
(7) Fill proper amount of recommended oil.
- Amount of oil
  - Type 1 : 3.5 ℓ (0.9 U.S.gal)
  - Type 2 : 2.5 ℓ (0.7 U.S.gal)



30) LUBRICATE SWING REDUCTION GEAR (TYPE 2 ONLY)

(1) Remove air vent plug.

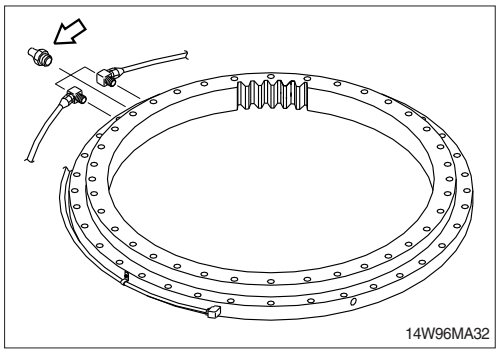
(2) Lubricate NLGI No.2 with grease gun until comes out new grease from air vent port.
- Amount of oil : 0.35 kg (0.09 lb)



31) LUBRICATE SWING BEARING

(1) Grease at 3 fitting.

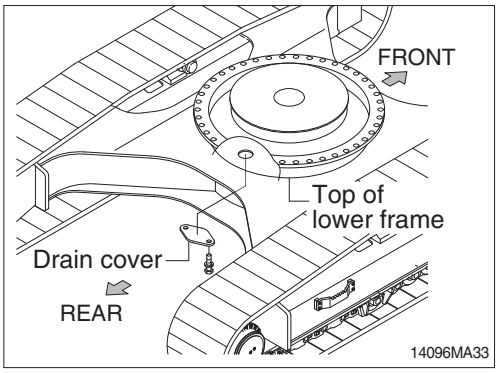
※ **Lubricate every 250 hours.**



32) SWING GEAR AND PINION

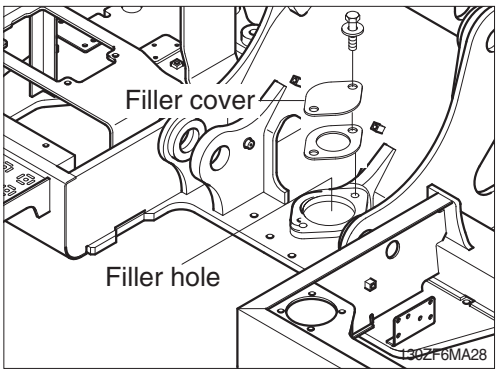
(1) Drain old grease

① Remove under cover of lower frame.
② Remove drain cover of lower frame.
③ Remove filler cover of upper frame.
④ Operate full turn (360˚) of swing several times.



(2) Refill new grease

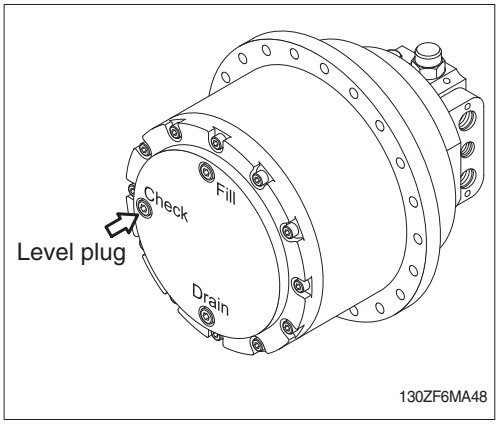
① Install drain cover.
② Fill with new grease.
③ Install filler cover.
· Capacity : 4.3 kg (9.4 lb)



33) CHECK THE TRAVEL REDUCTION GEAR OIL

(1) Operate the machine to the position of drain plug down to the flat ground.

(2) Loosen the level plug and check the oil level. If the level is at the hole of the plug, it is normal. Fill the oil if it is not sufficient.



34) CHANGE OF THE TRAVEL REDUCTION GEAR OIL

(1) Raise the temperature of the oil by traveling machine first.

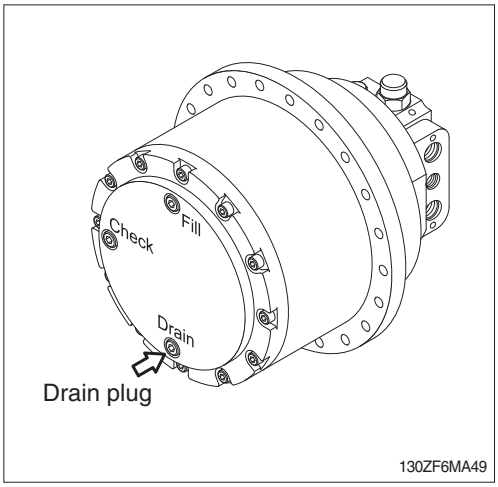
(2) Stop when the position of the drain plug is down.

(3) Loosen the level plug and then the drain plug.

(4) Drain the oil to adequate container.

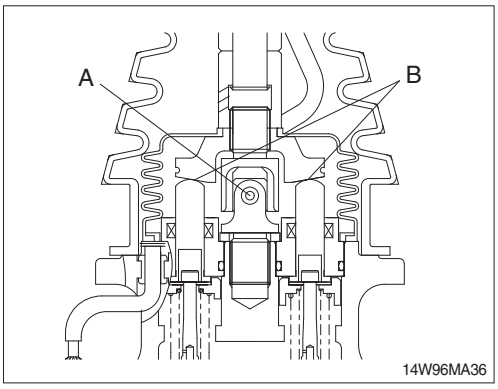
(5) Tighten the drain plug and fill specified amount of oil at filling port.
· Amount of gear oil : 2.3 ℓ (0.6 U.S.gal)

(6) Tighten the level plug and travel slowly to check if there is any leakage of oil.



35) LUBRICATE RCV LEVER

Remove the bellows and with a grease gun grease the joint part (A) and sliding parts (B).



36) ADJUSTMENT OF TRACK TENSION

※ **It is important to adjust the tension of track properly to extend the lifetime of track and traveling device.**

※ **The wear of pins and bushings on the undercarriage will vary with the working conditions and soil properties.**
It is thus necessary to continually inspect the track tension so as to maintain the standard tension on it.

(1) Raise the chassis with the boom and arm.

(2) Measure the distance between bottom of track frame on track center and back of shoe.

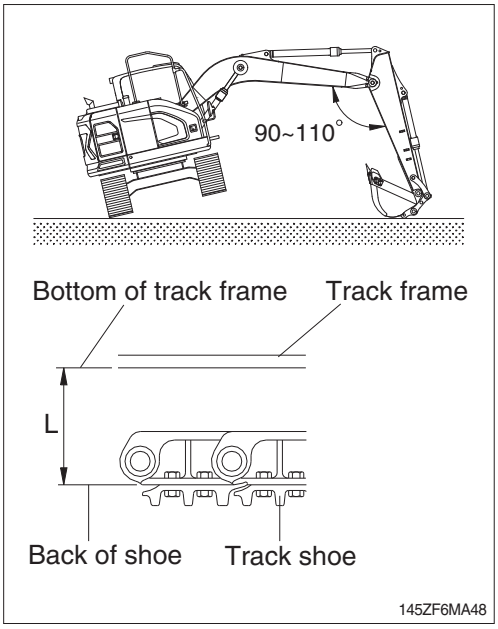
※ **Remove mud with rotating the track before measuring.**

(3) If the tension is tight, drain the grease in the grease nipple and if the tension is loose, charge the grease.

⚠ **Personal injury or death can result from grease under pressure.**

⚠ **Unscrew the grease nipple after release the tension by pushing the poppet only when necessarily required.**
Grease leaking hole is not existing. So, while unscrew the grease nipple, grease is not leaking until the grease nipple is completely coming out. If the tension is not released in advance, the grease nipple can be suddenly popped out by pressurized grease.

※ When the grease is drained, move the track to the forward and backward slightly.
If the track tension is loose even after the grease is charged to the maximum, change the pins and bushings as there are worn seriously.



Length (L)	
240~270 mm	9.4~10.6"

37) REPLACEMENT OF BUCKET

⚠ **When knocking the pin in with a hammer, metal particles may fly and cause serious injury, particularly if they get into your eyes. When carrying out this operation, always wear goggles, helmet, gloves, and other protective equipment.**

※ **When the bucket is removed, place it in a stable condition.**

※ **When performing joint work, make sure signals to each other and work carefully for safety's sake.**

(1) Lower the bucket on the ground as the picture shown in the right.

(2) Lock the safety lever to the LOCK position and stop the engine.

(3) Remove the stopper bolts (1) and nuts (2), then remove pins (3, 4) and remove the bucket.

※ **When removing the pins, place the bucket so that it is in light contact with the ground.**

※ **If the bucket is lowered strongly to the ground, the resistance will be increased and it will be difficult to remove the pins.**

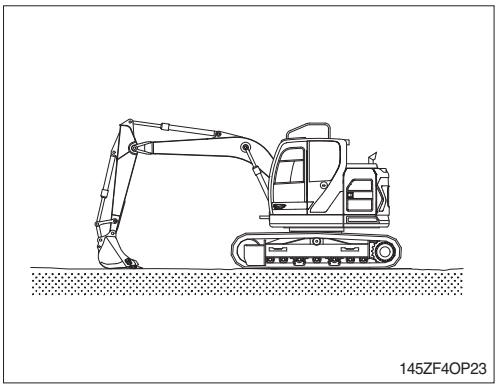
※ **After remove the pins, make sure that they do not become contaminated with sand or mud and that the seals of bushing on both sides do not become damaged.**

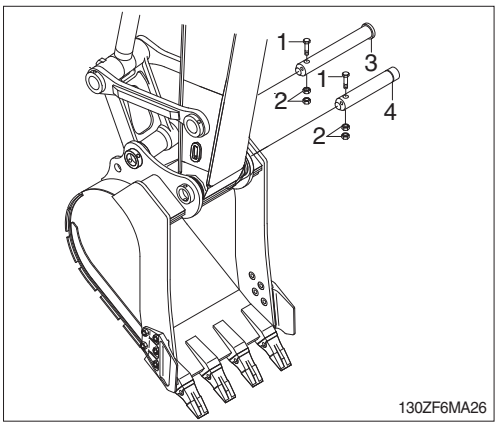
(4) Align the arm with holes (A) and the link with holes (B), then coat with grease and install pins (3, 4)

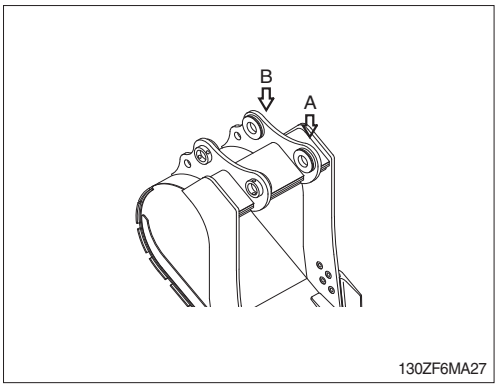
※ **When installing the bucket, the O-rings are easily damaged, so fit the O-rings on the boss of the bucket as shown in the picture. After knocking the pin, move the O-ring down to the regular groove.**

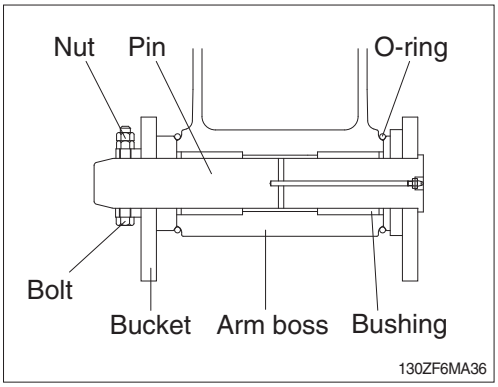
(5) Install the stopper bolt (1) and nuts (2) for each pin, then grease the pin.

· Tightening torque : 29.7±4.5 kgf · m
(215±32.5 lbf·ft)







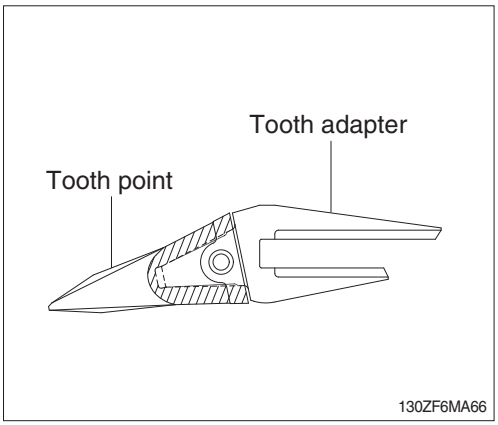


38) REPLACEMENT OF BUCKET TOOTH

(1) Timing of replacement

① Check wearing condition as shown in the illustration and replace tooth point before adapter starts to wear.

② If excessive use, tooth adapter has worn out, replacement may become impossible.



(2) Instructions for replacement

① Pull out pin by striking pin with punch or hammer, avoiding damage to lock washer.

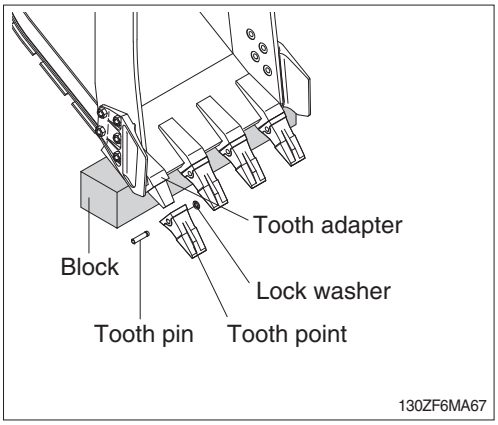
② Remove dust and mud from surface of tooth adapter by using knife.

③ Place lock washer in its proper place, and fit tooth point to adapter.

④ Insert pin until locking washer is positioned at tooth pin groove.

⚠ Personal injury can result from bucket falling.

⚠ Block the bucket before changing tooth points or side cutters.



39) ADJUSTMENT OF BUCKET CLEARANCE

(1) Lower the bucket on the ground as the picture shown in the right.

(2) Swing to the left and keep the arm boss to be contact to the bucket left.

(3) Lock the safety lever to the LOCK position and stop the engine.

(4) Measure the clearance (A) between bucket and arm boss. This is the total clearance.

(5) Adjusting

① Loosen bolt (1) and nuts (2) and pull out the pin (3).

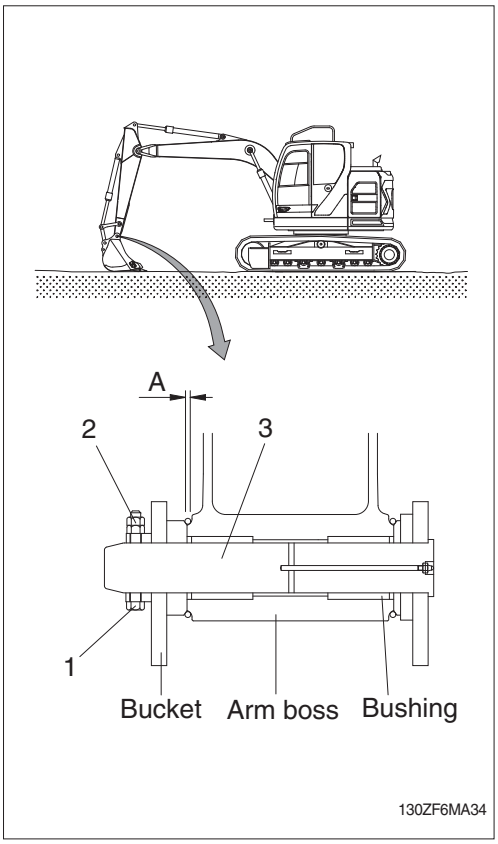
② Assemble the hard steel shim (0.5 mm) when the clearance (A) exceed 1.0 mm.

※ Assemble hard steel shim in the clearance between friction surfaces when inserting pin.

· Tightening torque : 29.6±3.2 kgf · m
(214.0±23.1 lbf · ft)

· Normal clearance : 0 ~ 0.5 mm
(0 ~ 0.02 in)

※ If the bucket is not adjusted correctly, noise and vibration created during operation, and damaged O-ring, pin and bushing quickly.



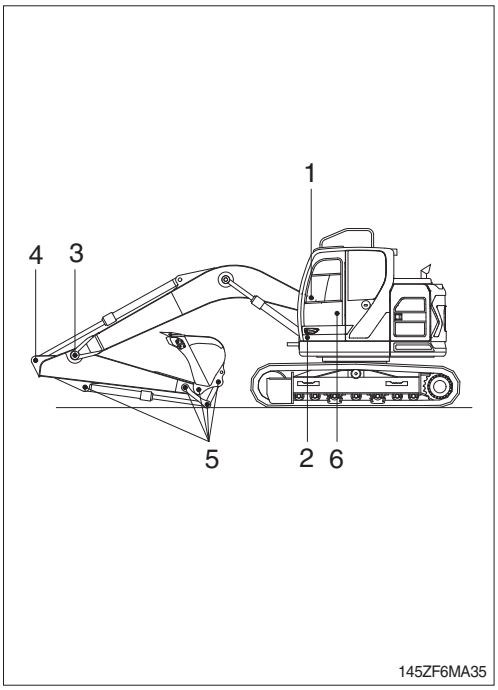
40) LUBRICATE PIN AND BUSHING

(1) Lubricate to each pin of working device

Lubricate the grease to the grease nipple according to the lubricating interval.

No.	Description	Qty
1	Lubrication manifold at boom	5
2	Boom cylinder pin (head side)	2
3	Boom and arm connection pin	1
4	Arm cylinder pin (rod side)	1
5	Bucket cylinder pin (head side, rod side)	2
	Bucket link (control rod)	3
	Arm and control link connection pin	1
	Arm and bucket connection pin	1
6	Boom rear bearing center	1

※ **Shorten lubricating interval when working in the water or dusty place.**



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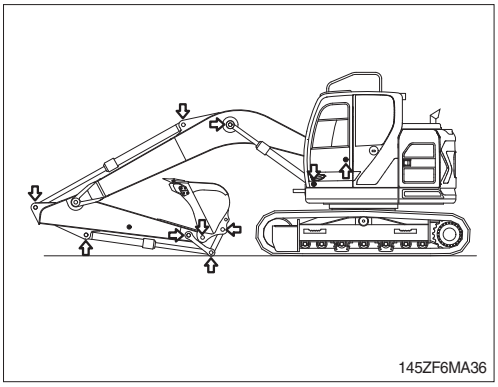
(2) Dust seals are mounted on the rotating part of working device to extend the lubricating interval.

※ **Mount the lip to be faced outside when replace the dust seal.**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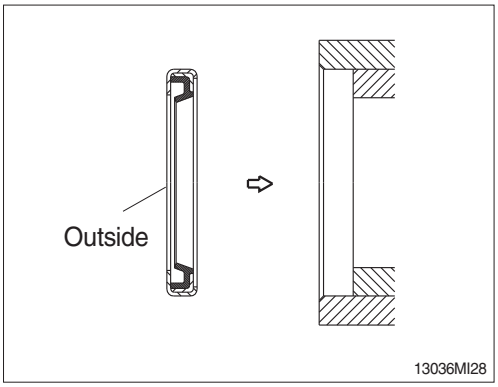
※ **If it is assembled in wrong direction, it will cause fast wear of pin and bushing, and create noise and vibration during operation.**

※ **Assemble the seal same direction with picture and use with plastic hammer when replace.**



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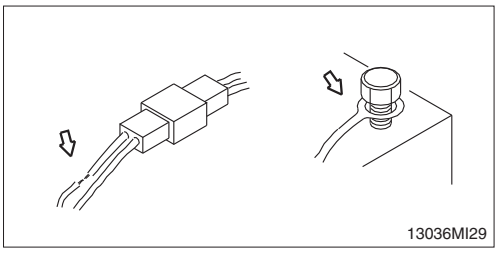
7. ELECTRICAL SYSTEM

1) WIRING, GAUGES

Check regularly and repair loose or malfunctioning gauges when found.



2) BATTERY

(1) Clean

① Wash the terminal with hot water if it is contaminated, and apply grease to the terminals after washing.

⚠ Battery gas can explode. Keep sparks and flames away from batteries.

⚠ Always wear protective glasses when working with batteries.

⚠ Do not stain clothes or skin with electrolyte as it is acid.
Be careful not to get the electrolyte in eyes. Wash with clean water and go to the doctor if it enters the eyes.

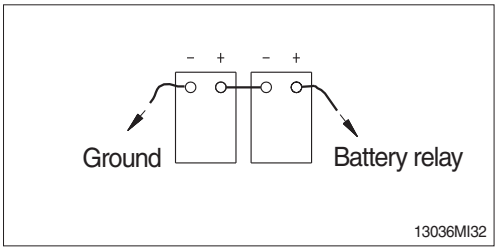
(2) Recycle

Never discard a battery.
Always return used batteries to one of the following locations.

- A battery supplier
- An authorized battery collection facility
- Recycling facility

(3) Method of removing the battery cable

Remove the cable from the ground connection first (⊖ terminal side) and reconnect it last when reassembling.



3) STARTING THE ENGINE WITH A BOOSTER CABLE

Keep following order when you are going to start engine using booster cable.

(1) Connection of booster cable

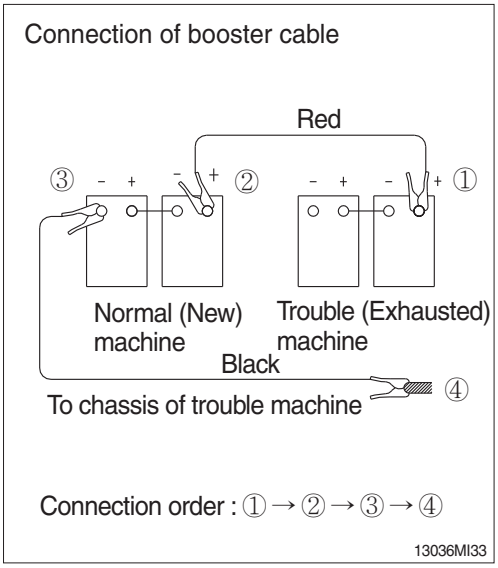
※ Use the same capacity of battery for starting.

① Make sure that the starting switches of the normal machine and trouble machine are both at the OFF position.

② Connect the red terminal of booster cable to the battery (+) terminal between exhausted and new battery.

③ Connect the black terminal of the booster cable between new battery (-) terminal and chassis of trouble machine.

※ Keep firmly all connection, the spark will be caused when connecting finally.

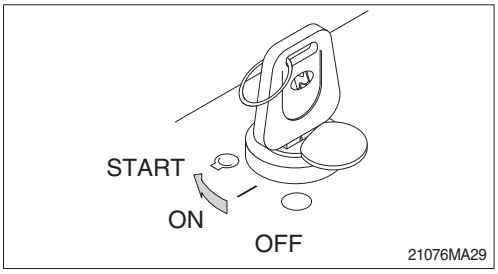


(2) Starting the engine

① Starting the engine of the normal machine and keep it to run at high idle.

② Start engine of the trouble machine with starting switch.

③ If you can not start it by one time, restart the engine after 2 minutes.



(3) Taking off the booster cable

① Take off the booster cable (black).

② Take off the booster cable (red) connected to the (+) terminal.

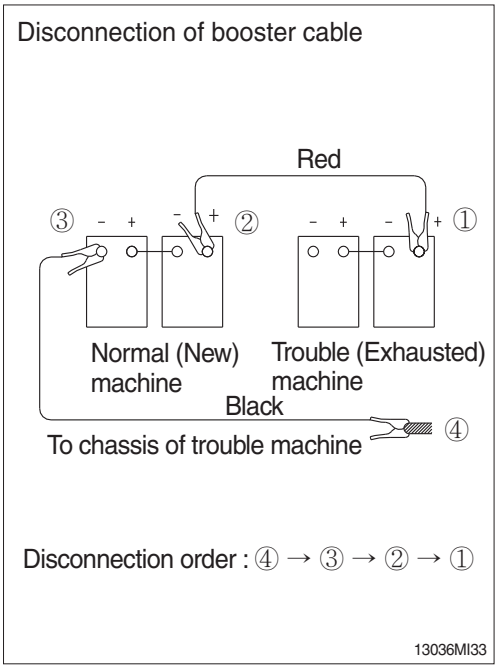
③ Run engine with high idle until charging the exhausted battery by alternator, fully.

⚠ Explosive gas is generated while using the battery or charging it. Keep away flame and be careful not to cause the spark.

※ Charge the battery in the well ventilated place.

※ Place the machine on the earth or concrete. Avoid charging the machine on the steel plate.

※ Do not connect (+) terminal and (-) terminal when connecting booster cable because it will be shorted.



(4) Welding repair

Before start to welding, follow the below procedure.

① Shut off the engine and remove the starting switch.

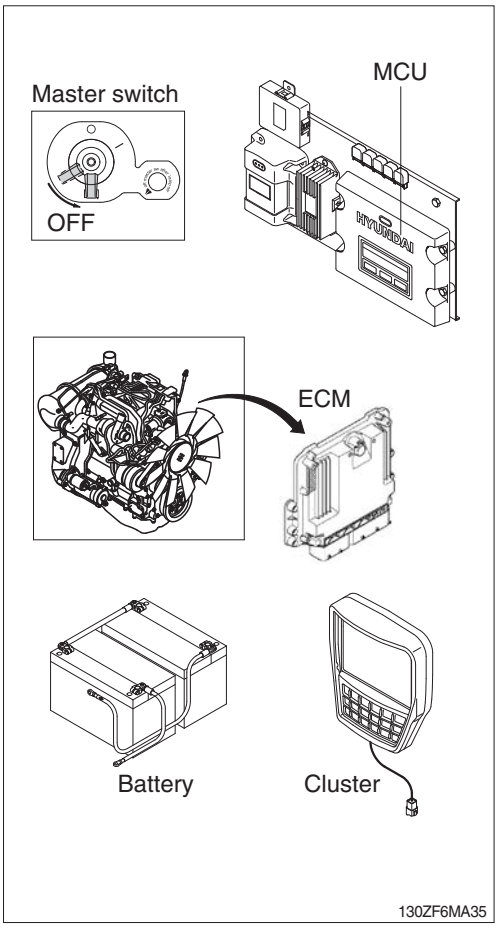
② Disconnect ground cable from battery by master switch.

③ Before carrying out any electric welding on the machine, the battery cables should be disconnected and the connectors pulled out of the electronic control units (MCU, ECM and cluster etc).

④ Connect the earth (ground) lead of the welding equipment as close to the welding point as possible.

※ Do not weld or flame cut on pipes or tubes that contain flammable fluids. Clean them thoroughly with nonflammable solvent before welding or flame cutting on them.

⚠ Do not attempt to welding work before carry out the above.
If not, it will caused serious damage at electric system.

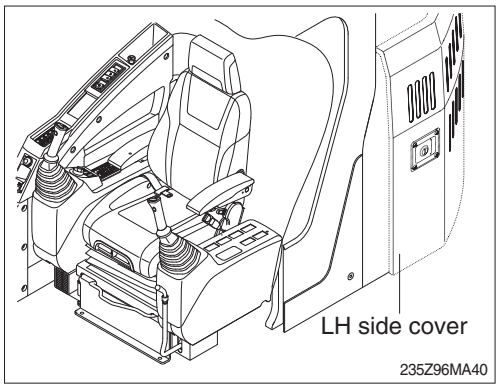


8. AIR CONDITIONER AND HEATER

1) CLEAN AND REPLACE OF FRESH AIR FILTER

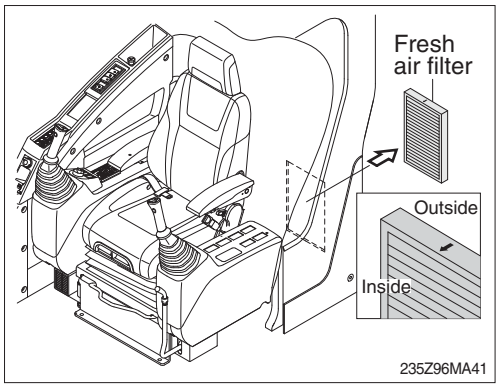
※ **Always stop the engine before servicing.**

(1) Open the LH side cover.



(2) Remove the fresh air filter.

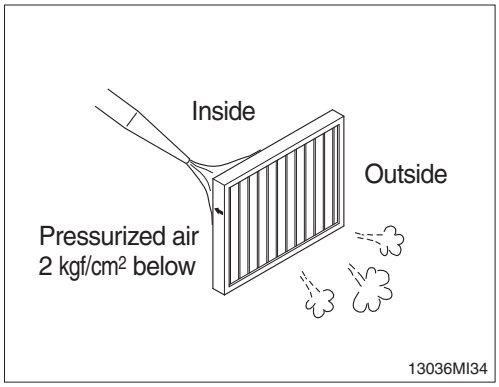
※ **When installing a filter, be careful not to change the filter direction.**



(3) Clean the filter using a pressurized air (below 2 kgf/cm^2, 28 psi).

△ **When using pressurized air, be sure to wear safety glasses.**

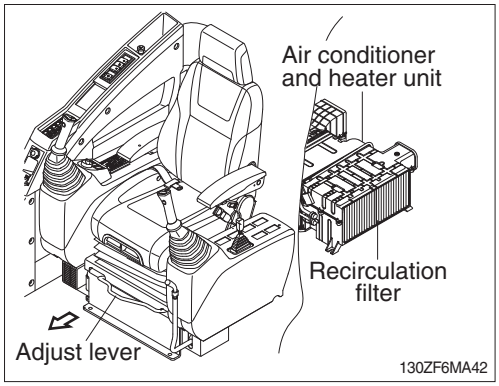
(4) **Inspect the filter after cleaning. If it is damaged or badly contaminated, use a new filter.**



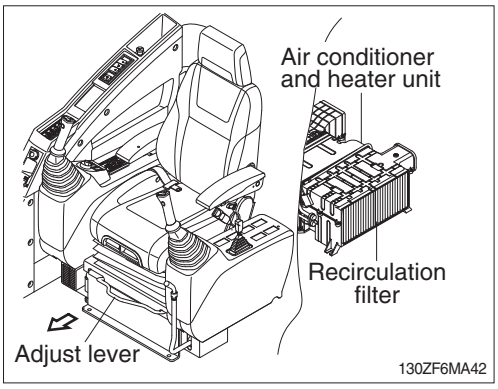
2) CLEAN AND REPLACE OF RECIRCULATION FILTER

※ **Always stop the engine before servicing.**

(1) Move seat and console box to arrow direction using the adjust lever.



(2) Remove recirculation filter.

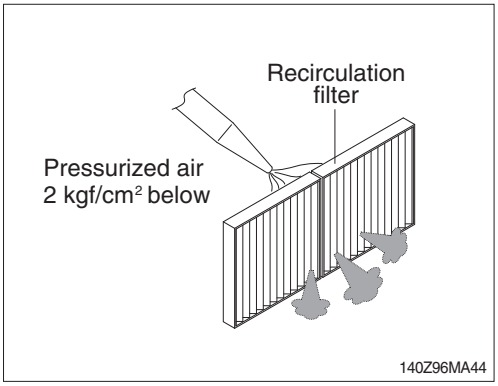


(3) Clean the recirculation filter using a pressurized air (below 2 kgf/cm², 28 psi) or washing with water.

△ **When using pressurized air, be sure to wear safety glasses.**

※ **Dry off after washing with water.**

(4) Inspect the filter after cleaning. If it is damaged or badly contaminated, use a new filter.



3) PRECAUTIONS FOR USING AIR CONDITIONER

(1) When using the air conditioner for a long time, open the window once every one hour.

(2) Be careful not to overcool the cab.

(3) The cab is properly cooled if the operator feels cool when entering there from outside (about 5˚C lower than the outside temperature).

(4) When cooling, change air occasionally.

4) CHECK DURING SEASON

Ask the service center for replenishment of refrigerant or other maintenance service so that the cooling performance is not damaged.

5) CHECK DURING OFF-SEASON

Operate the air conditioner 2 or 3 times a month (each for a few minutes) to avoid loss of oil film in the compressor.

6) Refrigerant (R134-a) amount : 750 ± 30 g

6) REFRIGERANT

(1) Equipment contains fluorinated greenhouse gas.

Model	Type	Quantity	GWP
HX130LCR	HFC-134a	0.75 kg (1.65 lb)	1073 CO2 eq.

※ **GWP**

Global warming potential (GWP) is a measure of how much heat a gas traps in the atmosphere relative to that of carbon dioxide (CO2). GWP is calculated in terms of the 100-year warming potential of 1 kg of a greenhouse gas relative to 1 kg of CO2.

(2) **Environmental precautions**

The air conditioning system of the machine is filled with HFC-134a refrigerant at the factory.
HFC-134a refrigerant is a flourinated greenhouse gas and contributes to global warming.
Do not release refrigerant into the environment.

(3) **Safety precautions**

Work on the air conditioning system must only be performed by a qualified service technician.
Do not attempt to preform work on the air conditioning system.
Wear safety goggles, chemical resistant gloves and appropriate personal protective equipment to protect bare skin when there is a risk of contact with refrigerant.

(4) **Action in case of exposure**

① Eye contact / Limited skin contact
Rinse with warm water and apply a light bandage. Seek medical attention immediately.

② Extensive skin contact
Rinse with warm water and carefully heat the area with warm water or warm clothing.
Seek medical attention immediately.

③ Inhalation
Leave the area and find fresh air. Seek medical attention immediately