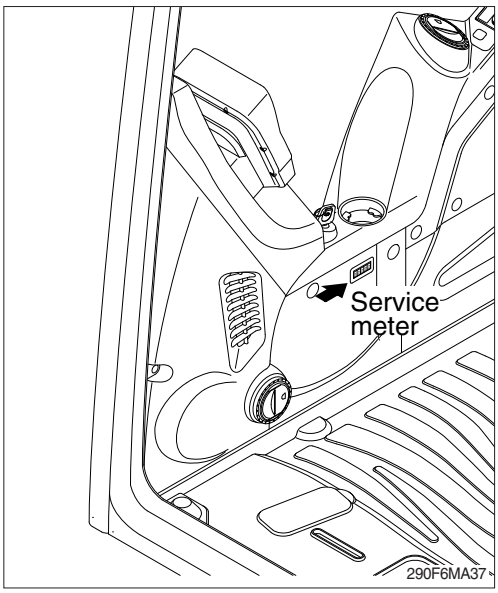
1. INSTRUCTION

1) INTERVAL OF MAINTENANCE



(1) You may inspect and service the machine by the period as described at page 6-12 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.

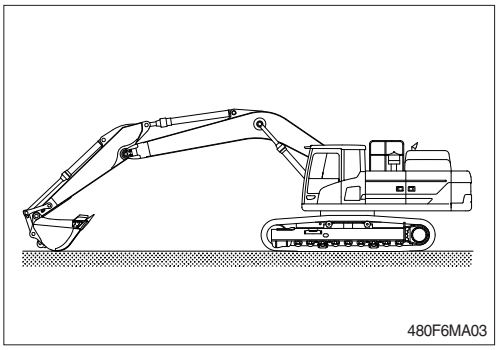
(9) For more detail information of maintenance, please contact local HD Hyundai Construction Equipment dealer.

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

4) RELIEVING THE PRESSURE IN THE HYDRAULIC SYSTEM

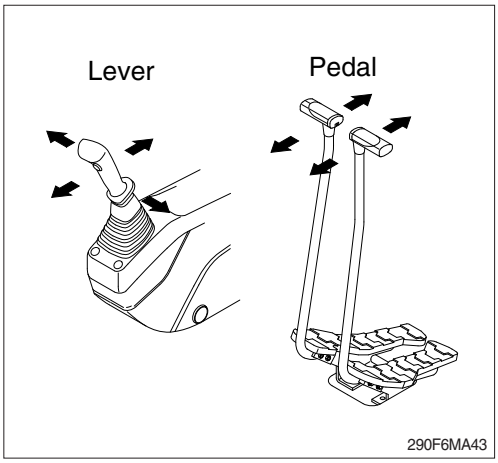
※ **Spouting of oil can cause the accident when loosening the cap or hose right after the operating of machine as the machine or oil is on the high pressure on the condition.**
Be sure to relieve the pressure in the system before repairing hydraulic system.

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

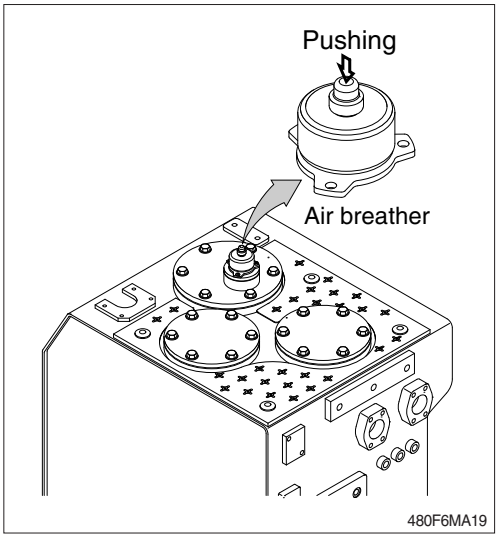


(2) Set the safety knob completely in the UNLOCK position, operate the control levers and pedals fully to the front, rear, left and right, to release the pressure in the hydraulic circuit.

※ **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) Relieve the pressure in the tank by pushing the top of the air breather.



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

· HX480 L

No.	Descriptions		Bolt size	Torque	
				kgf · m	lbf · ft
1	Engine	Engine mounting bolt (FR, bracket)	M16 × 1.5	28 ± 3.0	203 ± 21.7
2		Engine mounting bolt (RR, bracket)	M14 × 2.0	18 ± 2.0	130 ± 14.5
3		Engine mounting bolt (frame)	M22 × 2.5	69.6 ± 7.0	503 ± 50.6
4		Radiator mounting bolt	M16 × 2.0	29.7 ± 4.5	215 ± 32.5
5		Coupling mounting socket bolt	M20 × 2.5	46.5 ± 2.5	336 ± 18.1
6		Main pump housing mounting bolt	M10 × 1.5	6.7 ± 1.0	48.7 ± 7.2
7	Hydraulic system	Main pump mounting bolt	M20 × 2.5	44 ± 6.6	318 ± 47.7
8		Main control valve mounting nut	M20 × 2.5	57.9 ± 8.7	419 ± 62.9
9		Fuel tank mounting bolt	M20 × 2.5	46 ± 5.1	333 ± 36.9
10		Hydraulic oil tank mounting bolt	M20 × 2.5	57.9 ± 8.0	419 ± 57.9
11		Turning joint mounting bolt, nut	M16 × 2.0	29.7 ± 4.5	215 ± 32.5
12	Power train system	Swing motor mounting bolt	M20 × 2.5	57.9 ± 8.7	419 ± 62.9
13		Swing bearing upper part mounting bolt	M24 × 3.0	100 ± 10	723 ± 72.3
14		Swing bearing lower part mounting bolt	M24 × 3.0	100 ± 10	723 ± 72.3
15		Travel motor mounting bolt	M20 × 2.5	57.9 ± 8.7	419 ± 62.9
16		Sprocket mounting bolt	M20 × 2.5	57.9 ± 6.0	419 ± 43.4
17	Under carriage	Carrier roller mounting bolt, nut	M16 × 2.0	29.7 ± 3.0	215 ± 21.7
18		Track roller mounting bolt	M24 × 3.0	100 ± 10	723 ± 72.3
19		Track tension cylinder mounting bolt	M22 × 1.5	87.2 ± 12.5	631 ± 90.4
20		Track shoe mounting bolt, nut	M24 × 3.0	140 ± 14	1012 ± 101
21		Track guard mounting bolt	M24 × 3.0	100 ± 15	723 ± 108
22	Others	Counterweight mounting bolt	M42 × 3.0	390 ± 40	2821 ± 289
23		Cab mounting bolt	M12 × 1.75	12.8 ± 3.0	92.6 ± 21.7
24		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.

· HX520 L

No.	Descriptions		Bolt size	Torque	
				kgf · m	lbf · ft
1	Engine	Engine mounting bolt (FR, bracket)	M16 × 1.5	28 ± 3.0	203 ± 21.7
2		Engine mounting bolt (RR, bracket)	M14 × 2.0	18 ± 2.0	130 ± 14.5
3		Engine mounting bolt (frame)	M22 × 2.5	69.6 ± 7.0	503 ± 50.6
4		Radiator mounting bolt	M16 × 2.0	29.7 ± 4.5	215 ± 32.5
5		Coupling mounting socket bolt	M20 × 2.5	46.5 ± 2.5	336 ± 18.1
6		Main pump housing mounting bolt	M10 × 1.5	6.7 ± 1.0	48.7 ± 7.2
7	Hydraulic system	Main pump mounting bolt	M20 × 2.5	44 ± 6.6	318 ± 47.7
8		Main control valve mounting nut	M20 × 2.5	57.9 ± 8.7	419 ± 62.9
9		Fuel tank mounting bolt	M20 × 2.5	46 ± 5.1	333 ± 36.9
10		Hydraulic oil tank mounting bolt	M20 × 2.5	57.9 ± 8.0	419 ± 57.9
11		Turning joint mounting bolt, nut	M16 × 2.0	29.7 ± 4.5	215 ± 32.5
12	Power train system	Swing motor mounting bolt	M20 × 2.5	57.9 ± 8.7	419 ± 62.9
13		Swing bearing upper part mounting bolt	M24 × 3.0	100 ± 10	723 ± 72.3
14		Swing bearing lower part mounting bolt	M24 × 3.0	100 ± 10	723 ± 72.3
15		Travel motor mounting bolt	M20 × 2.5	57.9 ± 8.7	419 ± 62.9
16		Sprocket mounting bolt	M20 × 2.5	57.9 ± 6.0	419 ± 43.4
17	Under carriage	Carrier roller mounting bolt, nut	M16 × 2.0	29.7 ± 3.0	215 ± 21.7
18		Track roller mounting bolt	M24 × 3.0	100 ± 10	723 ± 72.3
19		Track tension cylinder mounting bolt	M22 × 1.5	87.2 ± 12.5	631 ± 90.4
20		Track shoe mounting bolt, nut	M24 × 3.0	140 ± 14	1012 ± 101
21		Track guard mounting bolt	M24 × 3.0	100 ± 15	723 ± 108
22		Adjustable track gauge bolt	M33 × 3.5	220 ± 20	1590 ± 145
23	Others	Counterweight mounting bolt	M42 × 3.0	390 ± 40	2821 ± 289
24		Center frame support & lower track mounting bolt	M33 × 3.5	220 ± 20	1591 ± 145
25		Cab mounting bolt	M12 × 1.75	12.8 ± 3.0	92.6 ± 21.7
26		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 CI-4, ACEA-E9)	SAE 10W-30, ★SAE 5W-40
DEF/AdBlue®	ISO 22241 (32.5% high-purity urea and 67.5% deionized water)
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 (GL-4/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
DEF : Diesel Exhaust Fluid
DEF compatible with AdBlue®

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 °C(°F) -50 (-58) -30 (-22) -20 (-4) -10 (14) 0 (32) 10 (50) 20 (68) 30 (86) 40 (104)
Engine oil pan	Engine oil	38.0 (10)	★SAE 5W-40 SAE 30 SAE 10W SAE 10W-30 SAE 15W-40
DEF/ AdBlue® tank	Mixture of urea and deionized water	69 (18.2)	ISO 22241, High-purity urea + deionized water (32.5:67.5)
Swing drive	Gear oil	7.0×2 (1.8×2)	★SAE 75W-90
Final drive		12×2 (3.2×2)	SAE 80W-90
Hydraulic tank	Hydraulic oil	Tank : 262 (69.2) System : 486 (128.4)	★ISO VG 15 ISO VG 32 ISO VG 46, HBHO VG 46★3 ISO VG 68
Fuel tank	Diesel fuel★1	621 (182)	★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	49.0 (13)	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 Material
DEF : Diesel Exhaust Fluid DEF compatible with AdBlue®

★ : 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		
Engine oil level	Check, Add	6-19
Coolant level	Check, Add	6-24
Fan belt tension and damage	Check, Adjust	6-27, 28, 29
Air cleaner (oil bath, option)	Check, Clean, Add	6-30-1, 2, 3
Fuel tank	Check, Refill	6-30-4
Fuel return filter element	Check, Clean	6-30-4
DEF/AdBlue® tank	Check, Add	6-35
Hydraulic oil level	Check, Add	6-36-1
★ Attachment pin and bushing	Lubricate	6-45
· 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		
Control panel & pilot lamp	Check, Clean	6-46

★ **Lubricate every 10 hours or daily for initial 100 hours.**

2) EVERY 50 HOURS SERVICE

Check items	Service	Page
Fuel tank (water, sediment)	Drain	6-30-4
Swing reduction gear oil	Check, Add	6-39
Track tension	Check, Adjust	6-41
Attachment pin and bushing	Lubricate	6-45
· Bucket cylinder rod end		
· Bucket + Arm connecting		
· Bucket control link + Arm		
· Bucket control rod		

3) INITIAL 50 HOURS SERVICE

Check items	Service	Page
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		

4) EVERY 200 HOURS SERVICE

Check items	Service	Page
★ Return filter	Replace	6-38
★ Drain filter cartridge	Replace	6-38
★ Pilot line filter	Replace	6-39

★ Replace 3 filters for continuous hydraulic breaker operation only.

5) INITIAL 250 HOURS SERVICE

Check items	Service	Page
Engine oil	Change	6-19, 20
Engine oil filter	Replace	6-23
Fuel return filter element	Replace	6-30-4
Fuel main filter element	Replace	6-31, 32, 33
Hydraulic oil return filter	Replace	6-38
Drain filter cartridge	Replace	6-38
Pilot line filter element	Replace	6-39
Swing reduction gear oil	Change	6-39
Travel reduction gear case	Change	6-40

6) EVERY 250 HOURS SERVICE

Check items	Service	Page
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		
Swing bearing grease	Lubricate	6-39
Attachment pin and bushing	Lubricate	6-45
· 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		
Battery (voltage)	Check, Clean	6-46
Aircon & heater fresh air filter	Check, Clean	6-49

7) INITIAL 500 HOURS SERVICE

Check items	Service	Page
Aircon & heater filter (inner)	Replace	6-49

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

8) EVERY 500 HOURS SERVICE

Check items	Service	Page
★Engine oil	Change	6-19, 20
Centrifugal oil cleaner (O-ring)	Clean (Replace)	6-20, 21, 22, 23
★Engine oil filter	Replace	6-23
Oil cooler	Check, Clean	6-25
Radiator, cooler fin and charge air cooler	Check, Clean	6-26, 27
Air cleaner element (primary)★1	Check, Clean	6-30
Fuel return filter element	Change	6-30-4
DEF/AdBlue® tank (with filler filter)	Check, Clean	6-36

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

★ If you use high sulfur containing fuel above than 0.5% or use low grade of engine oil reduce change interval.

9) EVERY 1000 HOURS SERVICE

Check items	Service	Page
Air breather element	Replace	6-31, 32, 33
Swing reduction gear oil	Change	6-35, 36
Pilot line filter	Replace	6-38
Travel motor reduction gear oil	Change	6-38
Grease in swing gear and pinion	Change	6-38
Fuel main filter element	Replace	6-39
DEF/AdBlue® supply module filter	Replace	6-39
Hydraulic oil return filter	Replace	6-40
Drain filter cartridge	Replace	6-40

10) EVERY 2000 HOURS SERVICE

Check items	Service	Page
Coolant	Change	6-24, 25, 26
Air cleaner element (primary, safety)★3	Replace	6-30
Air cleaner (oil bath, option)	Disassemble, Clean, Replace	6-30-1, 2, 3
Hydraulic oil★1	Change	6-37
HBHO★2	Change	6-37
Hydraulic tank suction strainer	Check, Clean	6-37
RCV lever	Check, Lubricate	6-41
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 4000 HOURS SERVICE

Check items	Service	Page
Fuel tank breather	Replace	6-34

12) EVERY 5000 HOURS SERVICE

Check items	Service	Page
Hydraulic oil★4	Change	6-37

★4 HD Hyundai Construction Equipment genuine long life

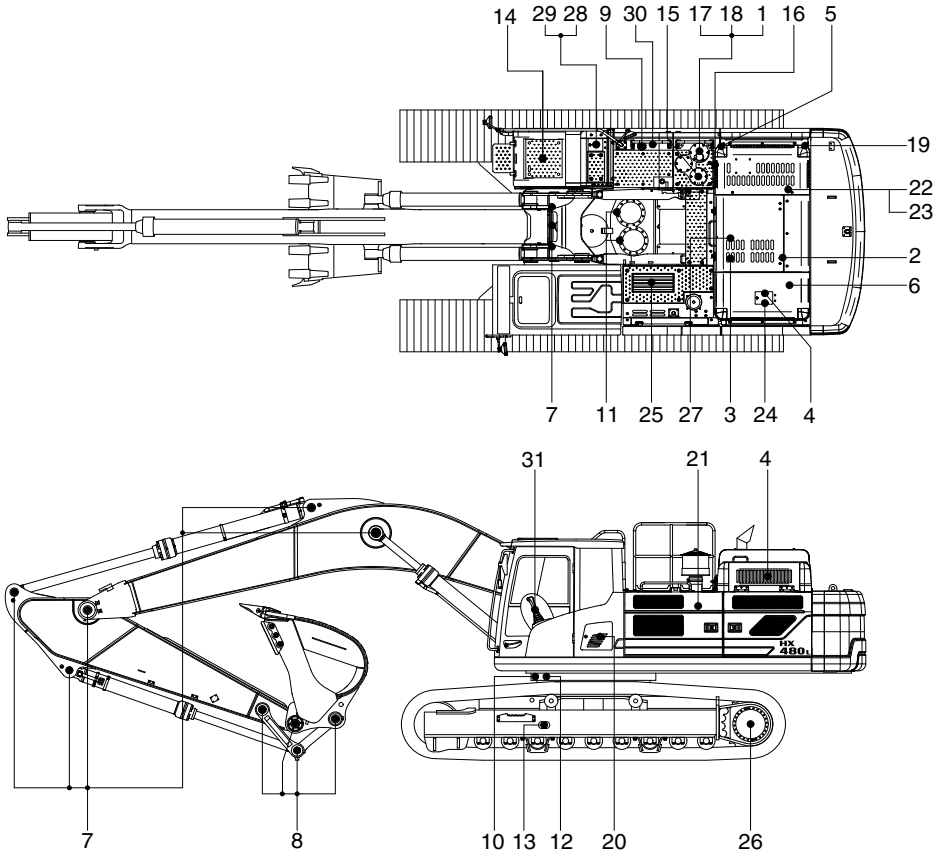
※Change oil every 1000 hours of continuous hydraulic breaker operation.

13) WHEN REQUIRED

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

Check items	Service	Page
Engine lubrication system		
· Engine oil	Change	6-19, 20
· Engine oil filter	Replace	6-23
Engine cooling system		
· Coolant	Add or Change	6-24, 25, 26
· Radiator	Clean or Flush	6-24, 25, 26
· Charge air cooler	Check	6-27
Engine air system		
· Air cleaner element (primary)	Clean or Replace	6-30
· Air cleaner element (safety)	Replace	6-30
· Air cleaner (oil bath, option)	Check, Clean, Replace	6-30-1, 2, 3
Fuel system		
· Fuel tank	Drain or Clean	6-30-4
· Fuel return filter element	Clean or Replace	6-30-4
· Fuel main filter element		
Hydraulic system	Replace	6-31, 32, 33
· Hydraulic oil	Add or Change	6-36-1
· Suction strainer	Clean	6-37
· Return filter	Replace	6-38
· Drain line filter	Replace	6-38
· Element of breather	Replace	6-38
· Pilot line filter	Replace	6-39
· RCV lever	Lubricate	6-41
Undercarriage		
· Track tension	Check, Adjust	6-41
Bucket		
· Bucket assy	Replace	6-42
· Tooth	Replace	6-43
· Side cutter	Replace	6-43
· Linkage	Adjust	6-44
Air conditioner and heater		
· Fresh air filter	Clean, Replace	6-49
· Recirculation filter	Clean	6-50
Other		
· DEF/AdBlue® tank	Check, Add	6-35
· DEF/AdBlue® supply module filter	Replace	6-34, 35, 36

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	262 (69.2)	1
	2	Engine oil level	Check, Add	EO	38.0 (10)	1
	4	Radiator coolant	Check, Add	C	49.0 (13)	1
	5	Fuel return filter element	Check, Clean	-	-	1
	6	Fan belt tension and damage	Check, Adjust	-	-	1
	9	Fuel tank	Check, Refill	DF	621 (182)	1
	21	Air cleaner (oil bath, option)	Check, Clean, Add	EO	5.0 (1.3)	1
	29	DEF/AdBlue® tank	Check, Add	DEF	69 (18.2)	1
50 Hours or weekly	8	Bucket linkage pins	Check, Add	PGL	-	6
	9	Fuel tank (water, sediment)	Check, Clean	-	621 (182)	1
	11	Swing reduction gear oil	Check, Add	GO	7.0 (1.8)	2
	13	Track tension	Check, Adjust	PGL	-	2
250 Hours	7	Attachment pins & bushing	Check, Add	PGL	-	11
	10	Swing bearing grease	Check, Add	PGL	-	2
	14	Battery (voltage)	Check	-	-	1
	20	Aircon and heater fresh air filter	Check, Clean	-	-	1

Service interval	No.	Description	Service action	Oil symbol	Capacity ℓ (U.S.gal)	Service points No.
Initial 250 Hours	2	Engine oil	Change	EO	38.0 (10)	1
	3	Engine oil filter	Replace	-	-	1
	5	Fuel return filter element	Replace	-	-	1
	11	Swing reduction gear oil	Change	GO	7.0 (1.8)	2
	15	Hydraulic oil return filter	Replace	-	-	2
	16	Drain filter cartridge	Replace	-	-	1
	19	Pilot line filter element	Replace	-	-	1
	23	Fuel main filter element	Replace	-	-	1
	26	Travel reduction gear case	Change	GO	12 (3.2)	2
500 Hours	2	Engine oil	Change	EO	38.0 (10)	1
	3	Engine oil filter	Replace	-	-	1
	5	Fuel return filter element	Replace	-	-	1
	21	Air cleaner element (primary)	Check, Clean	-	-	1
	24	Radiator, oil cooler, charge air cooler	Check, Clean	-	-	3
	25	Oil cooler	Check, Clean	-	-	1
	27	Centrifugal oil cleaner (O-ring)	Clean (Replace)	-	-	1
	29	DEF/AdBlue® tank (with filler filter)	Check, Clean	DEF	69 (18.2)	1
Initial 500 Hours	28	Aircon & heater recirculation filter	Replace	-	-	1
1000 Hours	11	Swing reduction gear oil	Change	GO	7.0 (1.8)	2
	12	Swing gear and pinion grease	Change	PGL	14 kg (31 lb)	1
	15	Hydraulic oil return filter	Replace	-	-	2
	16	Drain filter cartridge	Replace	-	-	1
	17	Air breather element	Replace	-	-	1
	19	Pilot line filter element	Replace	-	-	1
	22	Fuel prefilter element	Replace	-	-	1
	23	Fuel main filter element	Replace	-	-	1
	26	Travel reduction gear case	Change	GO	12 (3.2)	2
	28	DEF/AdBlue® supply module filter	Replace	-	-	1
2000 Hours	1	Hydraulic oil★1	Change	HO	262 (69.2)	1
	1	Hydraulic oil (HBHO★2)	Change	-	262 (69.2)	1
	4	Radiator coolant	Change	C	49.0 (13)	1
	18	Hydraulic oil suction strainer	Check, Clean	-	-	1
	21	Air cleaner element (primary)	Replace	-	-	1
	21	Air cleaner element (safety)	Replace	-	-	1
	21	Air cleaner (oil bath, option)	Disassemble, Clean, Replace	EO	5.0 (1.3)	1
	31	RCV lever	Check, Lubricate	PGL	-	2
	-	Hoses, fittings, clamps (fuel, coolant, hydraulic)	Check, Retighten, Replace	-	-	-
4000 Hours	30	Fuel tank breather filter	Replace	-	-	1
5000 Hours	1	Hydraulic oil★3	Change	HO	262 (69.2)	1
As required	20	Aircon & heater fresh filter	Replace	-	-	1
	20	Aircon & heater recirculation filter	Clean, Replace	-	-	1
	21	Air cleaner element (primary)	Clean, Replace	-	-	1
	21	Air cleaner element (safety)	Replace	-	-	1
	21	Air cleaner (oil bath, option)	Check, Clean, Replace	EO	5.0 (1.3)	1
	29	DEF/AdBlue® tank	Check, Add	DEF	69 (18.2)	1

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

★3 HD Hyundai Construction Equipment genuine long life

※ Oil symbol

Please refer to the recommended lubricants for specification.

DF : Diesel fuel **GO : Gear oil** **HO : Hydraulic oil** **DEF : DEF/AdBlue®**

C : Coolant **PGL : Grease** **EO : Engine oil**

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.

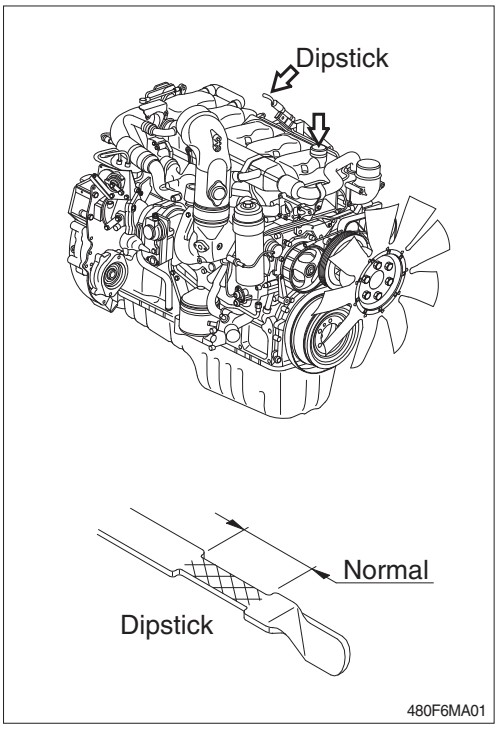
(2) Check the oil level by inserting the dipstick completely into the hole and pulling out again.

(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 15 minutes.**

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



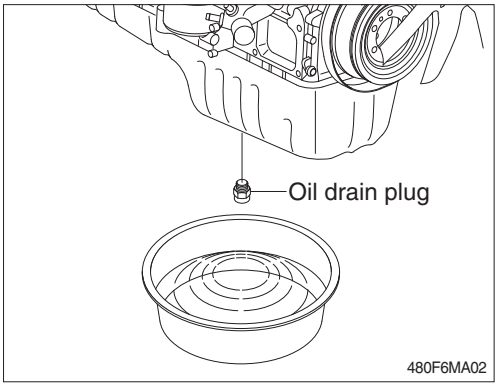
2) REPLACEMENT OF ENGINE OIL

※ **Renew the oil filter and clean the centrifugal oil cleaner when changing oil.**

(1) Operate the engine until the coolant temperature reaches 60˚C (140˚F). Shut off the engine.

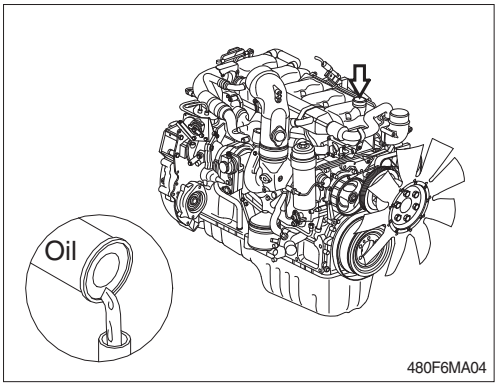
(2) Remove the oil drain plug. Drain the oil immediately to be sure all the oil and suspended contaminants are removed from the engine.

※ **A drain pan with a capacity of 45 liters (11.9 U.S. gallons) will be adequate.**

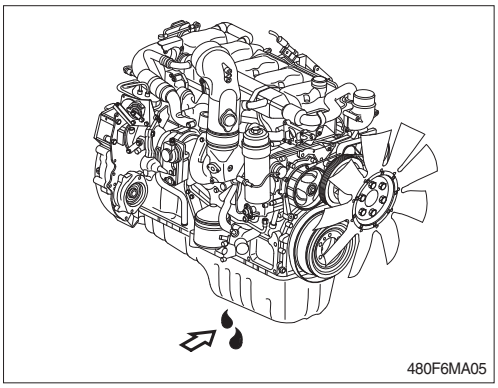


(3) Clean and check the lubricating oil drain plug threads and sealing surface.
Install the lubricating oil pan magnet drain plug.

(4) Fill the engine with clean oil to the proper level.
· Quantity : 38 ℓ (10 U.S.gallons)



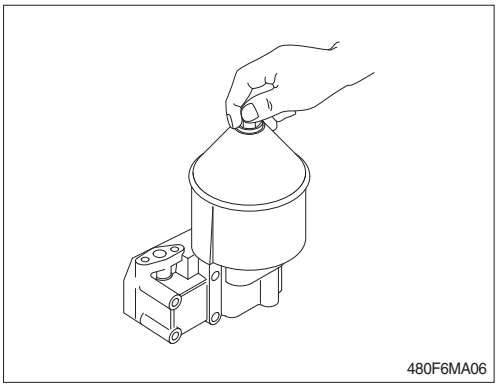
(5) Operate the engine at low idle and inspect for leaks at the filters and the drain plug.
Shut the engine off and check the oil level with the dipstick. Allow 15 minutes for oil to drain down before checking.


480F6MA05

3) CLEANING THE CENTRIFUGAL OIL CLEANER

※ **When cleaning the centrifugal oil cleaner there will be some dirt deposits in the rotor cover. If this is the case, this indicates that the rotor is working. If it is not working, the cause must be established immediately.**
If the dirt deposit exceeds 28 mm at the recommended intervals, the rotor cover should be cleaned more often.

⚠ **The oil may be hot. Carefully remove the cover from the centrifugal oil cleaner.**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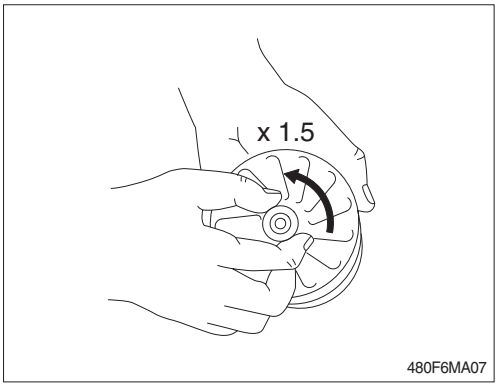
(1) Clean the outside of the cover.
Unscrew the nut and remove the cover.

(2) Lift out the rotor.
Wipe off the outside of the rotor.
Unscrew the rotor cover nut about one and a half turns.



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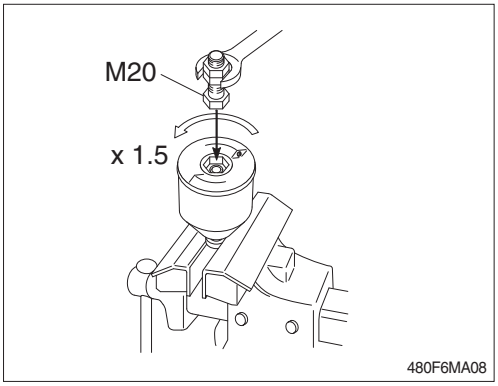
(3) If the rotor nut is jammed, turn the rotor upside down and fasten the nut in a vice.
Turn the rotor approximately one and a half turns anticlockwise by hand or use an M20 screw as illustrated.

※ **The rotor must not be put in a vice. This may cause damage resulting in rotor imbalance.**



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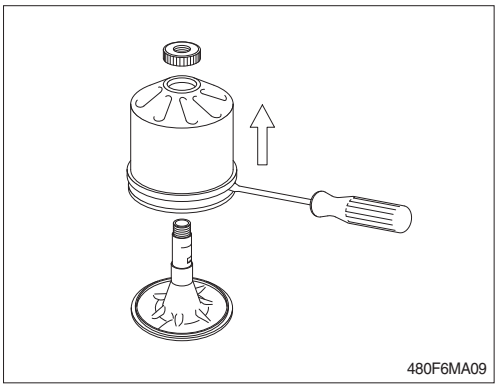
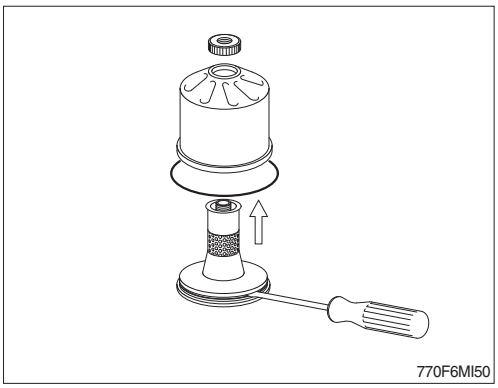
(4) Hold the rotor and tap lightly on the rotor nut with a plastic mallet or against the workbench, so that the rotor cover comes loose from the bottom plate.

※ **Never strike on the rotor directly as this may damage the bearings.**

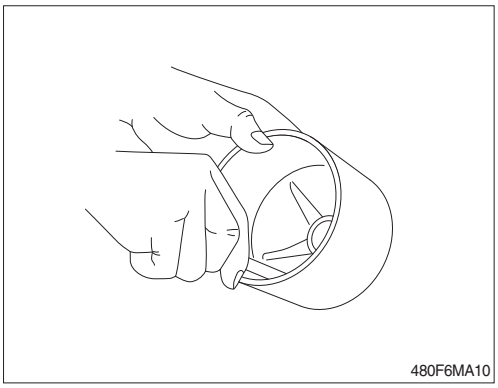
(5) Remove the rotor cover by holding the rotor in both hands and tapping the rotor nut against the table. Never strike the rotor directly as this may damage its bearings.



(6) Remove the strainer from the rotor cover. If the strainer is stuck, insert a screwdriver between the rotor cover and strainer and carefully prise them apart.



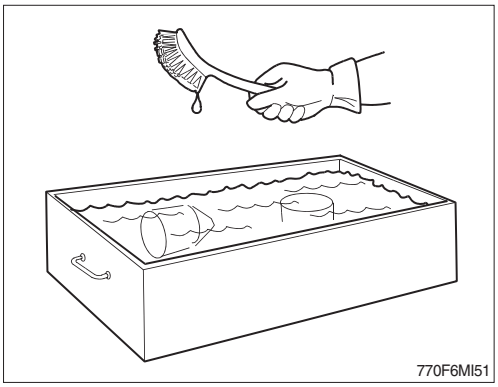
(7) Remove the paper insert and scrape away any remaining dirt deposits inside the rotor cover. If the deposits are thicker than 28 mm (1.1"), the centrifugal oil cleaner must be cleaned more often.



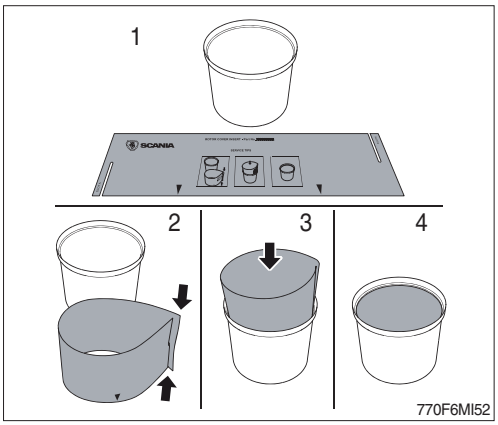
(8) Wash the parts.

(9) Inspect the 2 nozzles on the rotor. Ensure that they are not blocked or damaged. Renew any damaged nozzles.

(10) Check that the bearings are undamaged.



(11) Fit a new paper insert on the inside of the rotor cover. Fit the strainer onto the rotor.



(12) Fit the strainer onto the rotor.

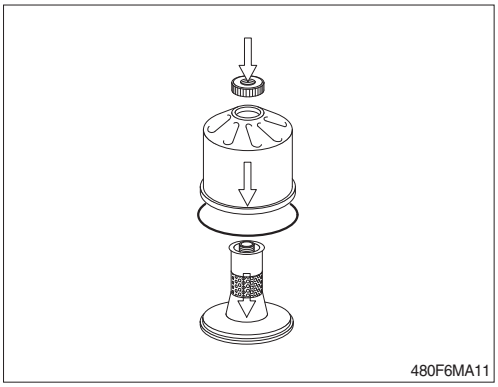
(13) Fit a new O-ring by sliding it over the strainer.

(14) Refit the rotor cover. Make sure that the O-ring is seated correctly on the inside.

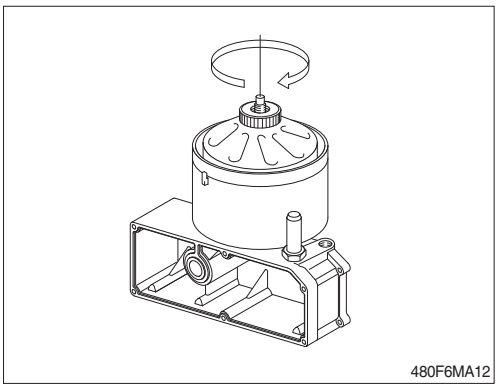
(15) Screw the rotor nut back on by hand.

(16) Check that the shaft is not loose. Secure with thread-locking fluid 561 200 if it is loose.
First clean thoroughly using a suitable solvent.
Tighten the rotor shaft using socket wrench 99 520. Tightening torque 2.75 kgf · m (20 lbf · ft).

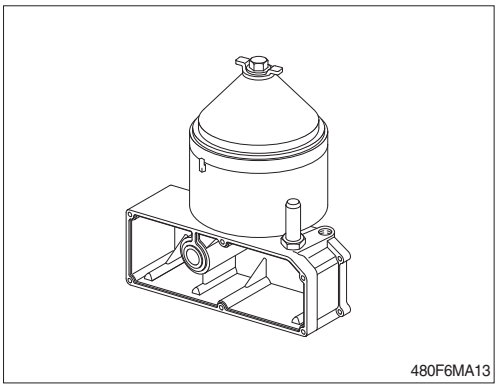
※ **Take care not to damage the rotor shaft.**



(17) Refit the rotor and screw it by hand to make sure it rotates easily.



(18) Renew the O-ring on the centrifugal oil cleaner housing cover.
· Tighten torque : 1.53 kgf · m (11 lbf · ft).



(19) Operational testing

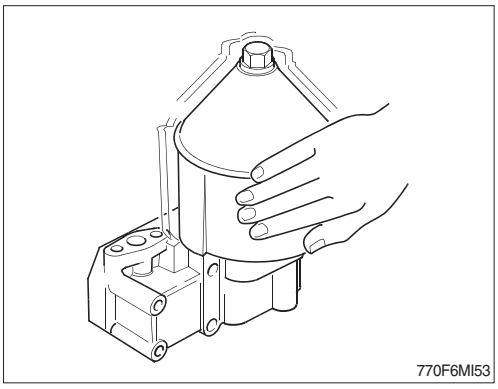
Operational testing need only be carried out if it is suspected that the centrifugal oil cleaner is not working properly. For example, if there is an abnormally small amount of deposit in the centrifugal oil cleaner in relation to the distance driven.

The rotor rotates very fast and should continue to turn when the engine has stopped.

① Run the engine until it is warm.

② Stop the engine and listen for noise coming from the rotor. Use your hand to feel if the filter housing is vibrating.

③ If the filter housing is not vibrating, dismantle and check the centrifugal oil cleaner.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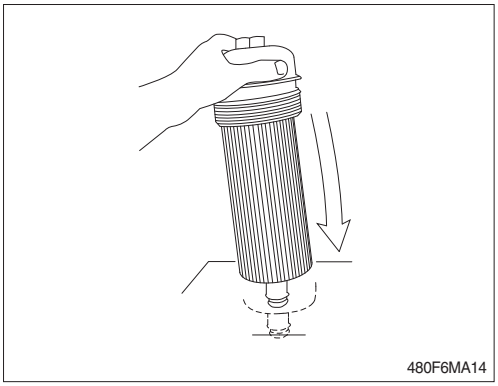
4) REPLACEMENT OF ENGINE OIL FILTER

※ Clean the centrifugal oil cleaner when renewing the oil filter.
Otherwise, the oil filter will be blocked and resistance in the filter will increase. If this happens, an overflow valve in the filter retainer opens and lets the oil pass without being filtered.

(1) Unscrew the filter cover with a closed tool with hexagon driver, 36 mm socket.

※ Do not use an adjustable spanner or other open tool as there is risk of damaging the filter cover.

(2) Lift out the filter housing cover with filter element. The filter housing will drain automatically once the filter has been removed.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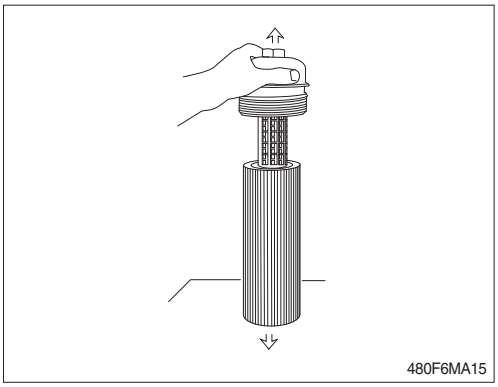
(3) Detach the old filter from the cover by holding the cover and carefully tapping the entire filter element against something hard. Remember that there will be oil splashes.

(4) Fit the new filter and tighten the filter cover to 2.54 kgf · m (18.4 lbf · ft).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5) CHECK COOLANT

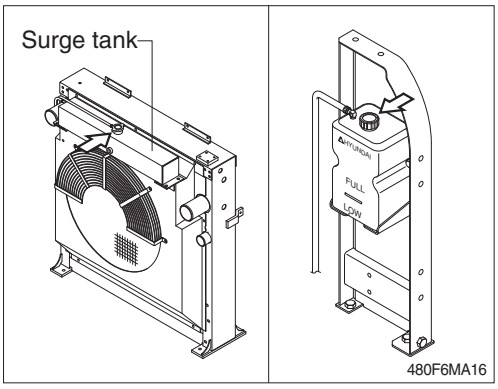
(1) Check if the level of coolant in reservoir tank is between FULL and LOW.

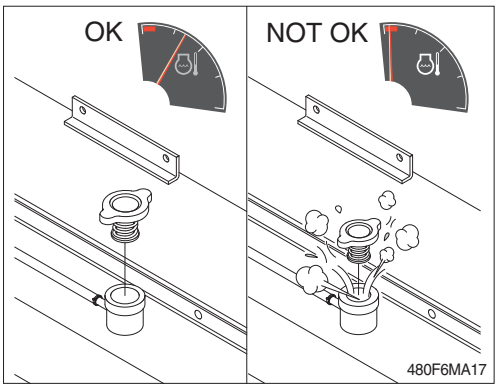
(2) Add the mixture of antifreeze and water after removing the cap of the reservoir tank if coolant is not sufficient.

(3) Be sure to use the reservoir empty, add the coolant by opening the cap of surge tank.

(4) Replace gasket of radiator 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.**



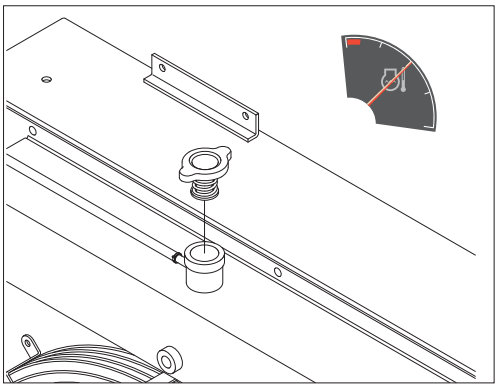


6) FLUSHING AND REFILLING OF RADIATOR

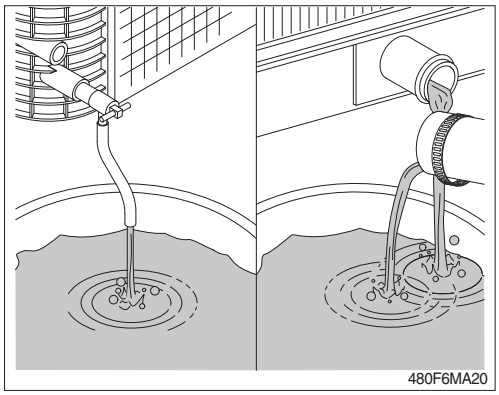
(1) Change coolant

⚠ **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 valve on the radiator and opening the drain valve on the bottom of the engine cylinder block.
A drain pan with a capacity of 57 liters (15 U.S. gallons) will be adequate.



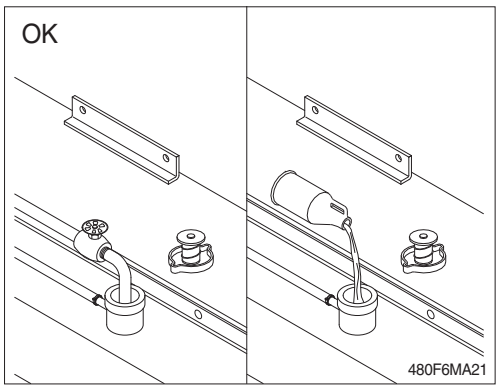
(2) Flushing of cooling system

① Remove the thermostats.

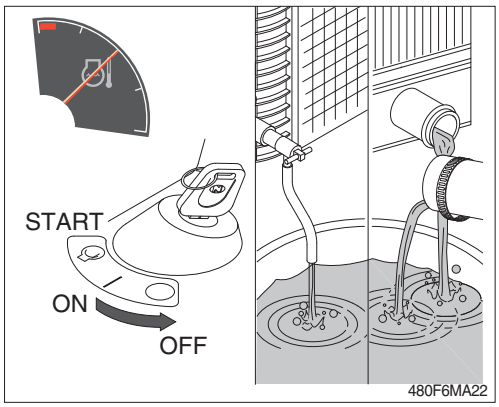
② Fill the system with a mixture of sodium carbonate and water (or a commercially available equivalent).

※ **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.**



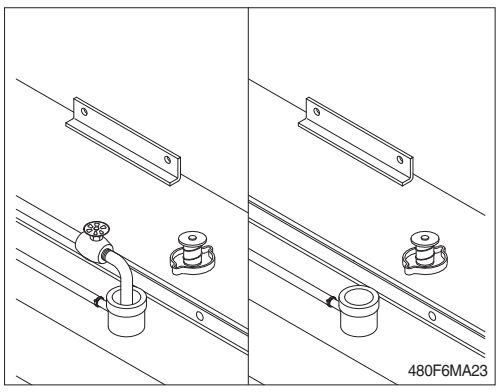
③ Operate the engine for 5 minutes with the coolant temperature above 80°C (176°F) .
Shut the engine off, and drain the cooling system.



④ Fill the cooling system with clean water.

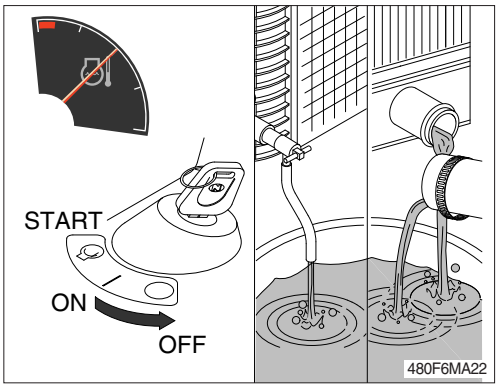
※ **Be sure to vent the engine and aftercooler for complete filling.**

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



⑤ Operate the engine for 5 minutes with the coolant temperature above 80˚C (176˚F) .
Shut the engine off, and drain the cooling system.

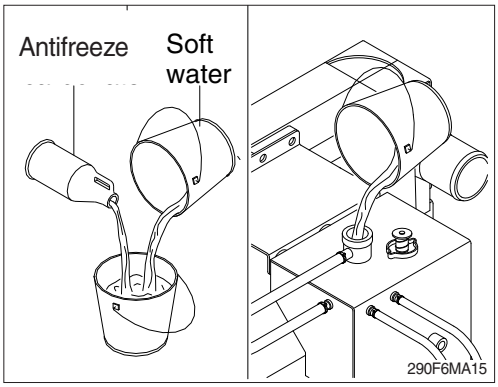
※ **If the water being drained is still dirty, the system must be flushed again until the water is clean.**



(3) Cooling system filling

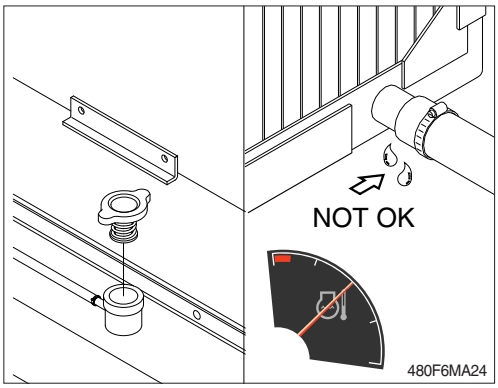
① Use a mixture of 50 percent soft water and 50 percent ethylene glycol antifreeze to fill the cooling system. Refit to the page 6-10.

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



② Refit the thermostats.

③ Install the pressure cap. Operate the engine until it reaches a temperature 80˚C (176˚F), and check for coolant leaks.
Check the coolant level again to make sure the system is full of coolant.

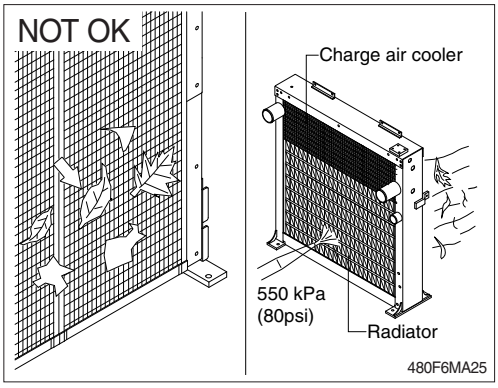


7) CLEAN RADIATOR AND OIL COOLER

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.

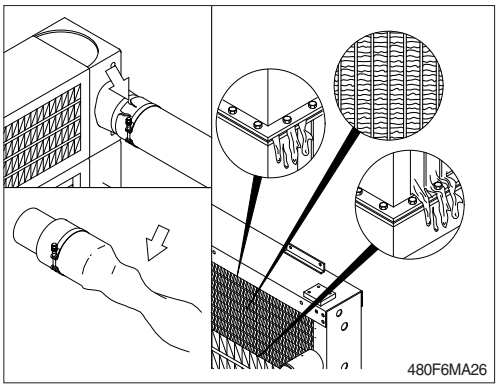
(2) Use 550 kPa (80 psi) air pressure to blow the dirt and debris from the fins.
Blow the air in the opposite direction of the fan air flow.



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

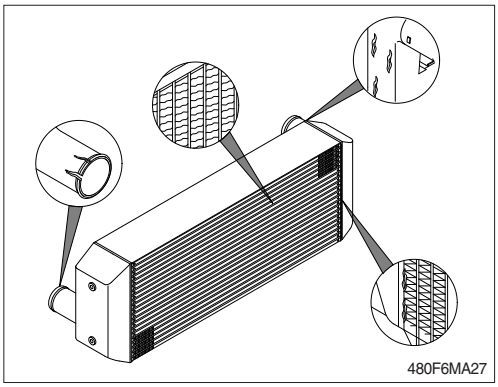
※ **If the radiator must be replaced due to bent or broken fins which can cause the engine to overheat, refer to the manufacturer's replacement procedures.**

(4) Visually inspect the radiator for core leaks.



8) 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.

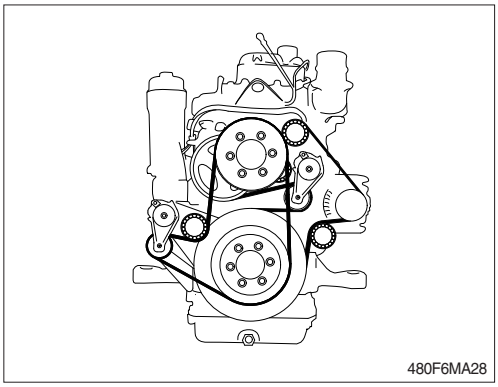


9) FAN BELT

※ **Refit the drive belt with the same direction of rotation as it had before removal.**

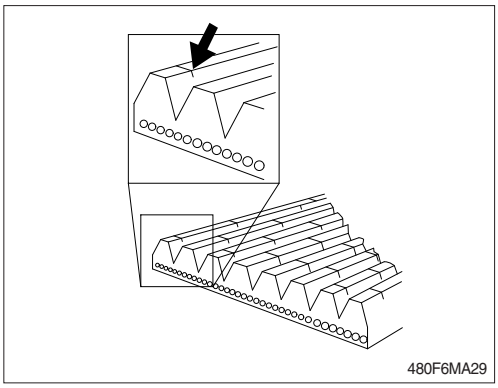
(1) Check the drive belt thoroughly, particularly at the idler rollers.

※ **The noise is considered to be nomal and will disappear within 50~100 operating hours.**



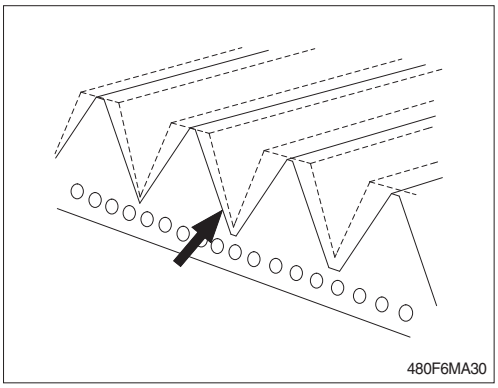
(2) Check the drive belt for cracks.

(3) The drive belt must be renewed if it has cracks.

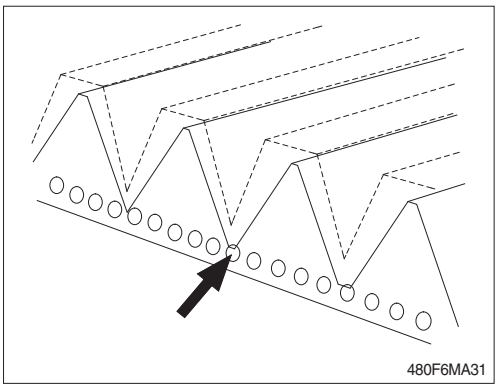


(4) Check the drive belt wear.

(5) The drive belt is starting to become worn, but can be refitted.



(6) The belt is worn down to the cord.
The drive belt must be renewed.

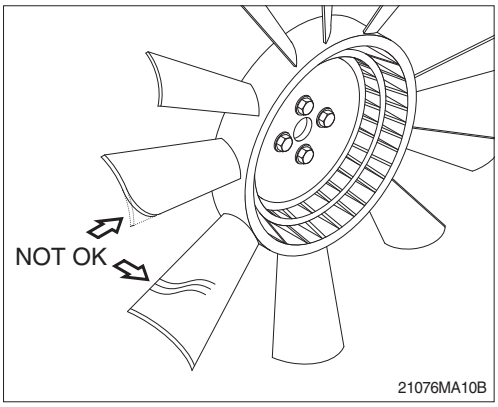


10) INSPECTION OF COOLING FAN

⚠ 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.

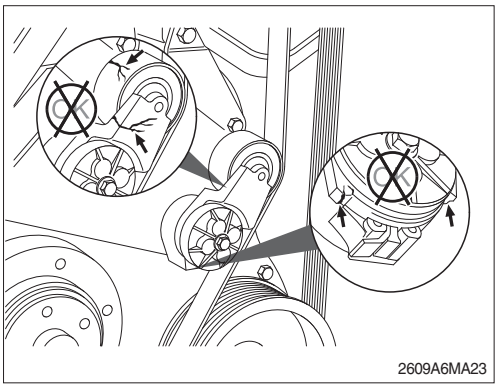
※ Rotate the crankshaft by using the engine barring gear.

※ 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.

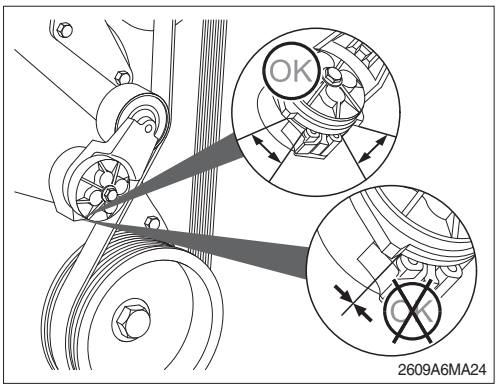


11) FAN BELT TENSIONER

(1) With the engine stopped, check the tensioner arm, pulley, and stops for cracks. If any cracks are found, the tensioner must be replaced.

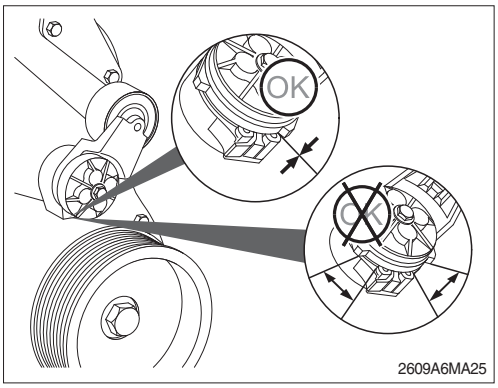


(2) With the belt installed, verify that neither tensioner arm stop is in contact with the spring case stop.
After replacing the belt, if the tensioner arm stops are still in contact with the spring case stop, replace the tensioner.

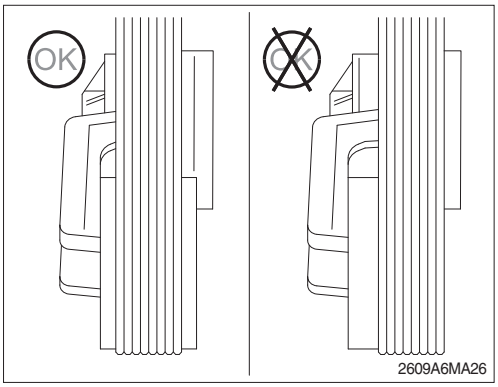


(3) With the belt removed, verify that the tensioner arm stop is in contact with the spring case stop.
If these two are not touching, the tensioner must be replaced.

※ **After replacing the belt, if the tensioner arm stop is still in contact with the spring case stop, the tensioner must be replace.**



(4) Check the location of the drive belt on the belt tensioner pulley. The belt should be centered on, or close to the middle of, the pulley. Misaligned belts, either too far forward or backward, can cause belt wear, belt roll-offs, or increase uneven tensioner bushing wear.



12) CLEANING OF AIR CLEANER

(1) Primary element

① Loosen the clamps 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.

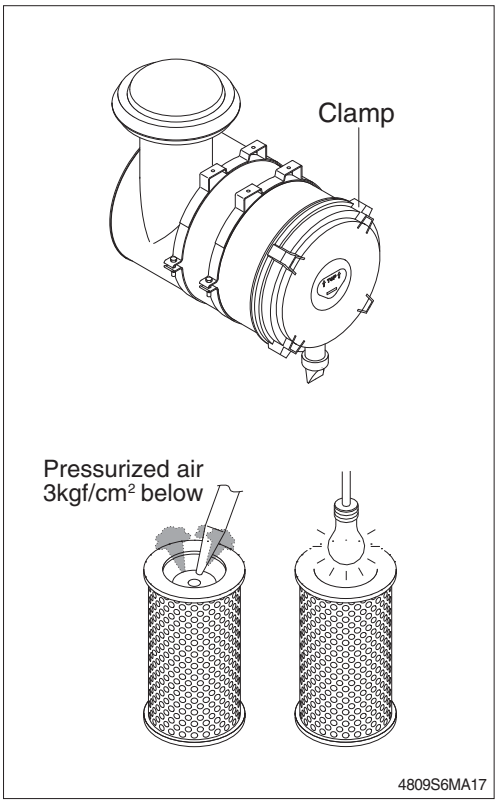
⑤ Insert element and tighten wing nut.

※ 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.



12-1) AIR CLEANER (OIL BATH)
(S/N HX480 L : -#0191 / HX520 L : -#0195)

△ **Always cover the engine intake hole while the air cleaner is being serviced.**

(1) General service

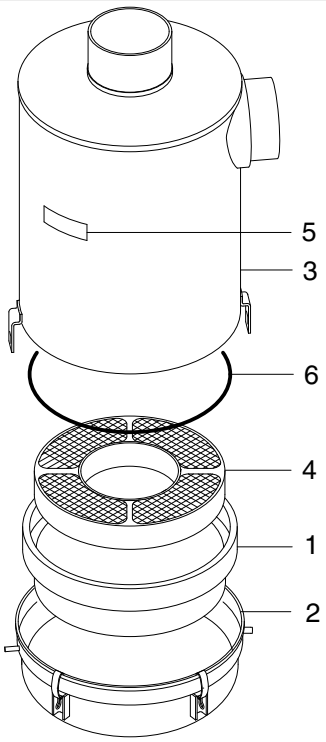
① The oil bath air cleaner should be inspected constantly for leaks and damage.

② The removable element assembly (4) should be removed the from the oil cups (1, 2) and inspected daily or at each oil cup service.

③ Watch all connections for mechanical tightness. Be sure cleaner outlet pipe is not fractured.

④ If air cleaner has been dented or damaged, check all connections immediately.

⑤ In case of leakage and if adjustment does not correct the trouble, replace necessary parts or O-ring.



1 Inner cup assy
2 Outer cup assy
3 Body assy
4 Removable element
5 Marking
6 O-ring

480S6MA35

(2) Oil cup

① Service the inner oil cup (1) and outer oil cup (2) daily or when 1/2" of dirt has collected in bottom of either cup.

※ **Severe operating conditions may require several inspections daily.**

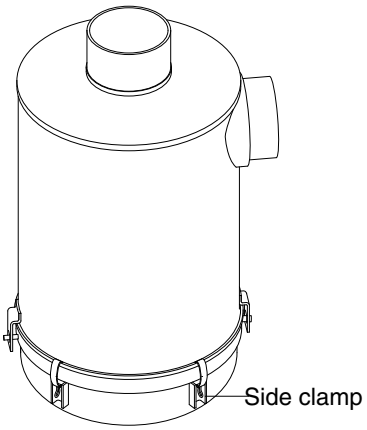
② Loosen the side clamps and removing bottom of unit and lift the removable element assembly (4) from the oil cup.

③ Pour out the oil and remove inner cup (1) from out cup (2) and remove sludge and wipe clean.

④ Reassembled inner cup (1) in outer cup (2) and refill both cups to indicated oil level.

⑤ The same oil specified for the engine crankcase is generally acceptable.

※ **Do not over fill or under fill the cup.**
Overfilling means loss of capacity and under filling means lack of efficiency.



480S6MA36

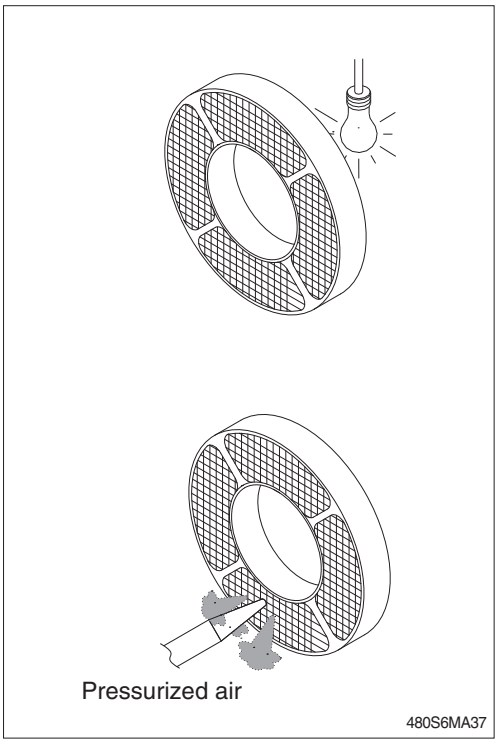
(3) Removable element

① First step in servicing removable element assembly is hold up to a strong light. An even, bright pattern of light through the wire element means if is clean.

② If removable element is even partially plugged with dirt, lint or chaff, wash thoroughly with solvent.
Then blowout with compressed air.

③ Inspect lower portion of body assembly and center tube each time oil cup is serviced. See back side for service details.

④ Reassemble removable element assembly to serviced oil cups and to air cleaner body.
Be sure the oil cup is tight to body assembly.

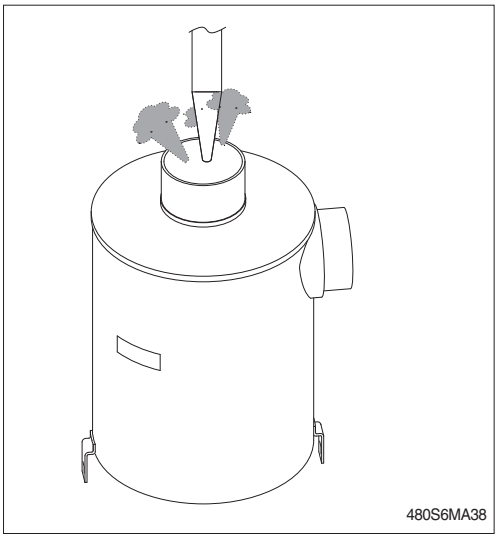


(4) Body assembly

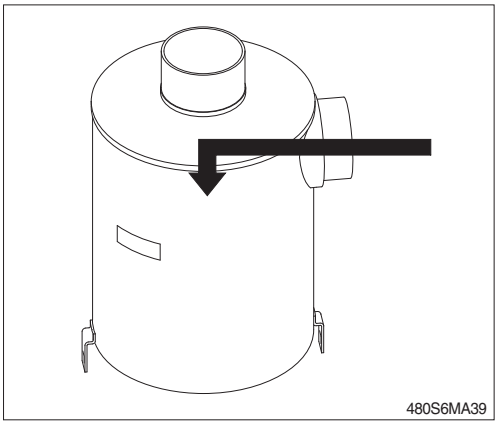
The lower portion of the body assembly should be inspected each time the air cleaner is serviced. If there is any sign of build-up or plugging, the body assembly should be removed and cleaned. At least once a year, remove the body assembly and perform the following service steps.

① Remove oil cup and removable element assembly.

② Check and clean center tube.



③ Pump solvent through the air outlet with sufficient force and volume to produce a hard, even stream out the bottom of the body assembly. Reverse flush until all foreign material is removed.



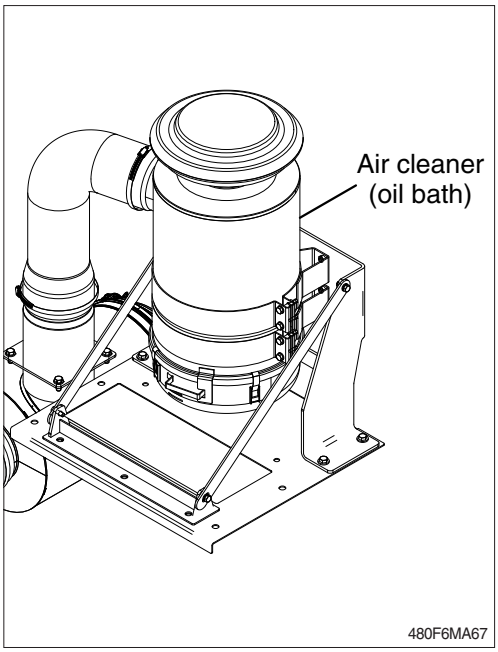
12-2) AIR CLEANER (OIL BATH, OPTION)
(S/N HX480 L : #0192- / HX520 L : #0196-)

※ In harsh working condition, the filter element must be inspected and cleaned daily or change the oil.

※ Failure to manage filters can cause degradation. If the filter is clogged, engine damage and power loss will occur.

※ In order to ensure the filtration efficiency of oil bath, it is recommended to replace a set of metal elements every year.

※ The maximum ash capacity of the filter element is approximately to 14 kg (31 lb).

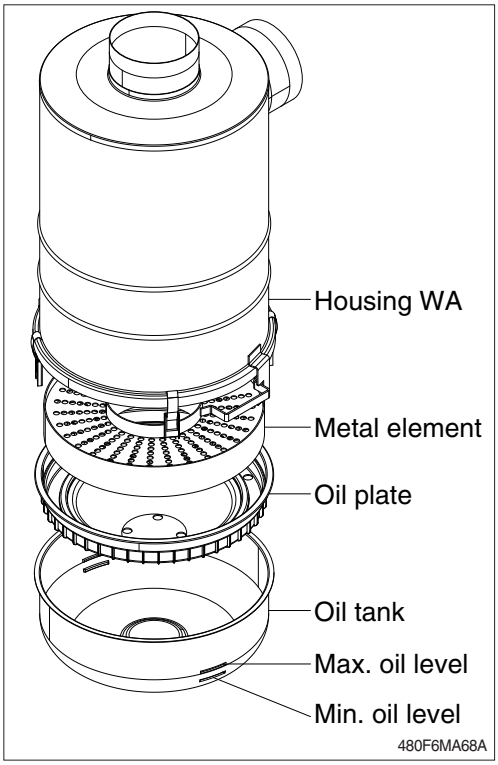


(1) Check air cleaner

Check the inside and outside of the air cleaner.

(2) Cleaning and replacement of filter element

① Disassemble as shown the illustration.
② Check the filter element with the light.
③ Clean or change the filter elment if necessary. Immerse the filter element in diesel for 20 to 30 minutes, take out the filter element and then wash is with diesel to remove the remaining dust on the filter element.
④ Use commpressed air to dry completely.
⑤ Check the housing WA.
⑥ Check the lower body of the air cleaner and center tube everytime when the oil tank is serviced. Replace any broken, cracked or missing part.
⑦ After serviced, assemble oil tank with oil plate and fill the oil (3 ~ 5 ℓ / 0.8 ~ 1.3 U.S. gal) in the guide line. Frequently check whether the oil tank buckle for looseness.



13) FUEL TANK

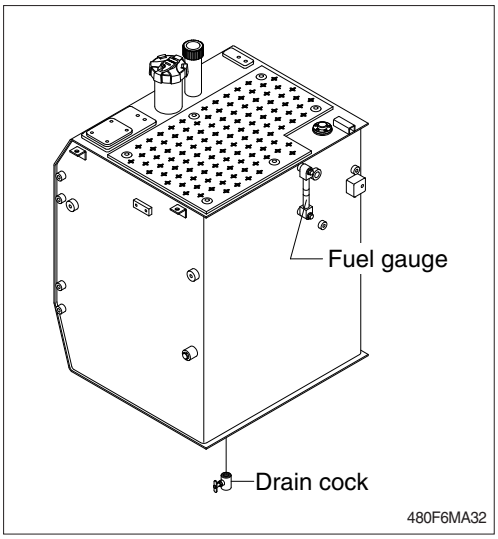
(1) Fill fuel fully when system the operation to minimize water condensation, and check it with fuel gauge before starting the machine.

(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.



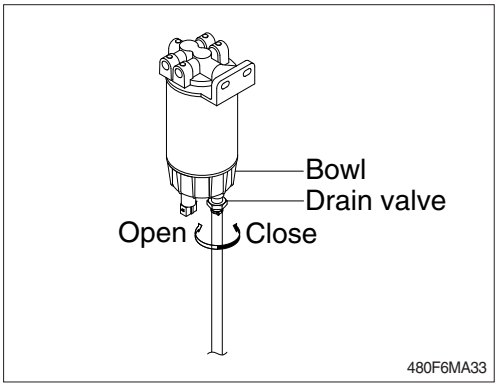
14) FUEL RETURN FILTER

※ Inspect or drain the collection bowl of water daily and replace the element every 1000hours.

(1) Drain water

① Open bowl drain valve to evacuate water.

② Close drain valve.



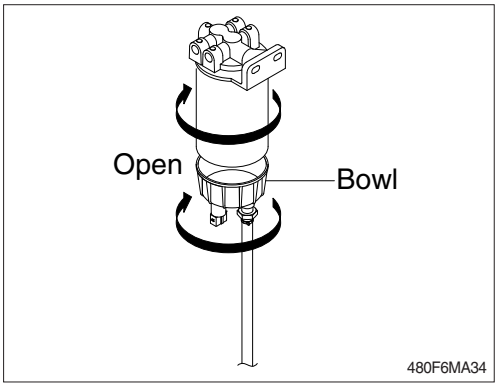
(2) Replace element

① Drain the unit of fuel. Follow "Drain water" instructions above.

② Remove element / bowl from filter head.

※ **The bowl is reusable, do not damage or discard.**

③ Separate element from bowl. Clean bowl and seal gland.

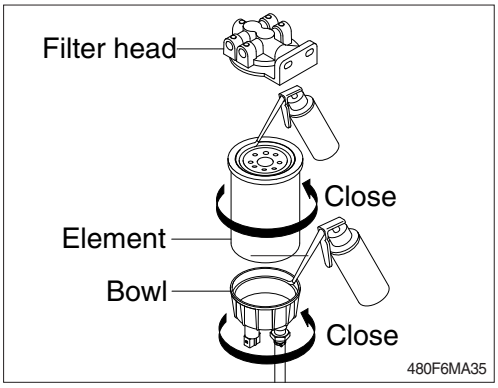


④ Lubricate new bowl seal with clean fuel or motor oil and place in bowl gland.

⑤ Attach bowl to new element firmly by hand.

⑥ Lubricate new element seal and place in element top gland.

⑦ Attach the element and bowl to the head.



15) REPLACEMENT OF FUEL FILTER

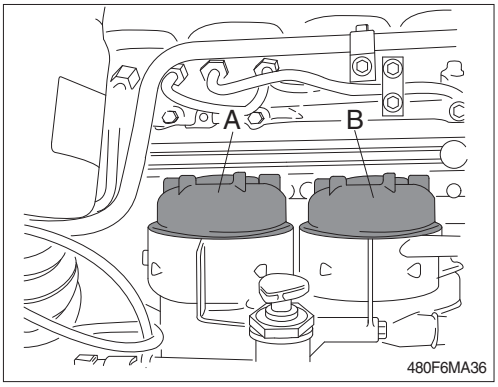
※ The fuel system is very sensitive to dirt. It is therefore important that everything is as clean as possible when work is carried out on the fuel system.

- Do not use compressed air to blow components in the fuel system clean.
- Use lint-free cloths for cleaning.
- Clean tools before use.
- Do not use worn chrome-plated tools as flakes of chrome may come off.
- Plug or tape connections on components which are removed.

(1) Turn the fuel supply and return shut-off valve to the OFF position.

(2) To ensure that the filter housings are drained properly, the filter covers must be removed as follows.
A - Water separating suction filter
B - Pressure filter

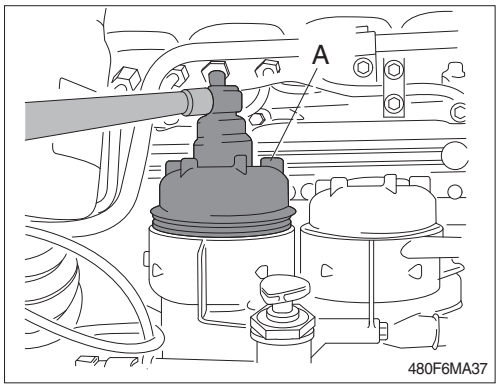
※ **Always start with the water separating suction filter A. Do not open the pressure filter cover B until housing for the water separating suction filter A is completely drained.**



※ **Do not use an adjustable spanner or other open tool to undo the filter covers, as this risks damaging the filter covers.**

(3) Make a mark on the water separating suction filter cover A. Unscrew the cover 3 to 4 turns, using a closed tool with hexagon driver (36 ㎜ socket).

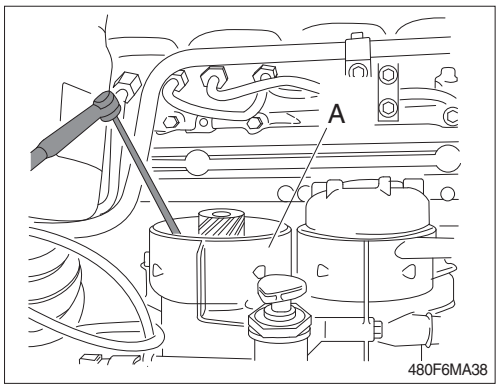
※ **Wait a minimum of 2 minutes to allow as much of the fuel as possible to drain out of the filter housing.**



(4) Unscrew the filter cover A and lift it up slowly with the filter element.

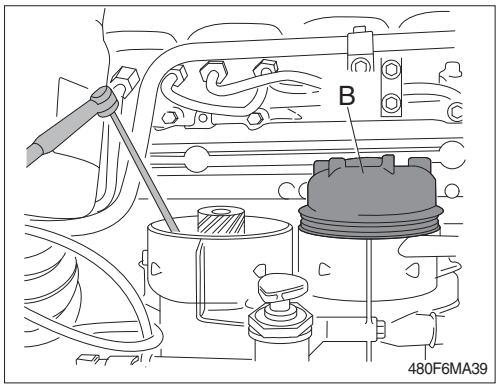
(5) Make sure the suction tool is completely drained before starting work.
Draw out remaining fuel and any particles using suction tool or a similar tool.

(6) Keep the suction tool hose in the filter housing for the water separating suction filter A.



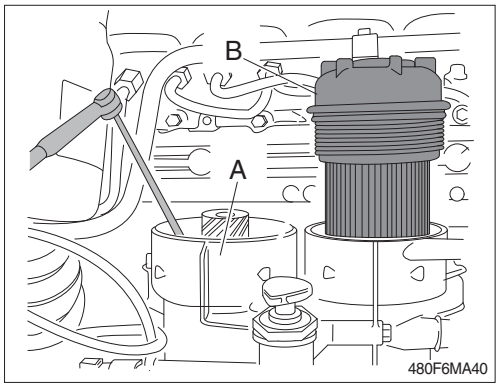
(7) Make a mark on the pressure filter cover B.
Unscrew the cover 3 to 4 turns, using a closed tool with hexagon driver socket. Draw out fuel which may drain into the water separating suction filter housing when the pressure filter is detached.

※ **Wait a minimum of 2 minutes to allow as much of the fuel as possible to drain out of the filter housing.**



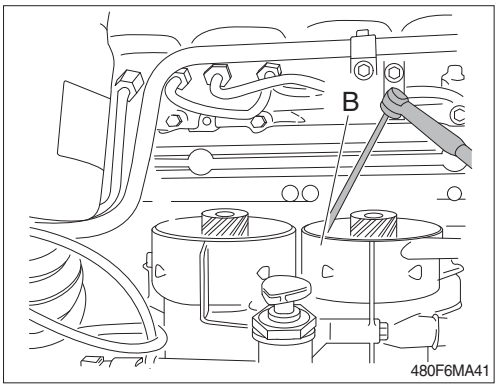
(8) Unscrew the pressure filter cover B and lift it up slowly with the filter element.

(9) Fuel from the pressure filter housing B may flow into the water separating suction filter housing A. Keep the suction tool hose in the filter housing for the water separating suction filter A until it is completely drained of fuel.



(10) Move the suction tool to the pressure filter housing B. Draw out remaining fuel and particles.

※ **It is important to remove remaining fuel and particles from the filter housing to prevent fuel system contamination.**



(11) Undo the old filter elements from the covers by carefully bending them to one side.

(12) Unpack the new filter elements and the supplied O-rings.

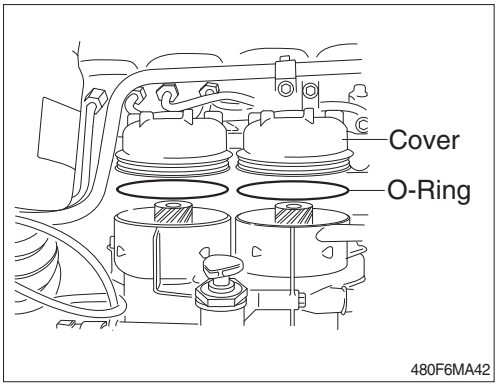
※ **Check that there is no remaining packaging material stuck to the filters.**

(13) Fit the new O-rings to the covers. Lubricate the O-rings with O-ring grease.

(14) Press the filter elements into the snap fasteners on the covers.

※ **Fit the filter element to the filter cover before positioning it in the fuel filter housing. The filter element can otherwise be damaged.**

※ **Open the bleed nipple to prevent back pressure in the filter housings when the filter elements are screwed on.**



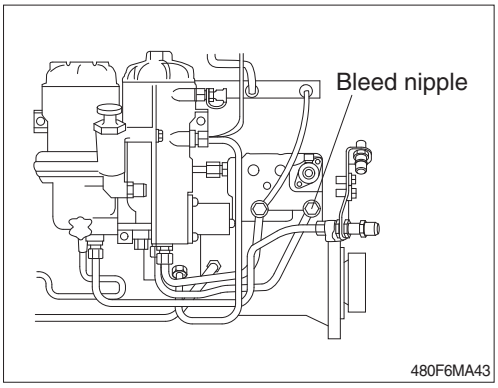
(15) Press down the filter element with filter cover into the filter housing.

(16) Screw on the filter cover. Use a closed tool with hexagon driver (36 mm socket).

· Tightening torque : 2.5 kgf · m (18 lbf · ft)

(17) Check that there is no gap between the filter cover and the filter housing. If there is a gap, repeat the procedure and make sure that the bleed nipple is open.

(18) Turn the fuel supply and return shut-off valve to the ON position.



16) BLEEDING THE FUEL SYSTEM

(1) Attach a clear plastic hose to the bleed nipple on the fuel filter housing. Place the end of the plastic hose in a container that holds at least 3 liters (0.8 US gallons).

(2) Loosen the hand pump handle.

(3) Open the bleed nipple.

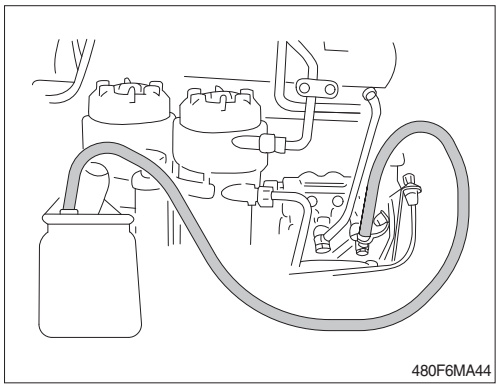
(4) Pump by hand until fuel comes out of the hose. This may take around 100 pump strokes. Depending on the installation, a significantly greater number of pump strokes may be required before fuel comes out.

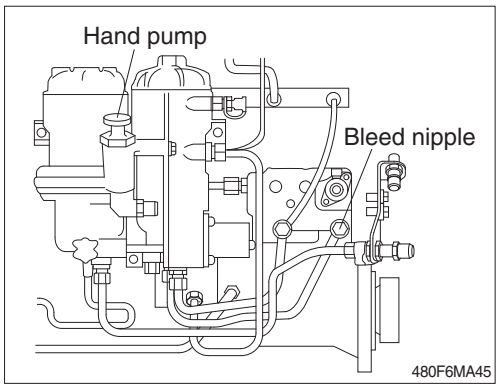
(5) Close the bleed nipple.

(6) Start the engine and open the bleed nipple carefully.

(7) Check that fuel without air bubbles comes out of the hose. Normally, about 3 liters (0.8 US gallons) of fuel must be drained before no more air bubbles come through the hose.

(8) Close the bleed nipple, remove the hose and tighten the hand pump handle.



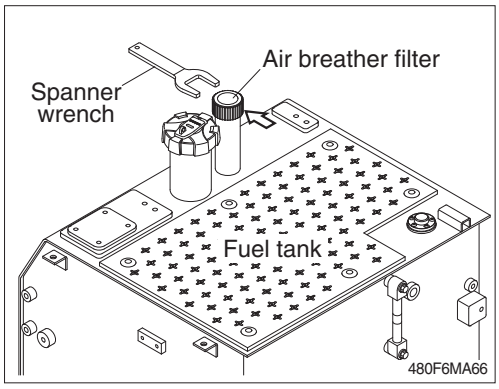


17) REPLACEMENT OF FUEL TANK AIR BREATHER FILTER

(1) Stop the engine.

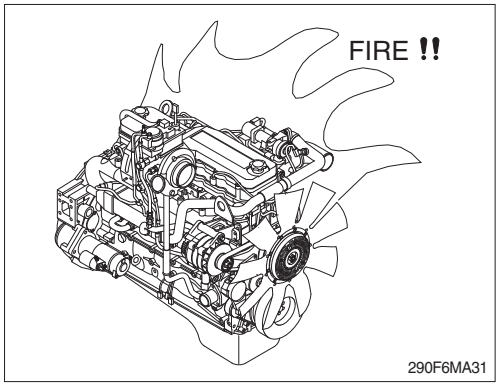
(2) Remove the air breather filter using the special spanner wrench and dispose it in accordance with environmental regulations.

(3) Replace the filter with new one.
- Tightening torque : 0.95±1.0 kgf · m (6.9±7.2 lbf · ft)



18) 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.



19) DEF/AdBlue® TANK

(1) The DEF/AdBlue® tank level must be checked daily with DEF/AdBlue® level gauge.

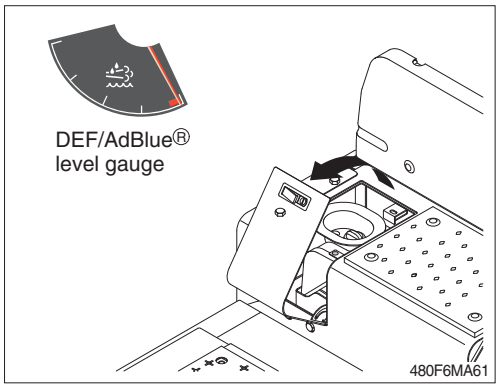
(2) If the DEF/AdBlue® level is found to below, DEF/AdBlue® must be added.

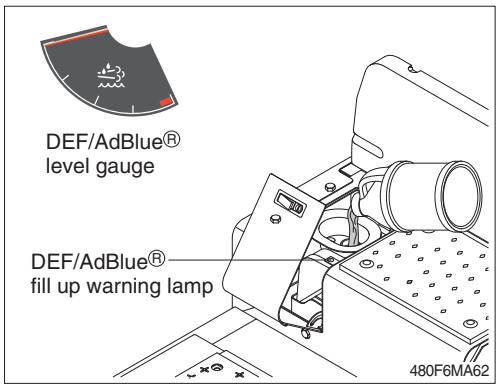
(3) DEF/AdBlue® fill up warning lamp turns on when tank is completely filled with DEF/AdBlue®. After turning light on, do not pour DEF/AdBlue® any more.

※ Fill the tank with DEF/AdBlue® after key on and then turn off the start key.

※ Be careful to entering dust, sand or other contamination substance when you refill the DEF/AdBlue® into the tank. Otherwise, fatal problem such as engine idle locking, derating or engine stopping can be happen.

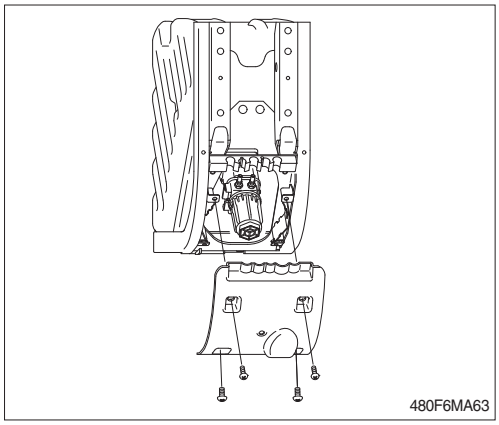
⚠ It is unlawful to tamper with or remove any component of the aftertreatment system. It is also unlawful to use a catalyst solution that does not meet the specifications provided or the operate the machine with no catalytic solution.





20) DEF/AdBlue® SUPPLY MODULE FILTER

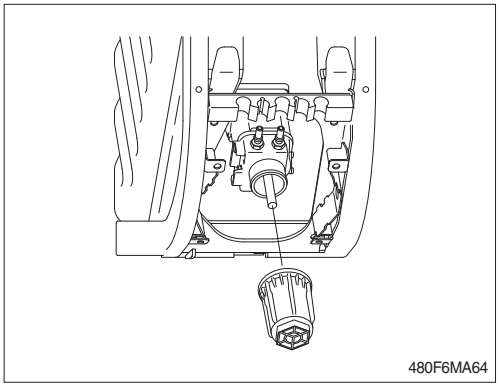
(1) Remove the cover on the rear of the DEF/AdBlue® tank.



(2) Place a suitable container underneath.

(3) Unscrew the filter cover. Use a 46 ㎜ socket.

(4) Remove the filter cover and O-ring.



(5) Remove the frost protection device and the filter.

(6) Wipe the pump clean.

(7) Check that the frost protection device and valve ring are correctly fitted in the new cover.

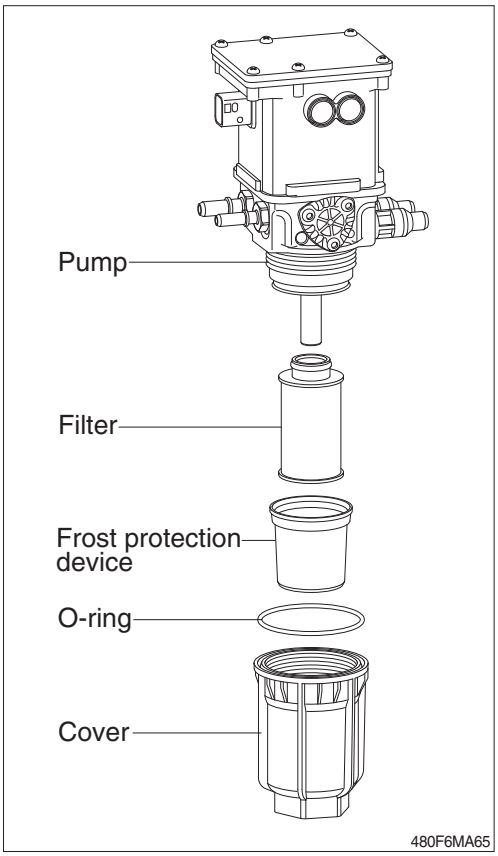
(8) Fit the new filter.

(9) Fit the new frost protection device.

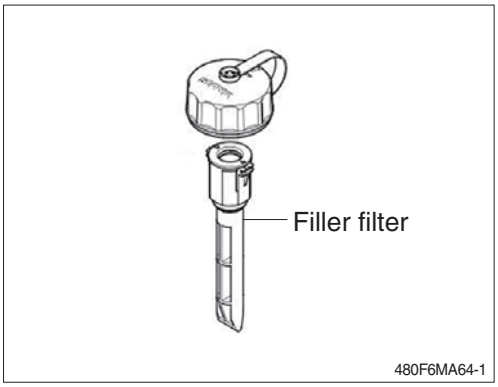
(10) Lubricate the threads with the spray.

(11) Fit the new O-ring in the new cover.

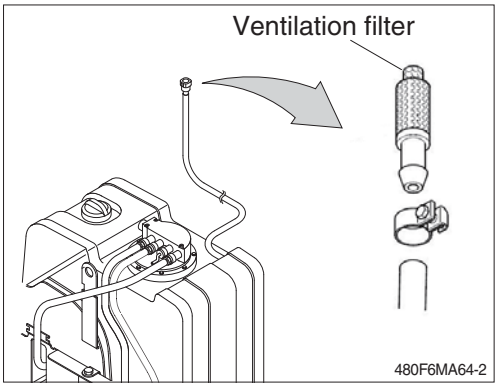
(12) Fit the new cover.
· Tightening torque : 8.2 kgf · m (59.3 lbf · ft)



※ Make sure that the DEF/AdBlue® filler filter is clean. If it is dirty, clean the filler filter with clean water and refit it.



※ Make sure that the DEF/AdBlue® ventilation filter is clean. If it is dirty, clean the ventilation filter with clean water and refit it.



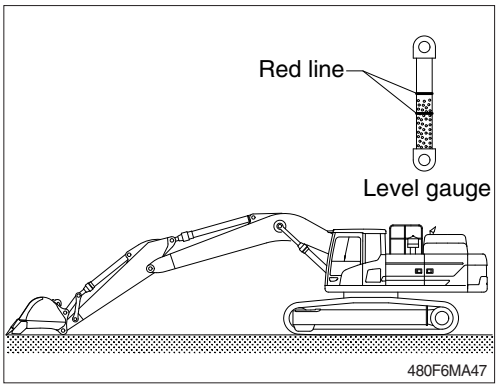
21) HYDRAULIC OIL CHECK

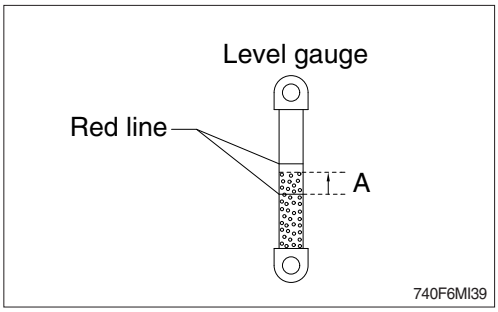
(1) Position the machine as shown in the illustration on the right. Then stop engine.

(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 3-21 for checking the temperature of the hydraulic oil.

※ Add the hydraulic oil, if necessary.

22) FILLING HYDRAULIC OIL

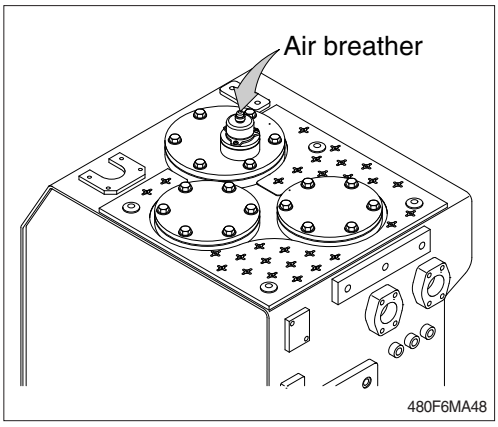
(1) Stop the engine to the position of level check.

(2) Relieve the pressure in the tank by pushing the top of the air breather.

(3) Remove the breather on the top of oil tank and fill the oil to the specified level.

(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.



23) CHANGE HYDRAULIC OIL

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

(2) Relieve the pressure in the tank by pushing the top of the air breather.

(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.

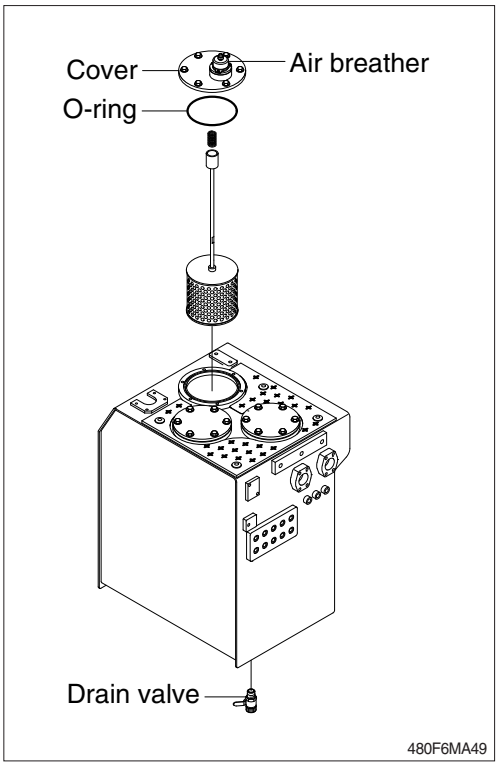
(7) Put the breather in the right position.

(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.



24) CLEAN SUCTION STRAINER

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

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

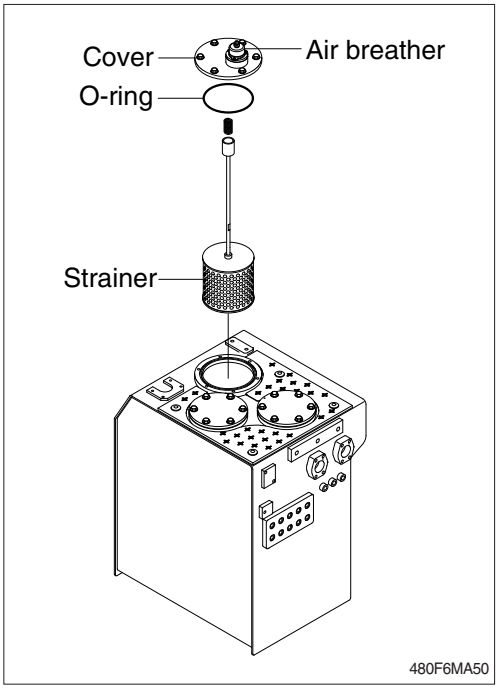
(2) Pull out the strainer in the tank.

(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.



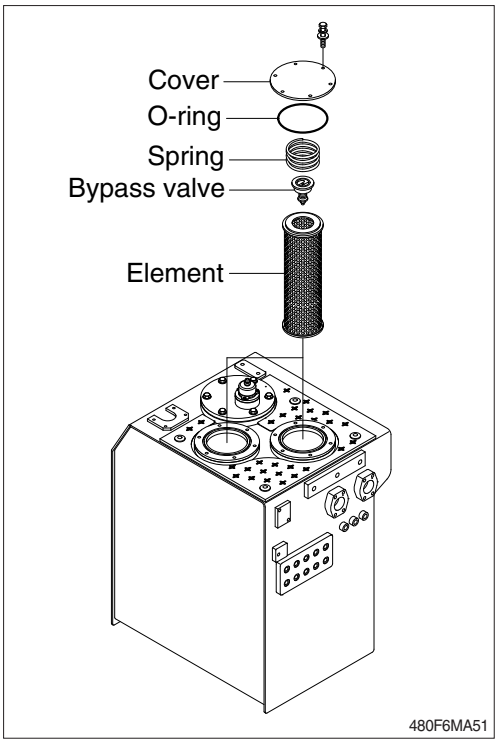
25) REPLACEMENT OF RETURN FILTER

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 element with new one.



26) REPLACEMENT OF ELEMENT IN HYDRAULIC TANK BREATHER

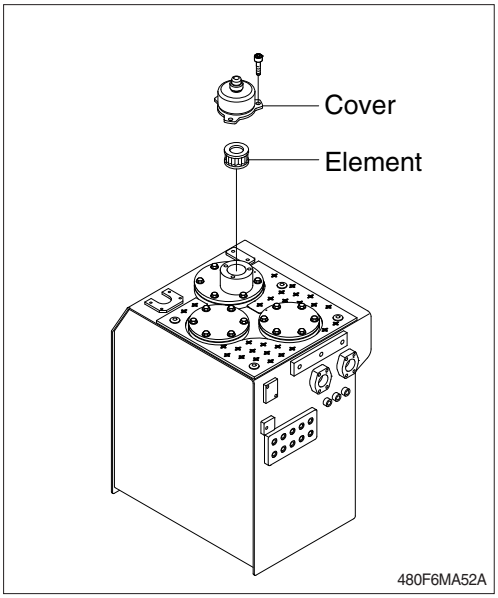
(1) Relieve the pressure in the tank by pushing the top of the air breather.

(2) Loosen the bolt and remove the cover.

(3) Pull out the filter element.

(4) Replace the filter element new one.

(5) Reassemble by reverse order of disassembly.
- Tightening torque : 0.8~1.0 kgf · m (5.9~7.4 lbf · ft)

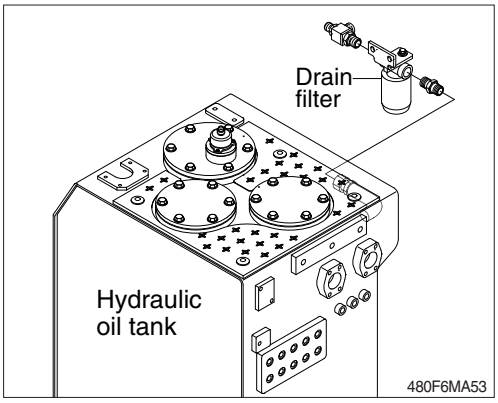


27) REPLACE OF DRAIN FILTER CARTRIDGE

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 body for mounting.

※ Change cartridge after initial 250 hours of operation. Thereafter, change cartridge every 1000 hours.



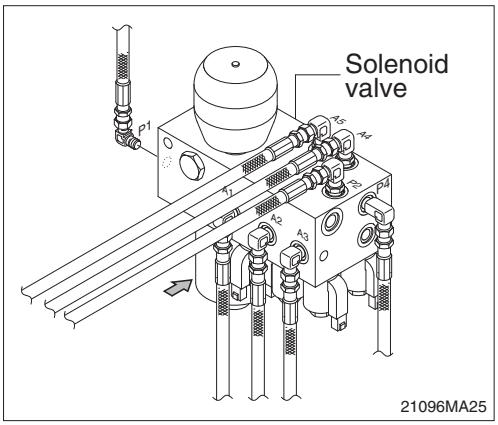
28) REPLACE OF PILOT LINE FILTER

(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 250 hours of operation. Thereafter, change cartridge every 1000 hours.

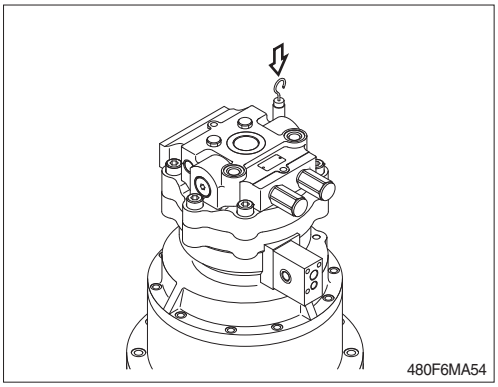


29) CHECK THE SWING REDUCTION GEAR OIL

(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.



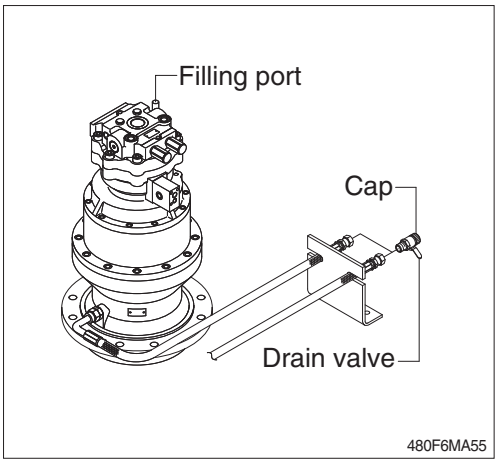
30) CHANGE SWING REDUCTION GEAR OIL

(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) Open the cap and loosen the drain valve.

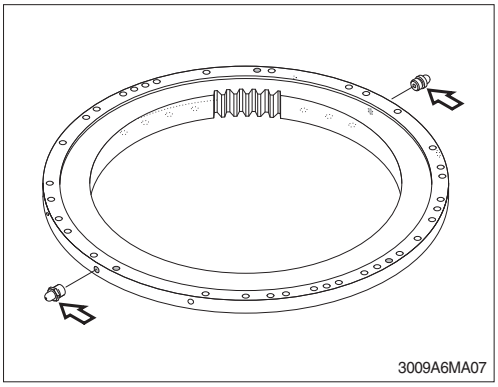
(4) Clean around the valve and close the drain valve and cap.
Fill proper amount of recommended oil.
· Amount of oil : 7.0 ℓ (1.8 U.S.gal)



31) LUBRICATE SWING BEARING

(1) Grease at 2 fitting.

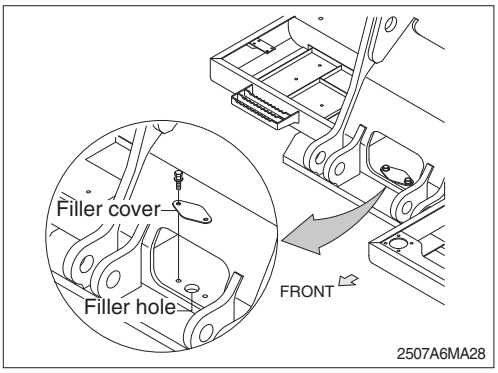
※ Lubricate every 250 hours.



32) SWING GEAR AND PINION

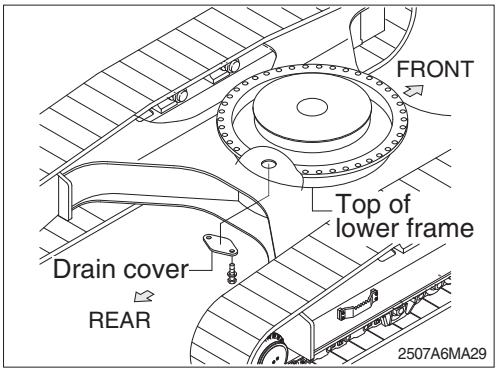
(1) Drain old grease

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

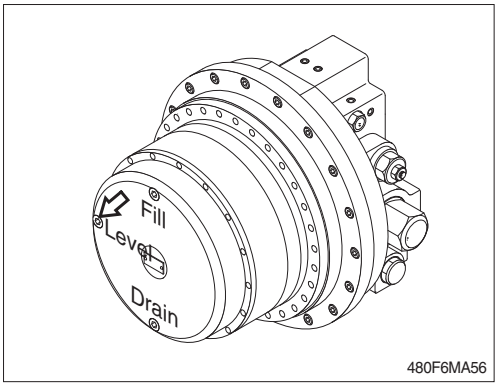
① Install drain cover.
② Fill with new grease.
③ Install filler cover.
· Capacity : 14 kg (31 lb)



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.
· Amount of oil : 12 ℓ (3.2 U.S.gal)



34) CHANGE OF THE TRAVEL REDUCTION GEAR OIL

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

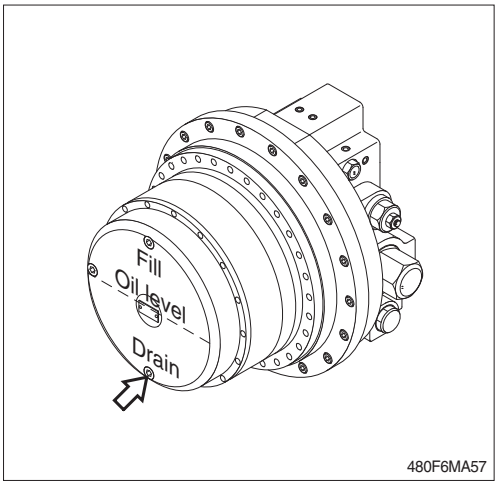
(2) Stop when the position of the drain plug is down.

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

(4) Drain the oil to adequate container.

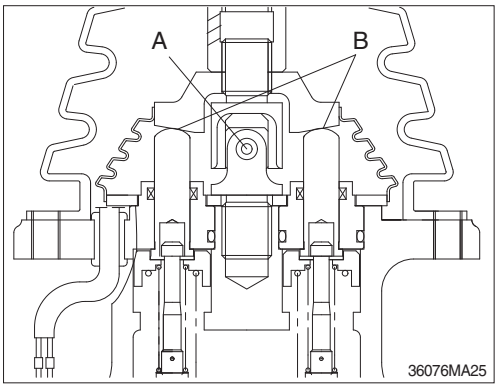
(5) Tighten the drain plug and fill specified amount of oil at filling port.

(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

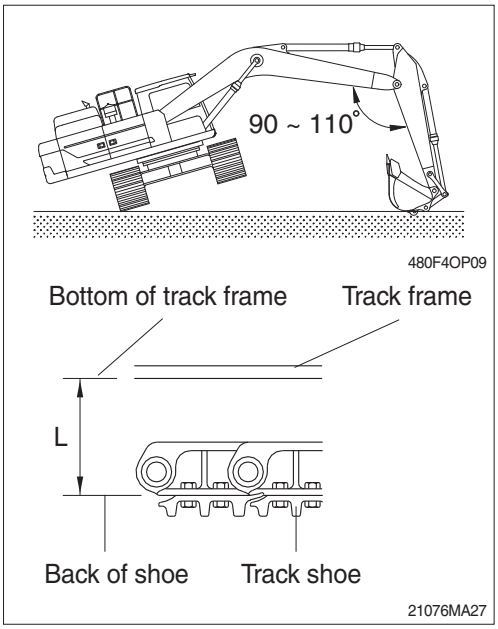
※ It is important to adjust the tension of track properly to extend the lifetime of track and traveling device.

※ The wear of pins and bushings on the under-carriage 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 track of shoe.

※ Remove mud with rotating the track before measuring.



Working condition	Length (L)	
General	390~420 mm	15.4~16.5"
Swamp	420~460 mm	16.5~18.1"
Sand, Mud, Pebbles	About 460 mm	About 18.1"

(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.

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 knob 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.

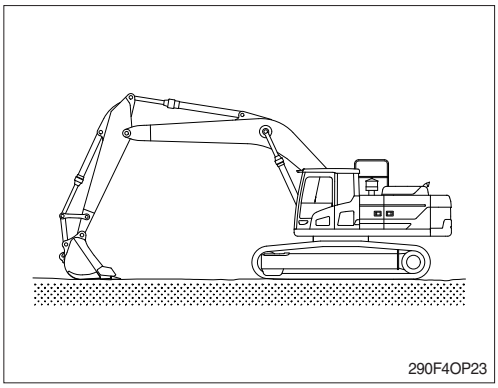
※ If the bucket is lowered strongly to the ground, the resistance will be increased and it will be difficult to remove the pins.

※ 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.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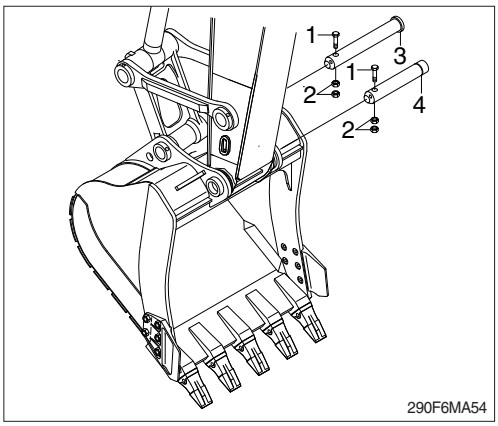

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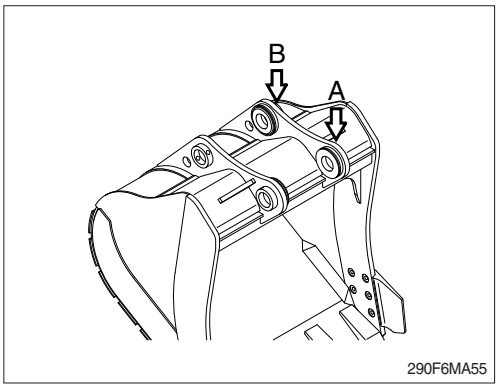

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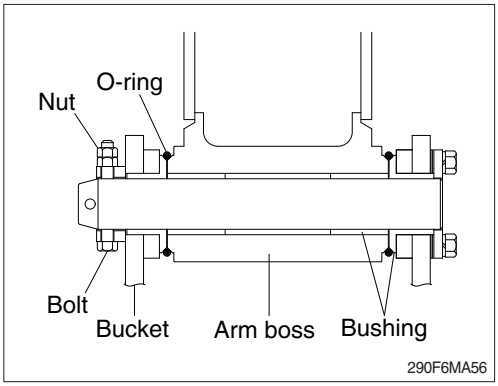

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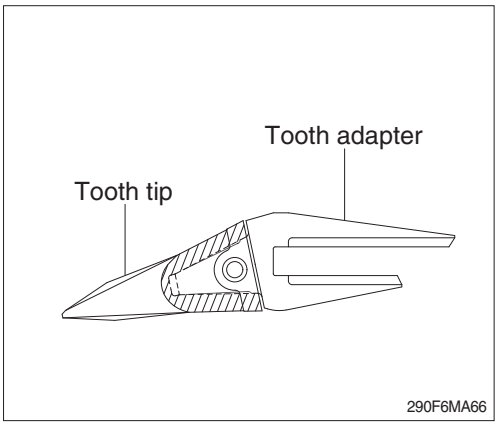
38) REPLACEMENT OF BUCKET TOOTH

(1) Timing of replacement

① Check wearing condition as shown in the illustration and replace tooth tip 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 locking washer.

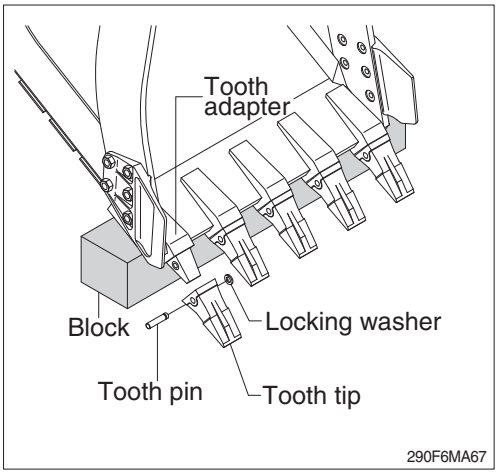
② Remove dust and mud from surface of tooth adapter by using knife.

③ Place locking washer in its proper place, and fit tooth tip 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 tips 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 right and keep the arm boss to be contact to the bucket left.

(3) Lock the safety knob 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 (2), and remove washer (3), plate (1) and shim (4).

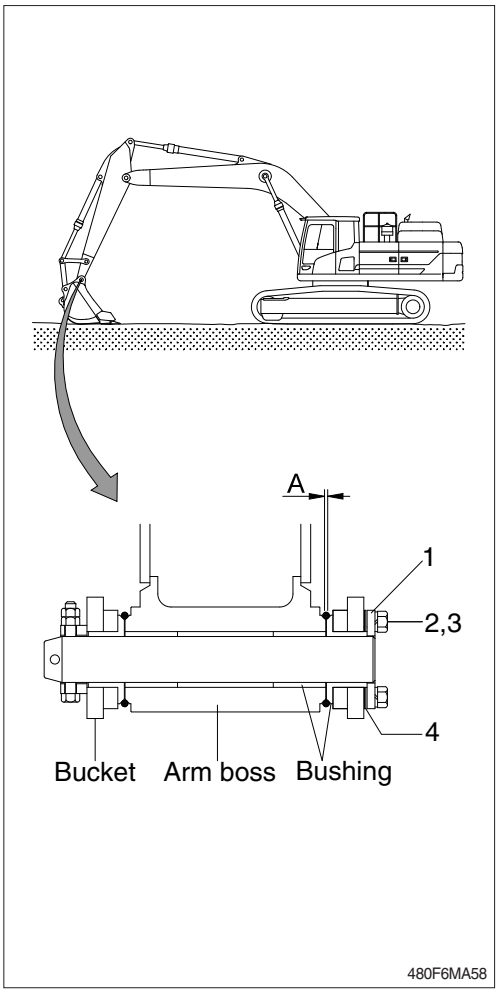
② Remove the shim equivalent value with measuring value.

③ Assemble the parts in the reverse order of removal.

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

· Normal clearance : 0.5 ~ 1.0 mm
(0.02 ~ 0.04 in)

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



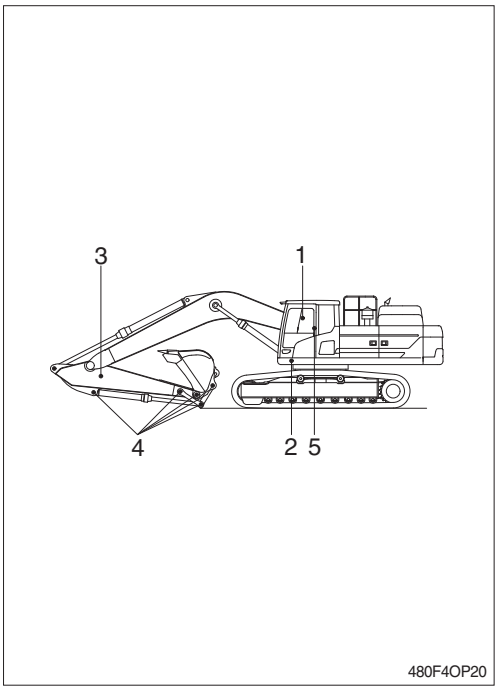
40) LUBRICATE PIN AND BUSHING

(1) Lubricate to each pin of working device

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

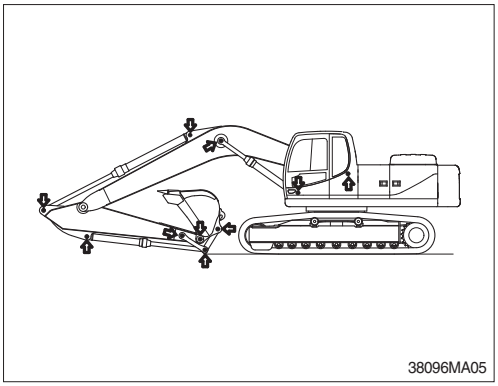
No.	Description	Qty
1	Lubrication manifold at boom	5
2	Boom cylinder pin	2
3	Lubrication manifold	3
4	Bucket cylinder pin (head, rod)	2
	Bucket link (control rod)	3
	Arm and control link connection pin	1
	Arm and bucket connection pin	1
5	Boom rear bearing center	1

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



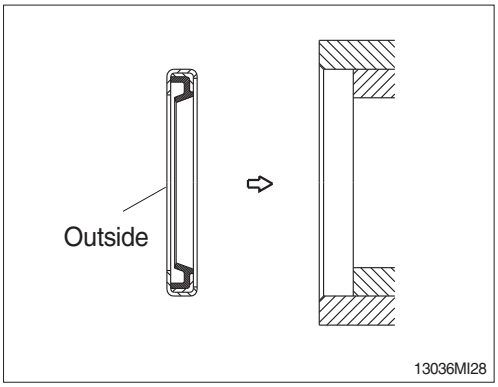
(2) Dust seals are mounted on the rotating part of working device to extend the lubricating interval.

※ **Mount the lip to be faced outside when replace the dust seal.**



※ **If it is assembled in wrong direction, it will cause fast wear of pin and bushing, and create noise and vibration during operation.**

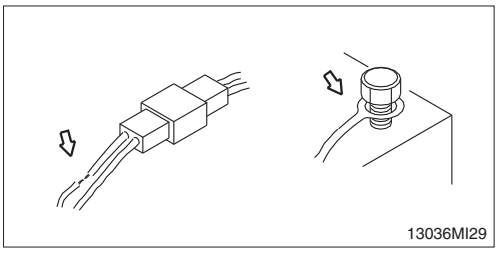
※ **Assemble the seal same direction with picture and use with plastic hammer when replace.**



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.

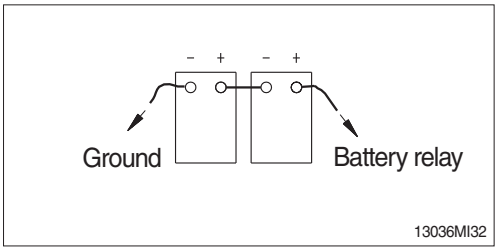
(2) Recycle

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

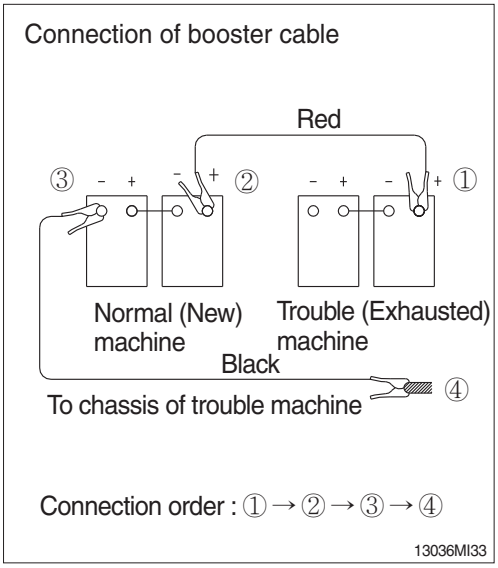
※ Use the same capacity of battery for starting.

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.

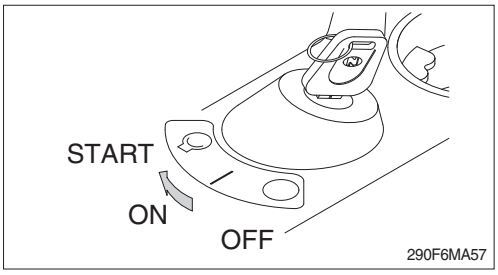


(2) Starting the engine

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.

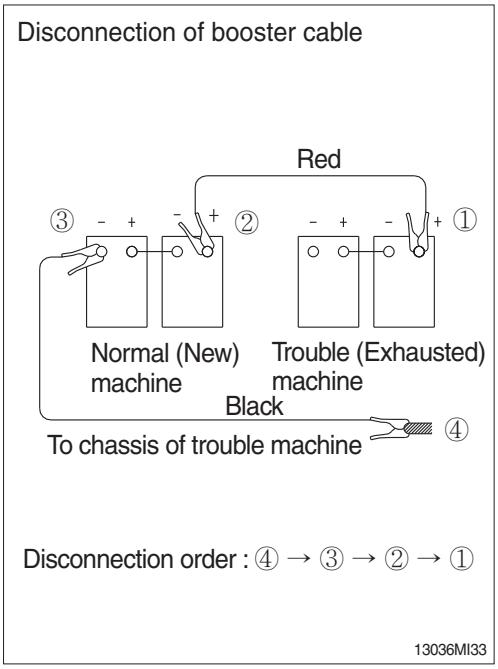
③ Run engine with high idle until charging the exhausted battery by alternator, fully.

⚠ 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.

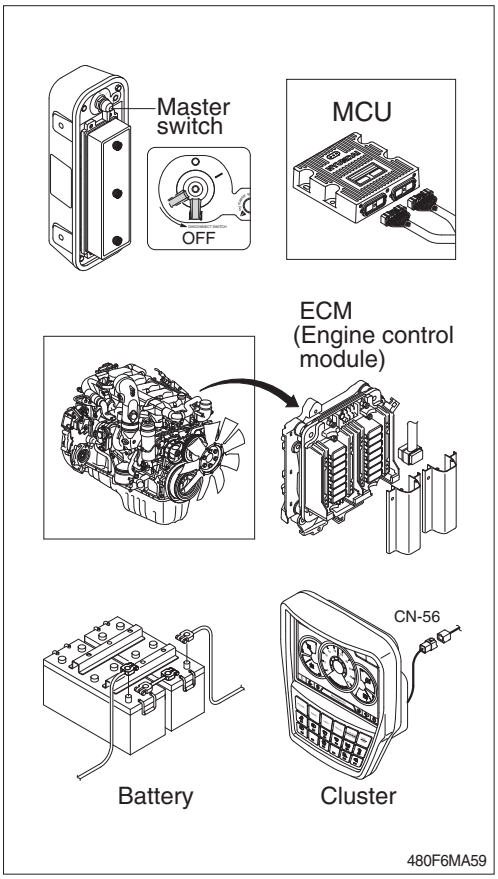
③ Before carrying out any electric welding on the machine, the battery cables should be disconnected and the connectors pulled out of the electronic control units (MCU, ECM, cluster etc).

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.

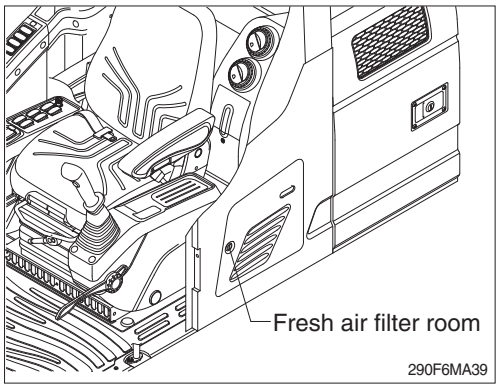
If not, it will caused serious damage at electric system.



1) CLEAN AND REPLACE OF FRESH AIR FILTER

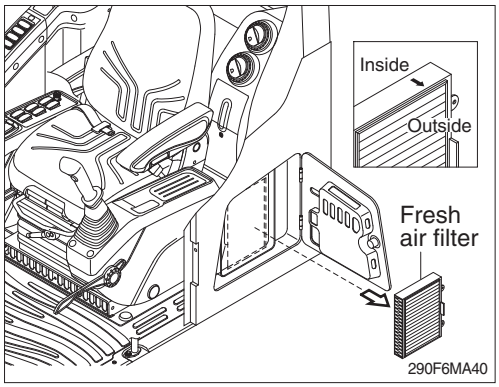
※ **Always stop the engine before servicing.**

(1) Open the fresh air filter room.



(2) Remove the fresh air filter.

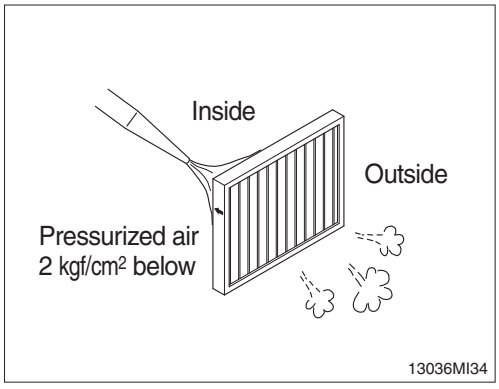
※ **When installing a filter, be careful not to change the filter direction.**



(3) Clean the filter using a pressurized air (below 2 kgf/cm², 28 psi).

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

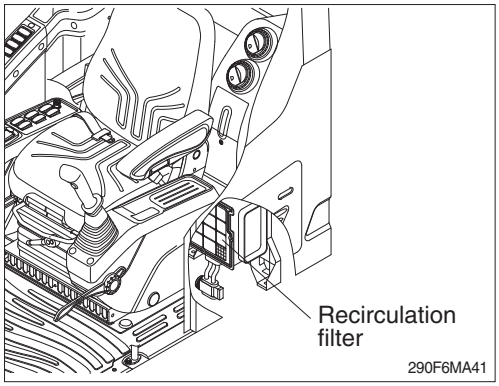
(4) **Inspect the filter after cleaning. If it is damaged or badly contaminated, use a new filter.**



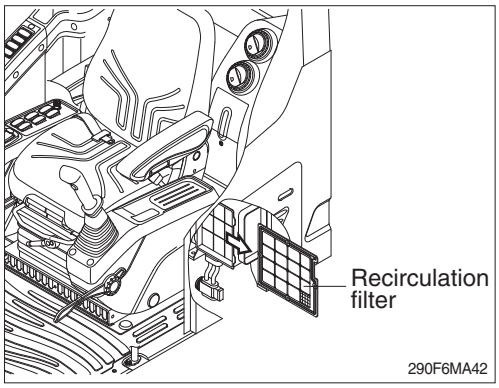
2) CLEAN AND REPLACE OF RECIRCULATION FILTER

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

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



(2) Remove recirculation filter.

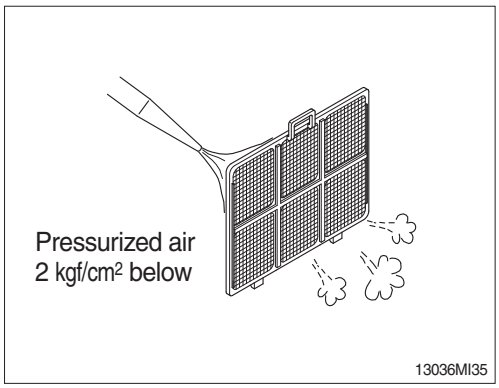


(3) Clean the recirculation filter using a pressurized air (below 2 kgf/cm², 28 psi) or washing with water.

△ **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

(1) Equipment contains fluorinated greenhouse gas.

Model	Type	Quantity	GWP
HX480 L / HX520 L	HFC-134a	0.8 kg (1.76 lb)	1144 CO_2 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.