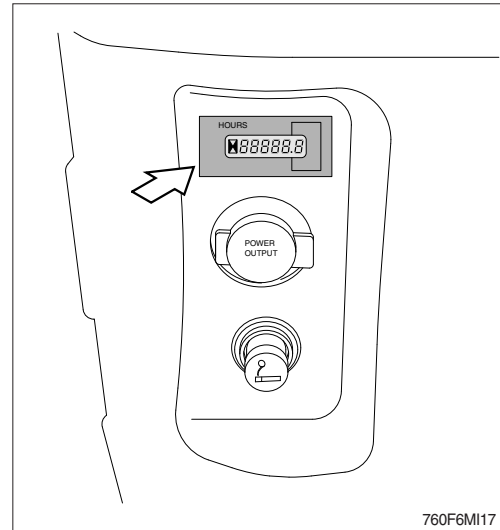


1. INSTRUCTIONS

1) INTERVAL OF MAINTENANCE

- (1) You may inspect and service the machine by the period as described at page 6-10 based on service meter of monitor.
- (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 250 hours, carry out all the maintenance 「each 250 hours, each 100 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, cutting edge, 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 by opening of breather when 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.

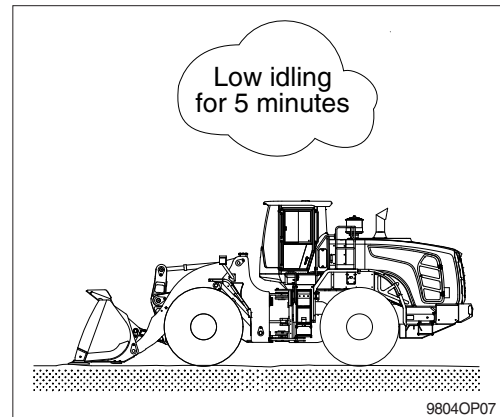
※ **Be sure to start the maintenance after fully understand the chapter 1, Safety hints.**

4) RELIEVING THE PRESSURE IN THE HYDRAULIC SYSTEM

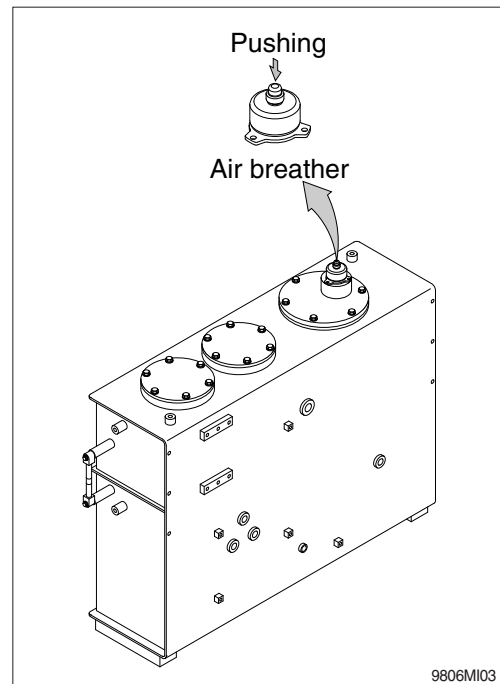
※ Spouting of oil can cause the accident when loosening the cap or hose right after the operating of the machine as the machine or oil is on the high pressure on the condition.

Be sure to relieve the pressure in the system before repairing hydraulic system.

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



- (2) 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) These are the parts which the operator can not judge the remained lifetime of them by visual inspection.
- (2) Repair or replace if an abnormality of these parts is found even before the recommended replacement interval.

Periodical replacement of safety parts	Interval
Fuel hose (engine-tank)	Every 2 years
Hose of steering system	
Packing, seal and O-ring of steering cylinder	
Hose of brake system	
Piston seal and packing of boom, bucket cylinder	

- ※ 1. **Replace the O-ring and gasket at the same time when replace 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	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	Width across flat (mm)	kgf · m	lbf · ft
9/16-18	19	4	28.9
11/16-16	22	5	36.2
13/16-16	27	9.5	68.7
1-3/16-12	36	18	130
1-7/16-12	41	21	152
1-11/16-12	50	35	253

4) FITTING

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

5) TIGHTENING TORQUE OF MAJOR COMPONENT

No.	Descriptions		Bolt size	Torque	
				kgf · m	lbf · ft
1	Engine	Engine mounting bolt, nut (rubber, 4EA)	M24×3.0	76.5 ± 7.7	553 ± 55.7
2		Engine mounting bolt (bracket, 16EA)	M16×1.5 M14×2.0	28.6 ± 4.3 9.18 ± 1.4	207 ± 31.1 66.4 ± 10.1
3		Coupling cover mounting bolt (8EA)	M10×1.5	3.06 ± 0.5	22.1 ± 3.6
4		Coupling mounting socket bolt (8EA)	M12×1.75	11.7 ± 1.8	84.6 ± 13.0
5		Fan motor mounting bolt	M12×1.75	12.8 ± 3.0	92.6 ± 21.7
6		Radiator mounting bolt	M16×2.0	29.7 ± 5.9	215 ± 42.7
7		Fuel tank mounting bolt, nut	M16×2.0	29.7 ± 4.5	215 ± 32.5
8	Hydraulic system	Main pump mounting bolt	M14×2.0	19.6 ± 2.9	142 ± 21.0
9		Steering pump mounting bolt	M14×2.0	19.6 ± 2.9	142 ± 21.0
10		Fan & Brake pump mounting bolt	M14×2.0	19.6 ± 2.9	142 ± 21.0
11		Main control valve mounting bolt	M12×1.75	12.8 ± 3.0	92.6 ± 21.7
12		Steering unit mounting bolt	M10×1.5	6.9 ± 1.4	50 ± 10.1
13		Flow amplifier mounting bolt	M10×1.5	6.9 ± 1.4	50 ± 10.1
14		Brake valve mounting bolt	M8×1.25	2.5 ± 0.5	18.1 ± 3.6
15		Cut-off valve mounting bolt	M8×1.25	2.5 ± 0.5	18.1 ± 3.6
16		EH control block mounting bolt	M8×1.25	2.5 ± 0.5	18.1 ± 3.6
17		Safety valve mounting bolt	M10×1.5	6.9 ± 1.4	50 ± 10.1
18		Hydraulic oil tank mounting bolt	M16×2.0	29.7 ± 4.5	215 ± 32.5
19	Power train system	Transmission mounting bolt, nut (rubber, 4EA)	M24×3.0	76.5 ± 7.7	553 ± 55.7
20		Transmission mounting bolt (bracket, 12EA)	M20×2.5 M16×2.0	56.1 ± 8.4 28.6 ± 4.3	406 ± 60.8 207 ± 31.1
21		Front axle mounting bolt, nut	M36×3.0	280 ± 30	2025 ± 217
22		Rear axle support mounting bolt, nut	M36×3.0	280 ± 30	2025 ± 217
23		Tire mounting nut	M22×1.5	79 ± 2.5	571 ± 18.1
24		Drive shaft joint mounting bolt	1/2-20UNF	15 ± 2.0	108 ± 14.5
25	Others	Counterweight mounting bolt	M30×3.5 M24×3.0	199 ± 30 100 ± 15	1439 ± 216 723 ± 108
26		Operator's seat mounting bolt	M8×1.25	3.4 ± 0.8	24.6 ± 5.0
27		ROPS Cab mounting bolt (4EA)	M30×3.5	199 ± 30	1440 ± 216
		ROPS Cab mounting nut (4EA)	M16×2.0	20.5 ± 4.7	148± 34

3. SPECIFICATION OF FUEL, COOLANT AND LUBRICANTS

1) NEW MACHINE

New machine used and filled with following lubricants.

Description	Specification
Engine oil	SAE 15W-40 (API CJ-4)
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 46, VG6 8 only) Conventional (ISO VG15 ^{★2}) HD Hyundai Construction Equipment Bio Hydraulic Oil (HBHO, ISO VG 46)
Transmission oil	SAE 15W-40
Axle oil	★ Refer to below list
Grease	Lithium base grease NLGI No. 2
Fuel	ASTM D975-No. 2, ^{★1} 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 ^{★2}

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®

★ Recommended oil list

- BP TERRAC SUPER TRANSMISSION 10W-30

- CASTROL AGRI TRANS PLUS 10W-30

- MOBILFLUID 426

- SHELL DONAX TD 10W-30

- TOTAL DYNATRANS MPV

★¹ Ultra low sulfur diesel

- sulfur content ≤ 15 ppm

★² Cold region

Russia, CIS, Mongolia

2) RECOMMENDED LUBRICANTS

Use only oils listed below.

Do not mix different brand oil.

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	45 (11.9)		SAE 0W-20, 0W-30								
				SAE 0W-40, 5W-40								
				SAE 5W-20, 5W-30								
				SAE 15W-30								
				SAE 10W-40								
				SAE 15W-40								
DEF/ AdBlue® tank	Mixture of urea and deionized water	60 (15.9)		ISO 22241, High-purity urea + deionized water (32.5 : 67.5)								
Transmission	Engine oil	54 (14.3)		SAE 10W-30								
				SAE 15W-40								
Axle★ ⁴	UTTO	Front : 58 (15.3) Rear : 58 (15.3)	★Refer to below list									
Hydraulic tank	Hydraulic oil	Tank: 186 (49.1)	★ ² ISO VG 15									
		System: 344 (90.9)	ISO VG 46, HBHO VG 46★ ⁵									
			ISO VG 68									
Fuel tank	Diesel fuel★ ¹	430 (113.6)	★ ² ASTM D975 NO.1									
			ASTM D975 NO.2									
Fitting (grease nipple)	Grease	As required	★ ² NLGI NO.1									
			NLGI NO.2									
Radiator (reservoir tank)	Mixture of antifreeze and soft water★ ³	50 (13.2)	Ethylene glycol base permanent type (50 : 50)									
			★ ² 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

UTTO : Universal Tractor Transmission Oil

DEF : Diesel Exhaust Fluid

DEF compatible with AdBlue®

★¹ Ultra low sulfur diesel

- sulfur content ≤ 15 ppm

★ Recommended oil list

- BP TERRAC SUPER TRANSMISSION 10W-30

- CASTROL AGRI TRANS PLUS 10W-30

- MOBILFLUID 426

- SHELL DONAX TD 10W-30

- TOTAL DYNATRANS MPV

★² Cold region

Russia, CIS, Mongolia

★³ Soft water

City water or distilled water

★⁴ If the machine is equipped with axle oil cooler, refer to page 6-43.

★⁵ HD Hyundai Construction Equipment Bio Hydraulic Oil

4. MAINTENANCE CHECK LIST

Scheduled maintenance is the normal maintenance necessary to provide proper and efficient machine operation. To protect your investment and prolong the service life of your machine, follow the scheduled maintenance list below.

1) EVERY 10 HOURS SERVICE

Check items	Service	Page
Hydraulic oil level	Check, Add	6-34
Engine oil level	Check, Add	6-15
Radiator coolant level	Check, Add	6-20
Belt tension & damage	Check	6-24, 25, 26
Fuel tank (water, sediment)	Drain	6-28
DEF/AdBlue® tank (with filler filter)	Check, Add	6-32

2) EVERY 50 HOURS SERVICE

Check items	Service	Page
Attachment pins	Lubricate	6-47
Tire (air)	Check, Add	6-37
Drive shaft (flange bearing, front, center, rear, upper)	Lubricate	6-44
Steering cylinder pins	Lubricate	6-44
Rear axle pivot	Lubricate	6-44
Fuel filter element (return)	Drain	6-28

3) INITIAL 250 HOURS SERVICE

Check items	Service	Page
Engine oil	Change	6-15, 16
Engine oil filter	Replace	6-19, 20
Fuel filter element (suction)	Replace	6-29
Fuel filter element (pressure)	Replace	6-29
Transmission oil	Change	6-40, 41
Transmission oil filter	Replace	6-40, 41
Front axle oil	Change	6-43
Rear axle oil	Change	6-43
Axle oil filter (option)	Replace	6-43
Hydraulic oil return filter	Replace	6-35
Pilot line filter element	Replace	6-36
Centrifugal oil cleaner	Clean	6-16
Pressure filter element (if equipped)	Replace	6-36

4) EVERY 250 HOURS SERVICE

Check items	Service	Page
Wheel nuts	Check, Tight	6-37, 38
Battery (voltage)	Check	6-49, 50
Air conditioner and heater filter (inner and outer)	Check, Clean	6-52

5) EVERY 500 HOURS SERVICE

Check items	Service	Page
Engine oil	Change	6-15, 16
Engine oil filter	Replace	6-19, 20
Radiator, oil cooler, change air cooler, condenser	Check, Clean	6-23
Air cleaner element (primary)	Clean	6-27
Centrifugal oil cleaner	Check, Clean	6-16
DEF/AdBlue® tank (with filler filter)	Check, Clean	6-32
Parking brake clearance	Check, Adjust	6-41-1

6) EVERY 1000 HOURS SERVICE

Check items	Service	Page
Fuel filter element (suction)	Replace	6-29
Fuel filter element (pressure)	Replace	6-29
Fuel filter element (return)	Replace	6-28
Hydraulic oil return filter	Replace	6-35
Pilot line filter element	Replace	6-36
Hydraulic tank air breather element	Replace	6-36
Center pivot pin	Lubricate	6-44
Transmission oil	Change	6-40, 41
Transmission oil filter	Replace	6-40, 41
Aircon and heater outer filter	Replace	6-52
DEF/AdBlue® filter	Replace	6-32
DEF/AdBlue® ventilation filter	Check, Clean	6-32
Pressure filter element (if equipped)	Replace	6-36

7) EVERY 1500 HOURS SERVICE

Check items	Service	Page
Front axle oil	Change	6-40
Rear axle oil	Change	6-40
Axle oil filter (option)	Replace	6-40

8) EVERY 2000 HOURS SERVICE

Check items	Service	Page
Hydraulic oil★ ¹	Change	6-35
HBHO★ ²	Change	6-35
Radiator coolant★ ¹	Change	6-20, 21, 22, 23
Hydraulic oil suction strainer	Check, Clean	6-35
Airconditioner and heater inner filter	Replace	6-52
RCV lever	Lubricate	6-36
Hoses, fittings, clamps (fuel, coolant, hydraulic)	Check, Retighten, Replace	-

★¹ Conventional

★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.

9) EVERY 5000 HOURS SERVICE

Check items	Service	Page
Hydraulic oil★ ³	Change	6-35

★³ HD Hyundai Construction Equipment genuine long life

10) EVERY 5000 HOURS SERVICE

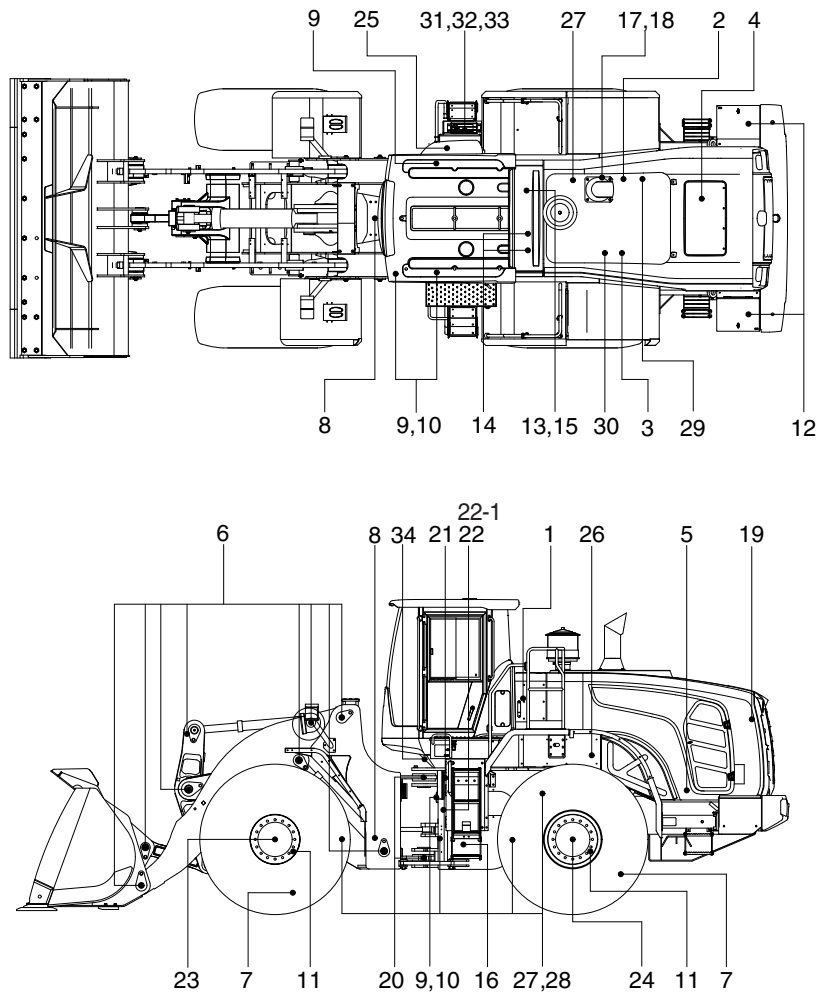
Check items	Service	Page
Radiator coolant★ ³	Change	6-20, 21, 22, 23

★³ HD Hyundai Construction Equipment genuine long life

11) WHEN REQUIRED

Check items	Service	Page
Air cleaner element		
· Safety	Replace	6-27
· Primary	Clean, Replace	6-27
Air conditioner and heater		
· Outer filter	Clean, Replace	6-52
· Inner filter	Clean, Replace	6-52

5. MAINTENANCE CHART



9806MI10

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.
4. For other details, refer to the service manual.

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

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	186 (49.1)	1
	2	Engine oil level	Check, Add	EO	45 (11.9)	1
	4	Radiator coolant level	Check, Add	C	50 (13.2)	1
	5	Fan belt tension & damage	Check, Adjust	-	-	2
	12	Fuel tank (water, sediment)	Drain	-	-	1
	31	DEF/AdBlue® tank (with filler filter)	Check, Add	DEF	60 (15.9)	1
50 Hours or weekly	6	Attachment pins	Lubricate	PGL	-	13
	7	Tire (air)	Check, Add	-	-	4
	8	Drive shaft (center bearing)	Lubricate	PGL	-	1
	9	Steering cylinder pin	Lubricate	PGL	-	4
	10	Rear axle pivot	Lubricate	PGL	-	2
	27	Drive shaft sleeve yoke	Lubricate	PGL	See page 6-44	11
	28	Drive shaft journal bearing assy	Lubricate	PGL	See page 6-44	8
	29	Fuel filter element (return)	Drain	-	-	1

Service interval	No.	Description	Service action	Oil symbol	Capacity ℓ (U.S.gal)	Service points No.
250 Hours	11	Wheel nuts	Check, Tight	-	-	92
	12	Battery (voltage)	Check, Add	-	-	2
	25	Aircon and heater inner and outer filter	Check, Clean	-	-	2
Initial 250 Hours	2	Engine oil	Change	EO	45 (11.9)	1
	3	Engine oil filter	Replace	-	-	1
	14	Hydraulic oil return filter	Replace	-	-	2
	16	Pilot line filter element	Replace	-	-	1
	17	Fuel filter element (suction)	Replace	-	-	1
	18	Fuel filter element (pressure)	Replace	-	-	1
	21	Transmission oil	Change	EO	54 (14.3)	1
	22	Transmission oil filter	Replace	-	-	2
	23	Axle oil (front)	Change	UTTO	58 (15.3)	3
	24	Axle oil (rear)	Change	UTTO	58 (15.3)	3
	-	Axle oil filter (option)	Replace	-	-	2
	30	Centrifugal oil cleaner	Check, Clean	-	C	1
	34	Pressure filter element (if equipped)	Replace	-	-	1
500 Hours	2	Engine oil	Change	EO	45 (11.9)	1
	3	Engine oil filter	Replace	-	-	1
	19	Radiator, oil cooler, CAC, condenser	Clean	-	-	5
	22-1	Parking brake clearance	Check, Adjust	-	-	1
	26	Air cleaner element (primary)	Clean	-	-	1
	30	Centrifugal oil cleaner	Check, Clean	-	C	1
	31	DEF/AdBlue® tank (with filler filter)	Check, Clean	-	60 (15.9)	1
1000 Hours	14	Hydraulic oil return filter	Replace	-	-	2
	15	Hydraulic tank air breather element	Replace	-	-	1
	16	Pilot line filter element	Replace	-	-	1
	17	Fuel filter element (suction)	Replace	-	-	1
	18	Fuel filter element (pressure)	Replace	-	-	1
	20	Center pivot pin	Lubricate	PGL	-	2
	21	Transmission oil	Change	EO	54 (14.3)	1
	22	Transmission oil filter	Replace	-	-	2
	25	Air conditioner and heater outer filter	Replace	-	-	1
	29	Fuel filter element (return)	Replace	-	-	1
	32	DEF/AdBlue® tank filter	Replace	-	-	1
	33	DEF/AdBlue® tank ventilation filter	Check, Clean	-	-	1
	34	Pressure filter element (if equipped)	Replace	-	-	1
1500 Hours	23	Axle oil (front)	Change	UTTO	58 (15.3)	3
	24	Axle oil (rear)	Change	UTTO	58 (15.3)	3
	-	Axle oil filter (option)	Replace	-	-	2
2000 Hours	1	Hydraulic oil★ ¹	Change	HO	186 (49.1)	1
	1	Hydraulic oil (HBHO★ ²)	Change	-	186 (49.1)	1
	4	Radiator coolant★ ¹	Change	C	50 (13.2)	1
	13	Hydraulic oil suction strainer	Check, Clean	-	-	1
	25	Air conditioner and heater inner filter	Replace	-	-	1
	-	RCV lever	Lubricate	PGL	-	2
	-	Hoses, fittings, clamps (fuel, coolant, hydraulic)	Check, Retighten, Replace	-	-	-
5000 Hours	1	Hydraulic oil★ ³	Change	HO	186 (49.1)	1
6000 Hours	4	Radiator coolant★ ³	Change	C	50 (13.2)	1
When required	25	Air conditioner and heater outer filter	Clean, Replace	-	-	1
		Air conditioner and heater inner filter	Clean, Replace	-	-	1
	26	Air cleaner element (safety)	Replace	-	-	1
		Air cleaner element (primary)	Clean, Replace	-	-	1

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

★³ HD Hyundai Construction Equipment genuine long life

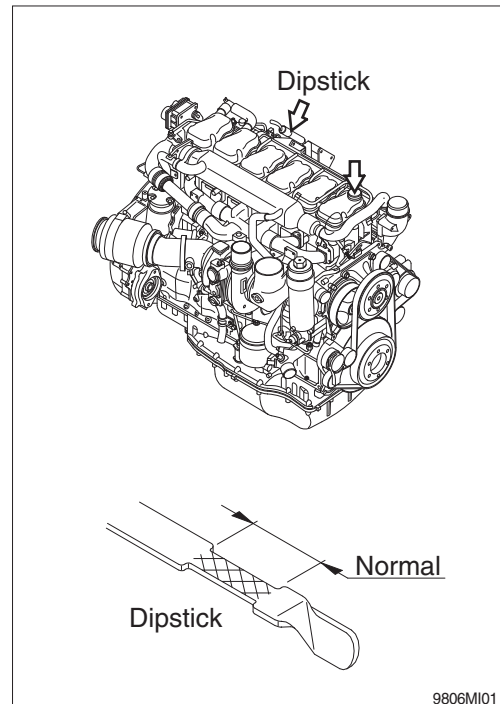
※ Oil symbol : Refer the recommended lubricants for specification.

6. SERVICE INSTRUCTION

1) CHECK ENGINE OIL LEVEL

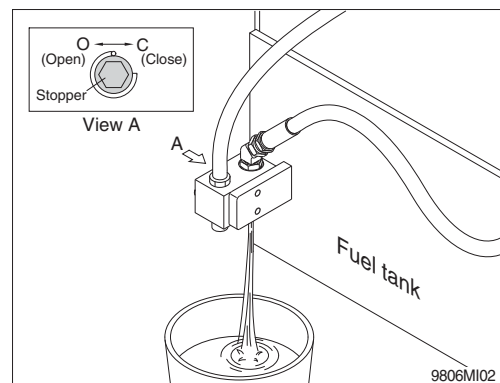
Check the oil level with the machine on a flat ground before starting engine.

- (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.

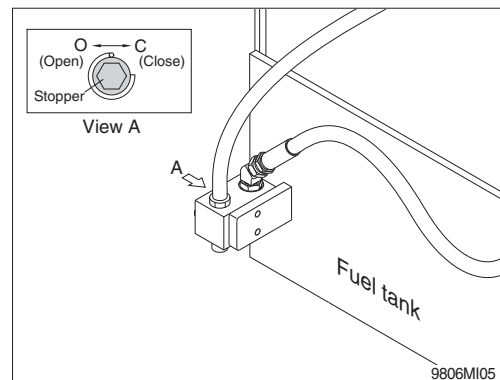


2) REPLACEMENT OF ENGINE OIL

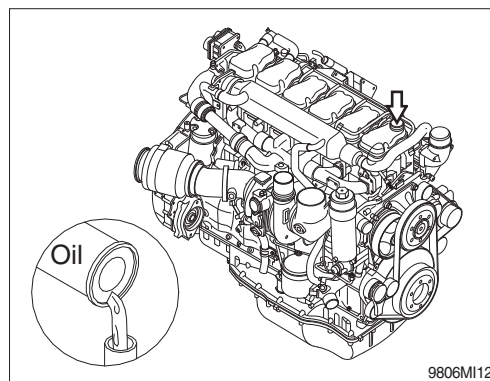
- ※ Renew the oil filter and clean the centrifugal oil cleaner when changing oil.
- (1) Operate the engine until the coolant temperature reaches 60°C (140°F). Shut off the engine.
 - (2) Turn the stopper to the open position and allow the oil to drain.
 - Wrench size : 10 mm
- ※ A drain pan with a capacity of 50 liters (13.2 U.S.gallons) will be adequate.



- (3) Turn the stopper to the close position.

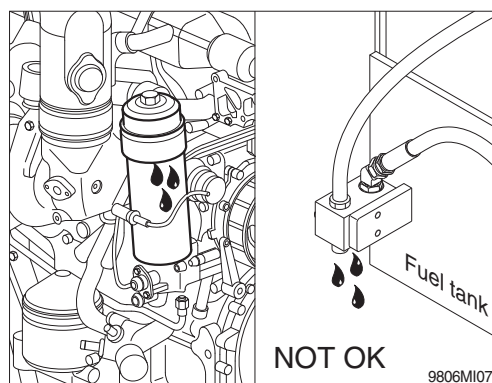


- (4) Fill the engine with clean oil to the proper level.
 · Quantity : 45 ℓ (11.9 U.S.gallons)



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

※ Do not overfill the engine with oil.



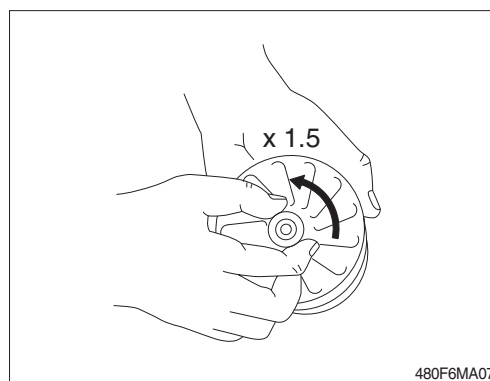
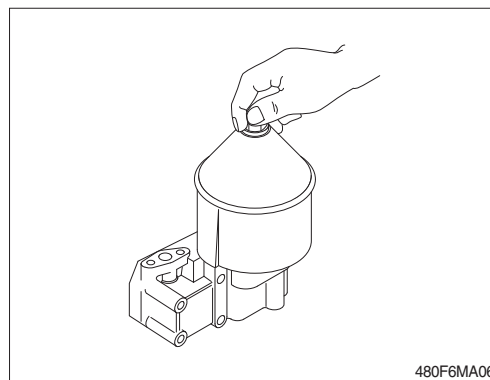
3) CLEANING THE CENTRIFUGAL OIL CLEANER

- ※ 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.

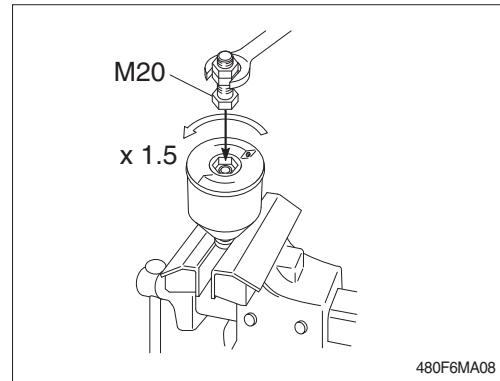
- (1) Clean the cover. Unscrew the nut securing the outer cover.
- (2) Let the oil run out from the rotor.
- (3) Lift out the rotor. Wipe off the outside. Undo the rotor nut and unscrew it about 1.5 turns to protect the bearing.

※ Take care not to damage the rotor shaft.

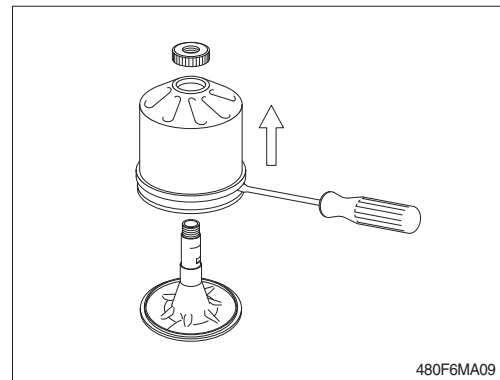


- (4) If the rotor nut is difficult to get loose, turn the rotor upside down and fasten the rotor nut in a vice. Turn the rotor counterclockwise 1.5 turns by hand or use an M20 nut, see the right figure.

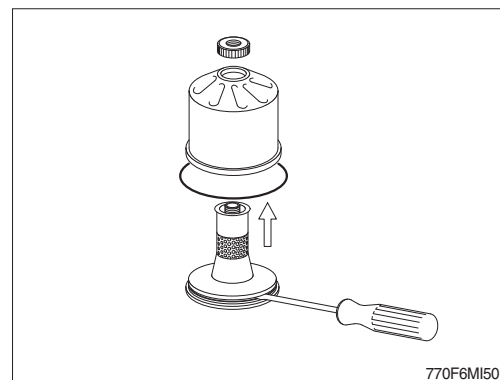
※ **The rotor must not be put in a vice. Never strike the rotor cover. This may cause damage resulting in imbalance.**



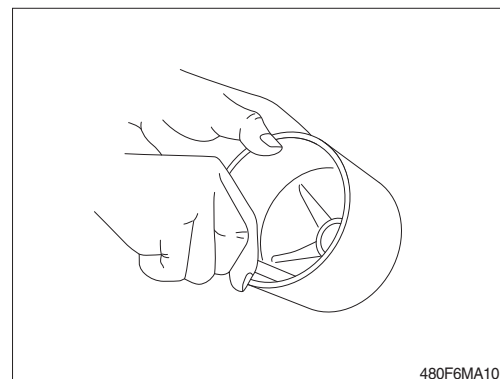
- (5) Remove the rotor cover by holding the rotor in both hands and tapping the rotor nut against the table. Never strike the rotor directly as this may damage its bearings.



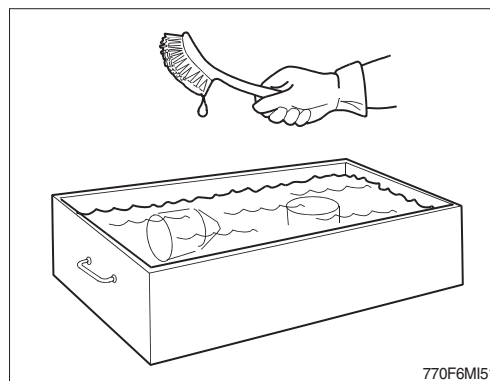
- (6) Remove the strainer from the rotor cover. If the strainer is stuck, insert a screwdriver between the rotor cover and strainer and carefully prise them apart.



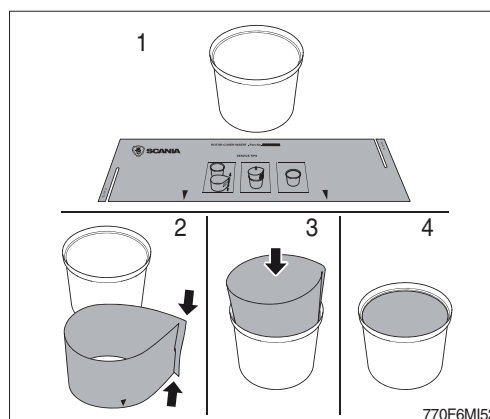
- (7) Remove the paper insert and scrape away any remaining dirt deposits inside the rotor cover. If the deposits are thicker than 28 mm, the centrifugal oil cleaner must be cleaned more often.



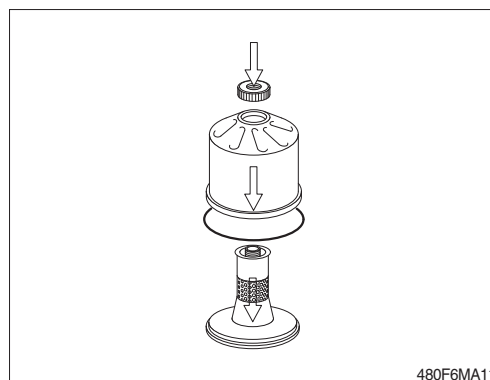
- (8) Wash the parts.
- (9) Inspect the 2 nozzles on the rotor. Ensure that they are not blocked or damaged. Renew any damaged nozzles.
- (10) Check that the bearings are undamaged.



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

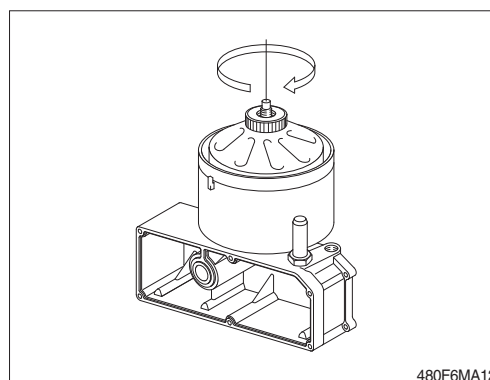


- (12) Fit the strainer onto the rotor.
- (13) Fit a new O-ring by sliding it over the strainer.
- (14) Refit the rotor cover. Make sure that the O-ring is seated correctly on the inside.
- (15) Screw the rotor nut back on by hand.
- (16) Check that the shaft is not loose. Secure with thread-locking fluid if it is loose.
First clean thoroughly using a suitable solvent.
Tighten the rotor shaft using socket wrench.
· Tightening torque : 2.75 kgf · m (20 lbf · ft).

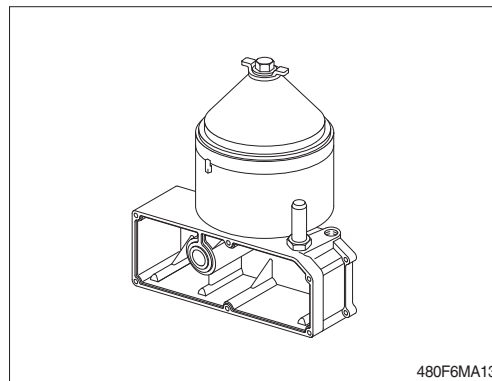


※ **Take care not to damage the rotor shaft.**

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



- (18) Renew the O-ring on the cover of the oil cleaner housing and fit the cover.
Tighten the lock nut to 1.53 kgf · m (11 lbf · ft).

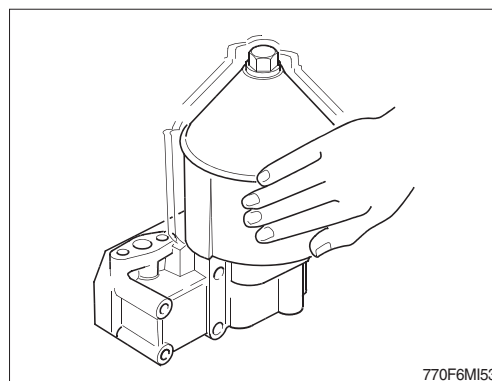


(19) Operational testing

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.

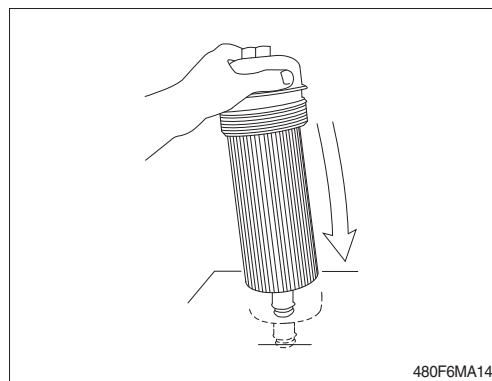


4) REPLACE FILTER OF ENGINE OIL

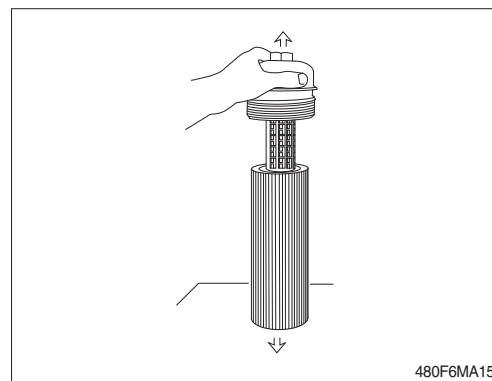
- ※ Clean the centrifugal oil cleaner when renewing the oil filter.

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.

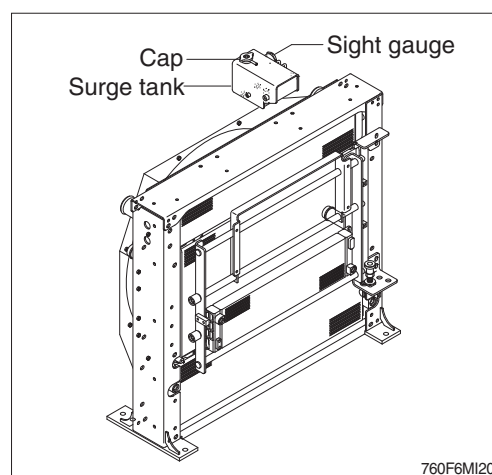


- (3) Detach the old filter from the cover by holding the cover and carefully tapping the entire filter element against something hard. Remember that there will be oil splashes.
- (4) Fit the new filter and tighten the filter cover to $2.54 \text{ kgf} \cdot \text{m}$ ($18.4 \text{ lbf} \cdot \text{ft}$).



5) CHECK COOLANT LEVEL

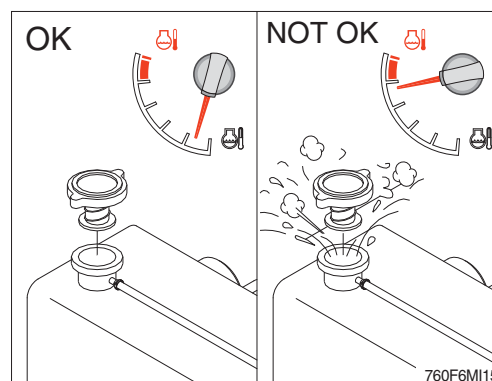
- (1) Check the engine fault code on the monitor.
- (2) If you following fault codes exist, check the coolant level.
 - SPN : 111, FMI : 18
Coolant level is low.
 - SPN : 111, FMI : 1
Coolant level is the most severely low.
- (3) Add the mixture of antifreeze and water after removing the cap of the surge tank if coolant is not sufficient.



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

⚠ Do not remove the surge tank cap from a hot engine. Wait until the coolant temperature is below 50°C (120°F) before removing the cap. Heated coolant spray or steam can cause personal injury.

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



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.

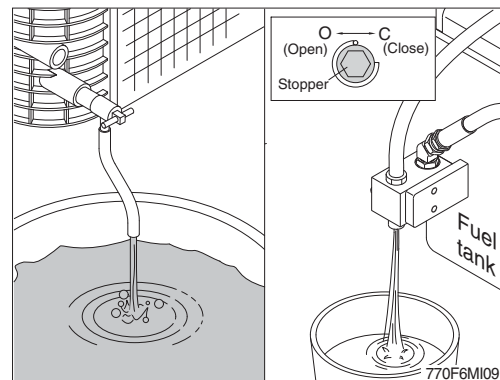
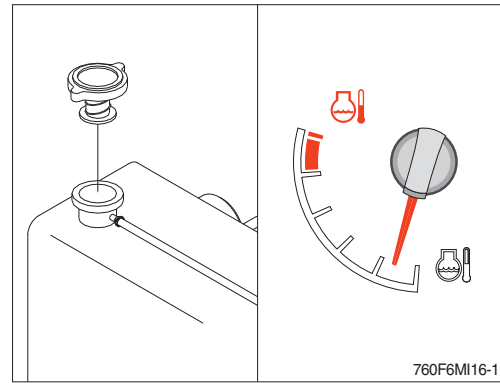
Use authorized waste disposal facilities, including civic amenity sites and garages providing authorized facilities for the receipt of used antifreeze.

If in doubt, contact your local authorities for guidance as to proper handling of used antifreeze.

- ⚠ Wait until the temperature is below 50°C (120°F) before removing the coolant system cap. Failure to do so can cause personal injury from heated coolant spray.

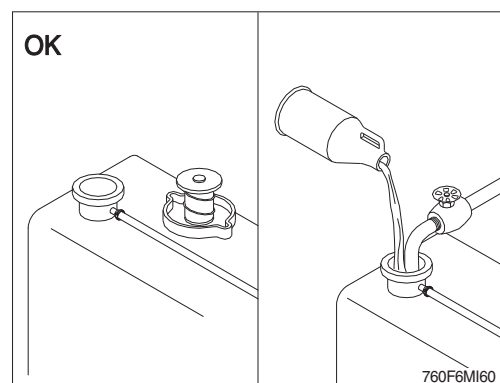
Drain the cooling system by turning the stopper to the open position and opening the drain valve on the bottom of the engine cylinder block.

A drain pan with a capacity of 50 liters (13.2 U.S.gallons) will be adequate in most applications.

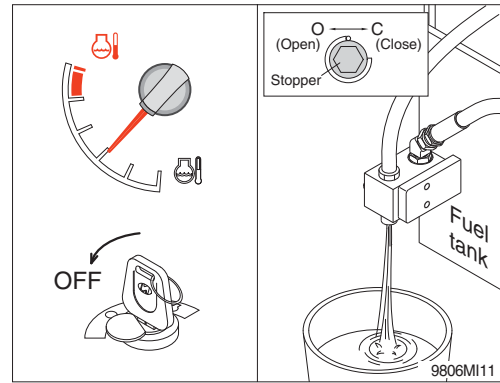


(2) Flushing of cooling system

- ① Fill the system with a mixture of sodium carbonate and water (or a commercially available equivalent).
- ※ Use 0.5 kg (1.0 pound) of sodium carbonate for every 23 liters (6.0 U.S. gallons) of water.
- ※ Do not install the cap. The engine is to be operated without the cap for this process.

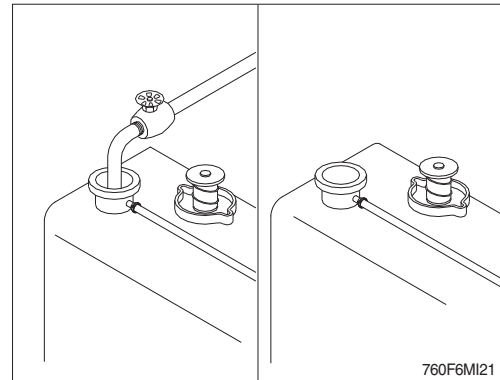


- ② Operate the engine for 5 minutes with the coolant temperature above 80°C (176°F). Shut the engine off, and drain the cooling system.



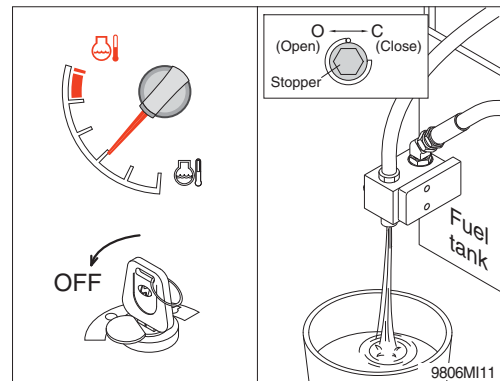
- ③ Fill the cooling system with clean water.

- ※ Be sure to vent the engine and aftercooler for complete filling.
- ※ Do not install the surge tank cap or the new coolant filter.



- ④ Operate the engine for 5 minutes with the coolant temperature above 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.



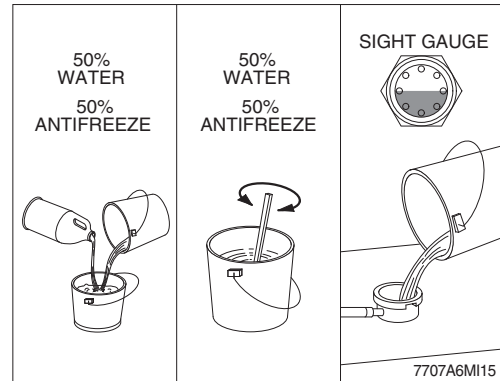
(3) Cooling system filling

- ① Use a mixture of 50 percent soft water and 50 percent ethylene glycol antifreeze to fill the cooling system. Refer to the page 6-9.

※ **Never use water alone for coolant.**

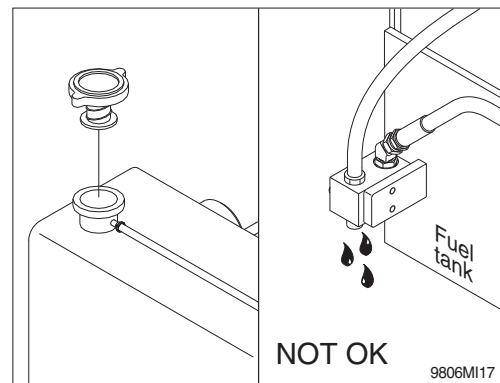
This can result in damage from corrosion.

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



- ② Install the 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.



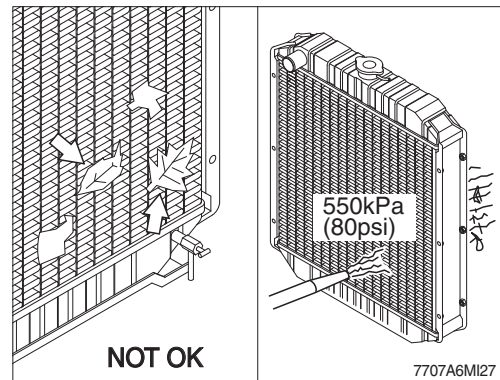
7) CLEAN RADIATOR AND OIL COOLER

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.

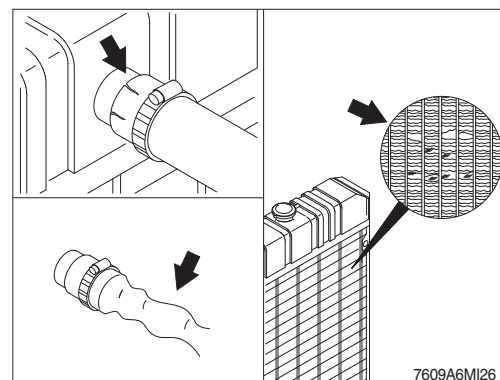
Blow the air in the opposite direction of the fan air flow.



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

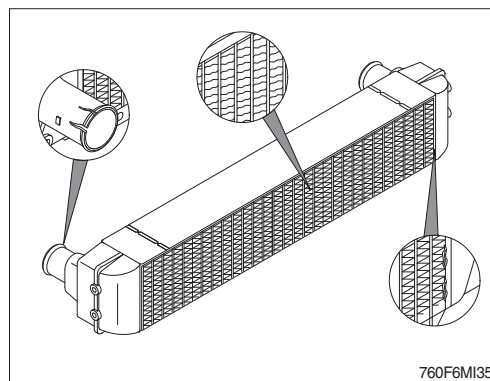
※ **If the radiator must be replaced due to bent or broken fins which can cause the engine to overheat, refer to the manufacturer's replacement procedures.**

- (4) Visually inspect the radiator for core and gasket leaks.



8) CHECK CHARGE AIR COOLER

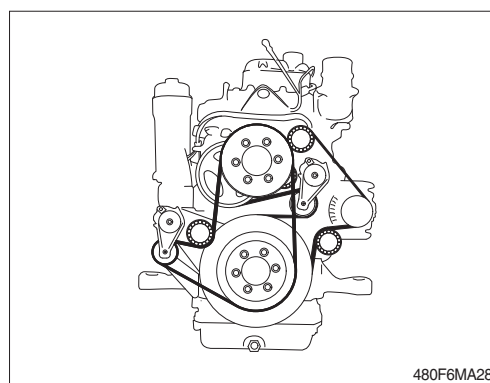
- (1) Inspect the charge air cooler for dirt and debris blocking the fins. Check for cracks, holes, or other damage. If damage is found, please contact hyundai distributor.



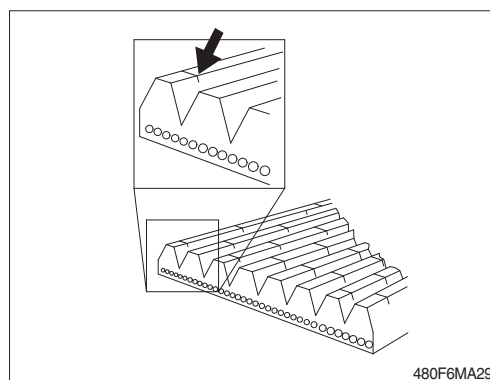
9) FAN BELT

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

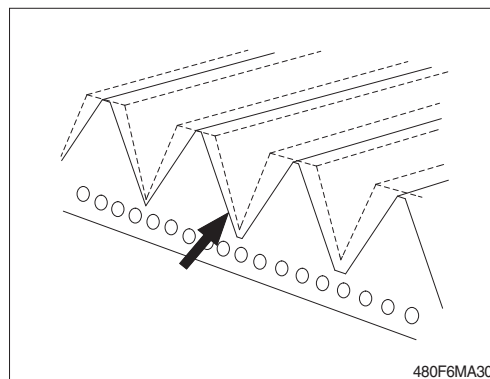
- (1) Check the drive belt thoroughly, particularly at the idler rollers.



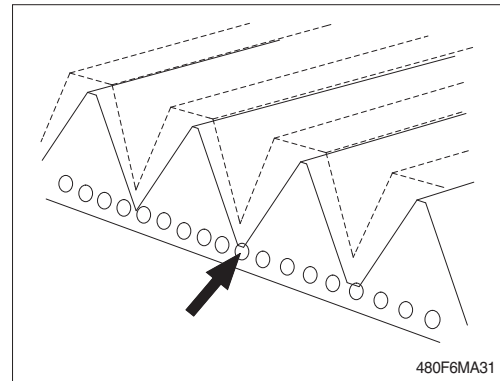
- (2) Check the drive belt for cracks.
- (3) The drive belt must be renewed if it has cracks.



- (4) Check the drive belt wear.
- (5) The drive belt is starting to become worn, but can be refitted.

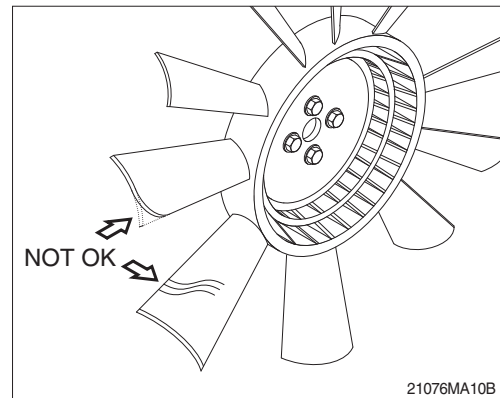


- (6) The belt is worn down to the cord.
The drive belt must be renewed.



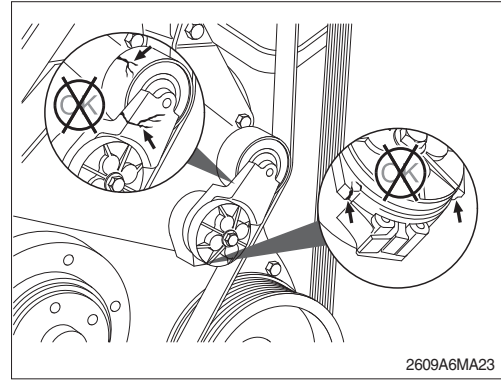
10) INSPECTION OF COOLING FAN

- ⚠ 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.



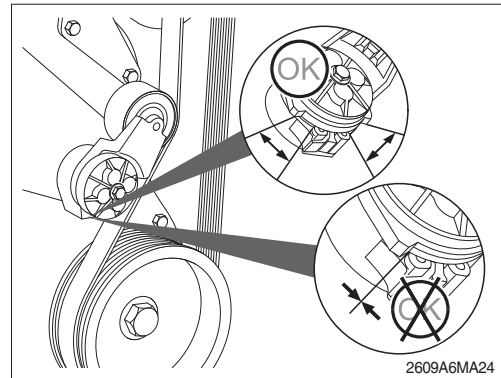
11) FAN BELT TENSIONER

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



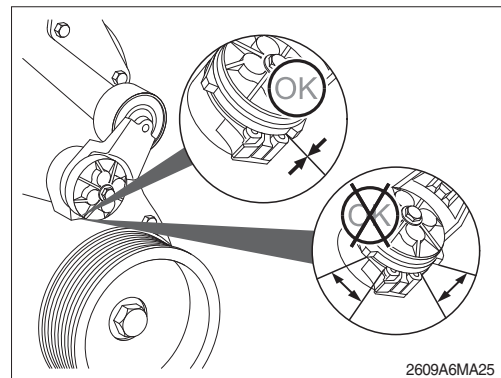
- (2) With the belt installed, verify that neither tensioner arm stop is in contact with the spring case stop.

After replacing the belt, if the tensioner arm stops are still in contact with the spring case stop, replace the tensioner.

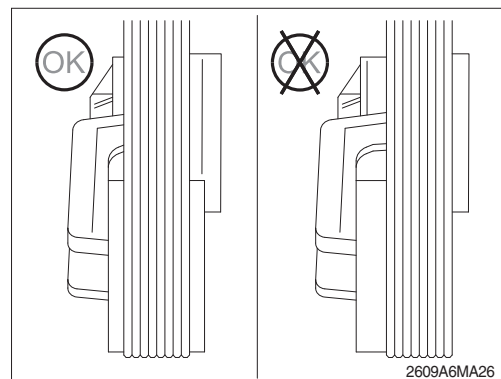


- (3) With the belt removed, verify that the tensioner arm stop is in contact with the spring case stop. If these two are not touching, the tensioner must be replaced.

※ **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.



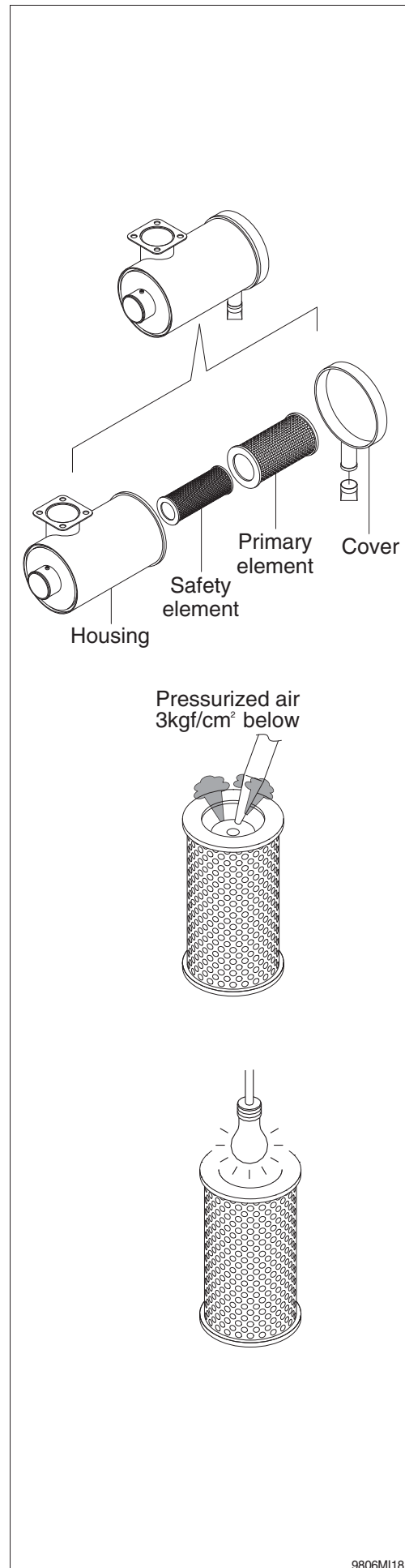
12) CLEANING OF AIR CLEANER

(1) Primary element

- ① Open the cover and remove the element.
- ② Wipe all contaminant and debris from inside the housing body.
- ③ Do not clean the filter element by striking or hitting the filter against any object to shake the debris from the filter element.
- ④ Clean the filter element with compressed air.
 - a. Remove dust from filter element by directing the compressed air into the opening of the air filter element.
 - b. Use 3 kg/cm² (40 psi) maximum air pressure and hold the compressed air nozzle at least 2.5 cm (1") away from the pleats while cleaning. Make sure to keep the clean side of air filter free of debris.
- ⑤ Visually inspect for damage to the filter elements and components. Use a light source to help identify any defects in the media. If any defects are observed discard the filter element and replace with a new primary filter element.
 - a. Before any type of cleaning, a visual inspection of the filter is needed. If there is any damage to the filter body, gaskets or endplates, do not clean or reuse; the filter should be discarded. Always clean filters in a clean environment, observe strict inspection procedures and repackage filters immediately after the cleaning process with appropriate materials.
 - b. Use observe proper safety precautions and dispose of waste materials in an environmentally compliant manner.
- ⑥ Re-install filter element into the air housing.
- ⑦ Replace the primary element at the fourth cleaning.

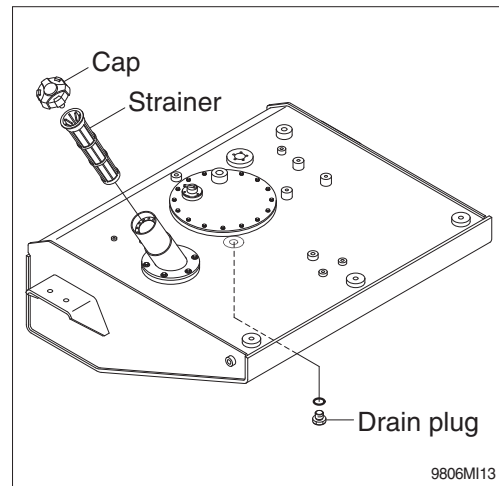
(2) Safety element

The safety filter element should never be cleaned since the safety filter is the last barrier to contaminant before it reaches engine/ equipment. The useful life of the safety filter is equivalent to that of the primary air filter only if the primary filter element is being regularly cleaned. If the primary filter element is not cleaned, the safety filter should be changed at every third primary air filter change or after one year of continuous service, whichever occurs first.



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.

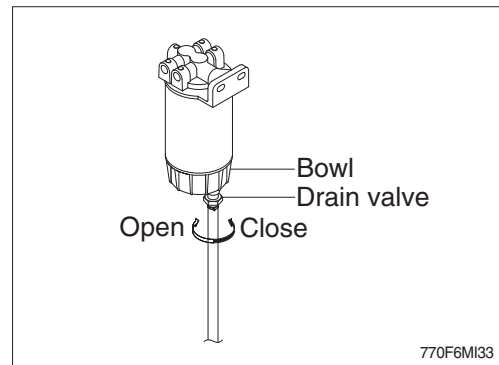


14) FUEL FILTER (RETURN)

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

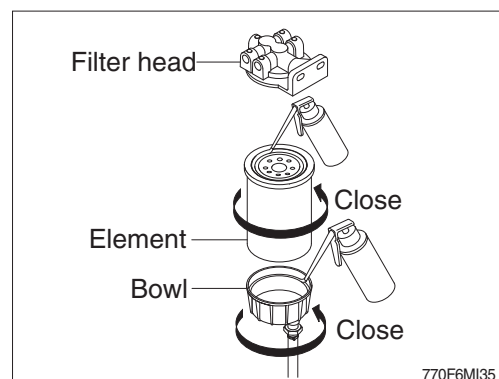
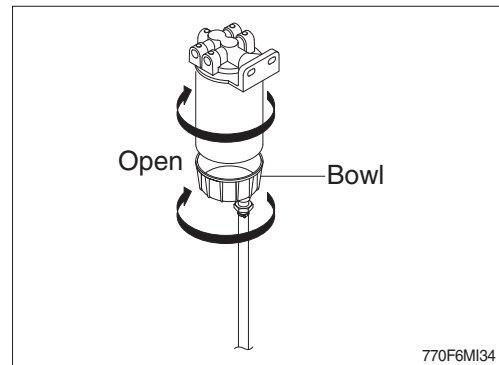
(1) Drain water

- ① Open bowl drain valve to evacuate water.
 - ② Close drain valve.
- ※ Don't tighten up a drain valve so strong.
 - ※ Inspect and drain water frequently for remain water volume to be less than 1/3 volume of a bowl.



(2) Replace element

- ① Drain the unit of fuel. Follow "Drain water" instructions above.
 - ② Remove element and 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

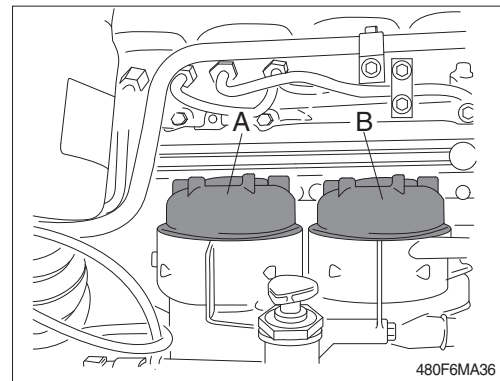
※ The fuel system is very sensitive to dirt. It is therefore important that everything is as clean as possible when work is carried out on the fuel system.

- 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.

(1) 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

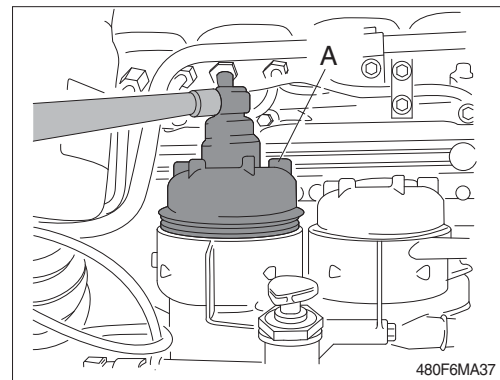
※ **Always start with the water separating suction filter A. Do not open the pressure filter cover B until housing for the water separating suction filter A is completely drained.**



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

(2) 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 mm socket).

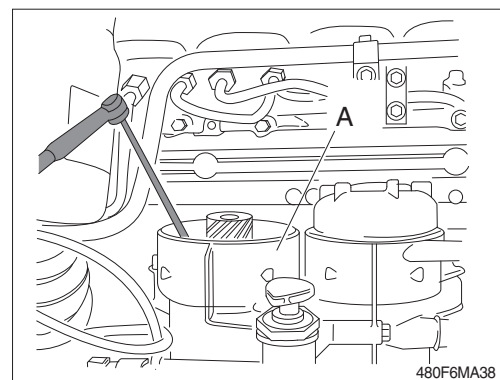
※ **Wait a minimum of 2 minutes to allow as much of the fuel as possible to drain out of the filter housing.**



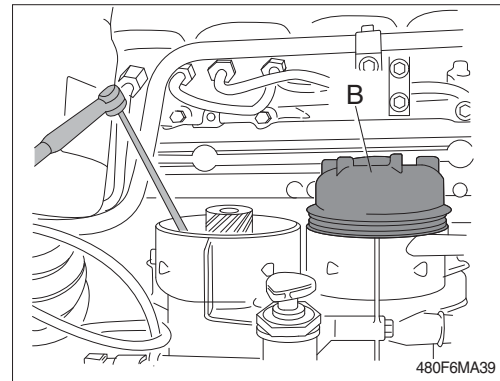
(3) Unscrew the filter cover A and lift it up slowly with the filter element.

(4) 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.

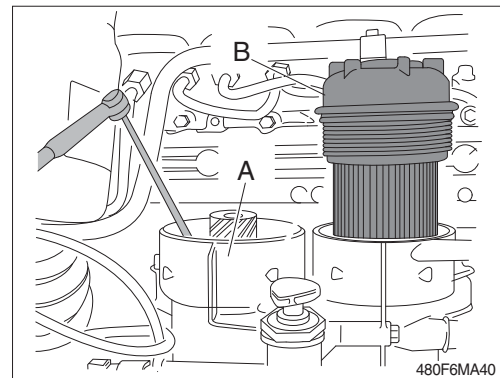
(5) Keep the suction tool hose in the filter housing for the water separating suction filter A.



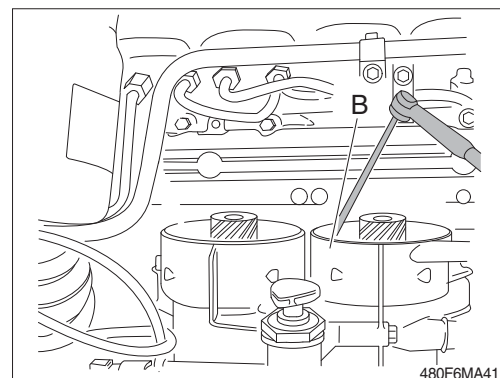
- (6) Make a mark on the pressure filter cover B.
- Unscrew the cover 3 to 4 turns, using a closed tool with hexagon driver socket. Draw out fuel which may drain into the water separating suction filter housing when the pressure filter is detached.
- ※ **Wait a minimum of 2 minutes to allow as much of the fuel as possible to drain out of the filter housing.**



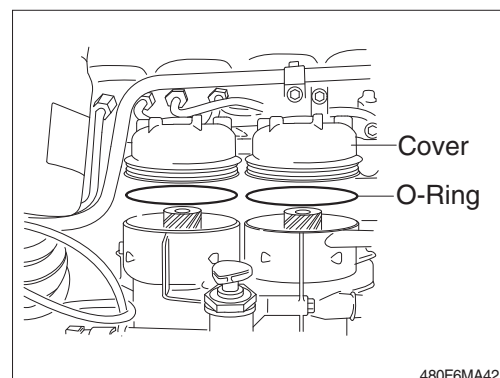
- (7) Unscrew the pressure filter cover B and lift it up slowly with the filter element.
- (8) Fuel from the pressure filter housing B may flow into the water separating suction filter housing A. Keep the suction tool hose in the filter housing for the water separating suction filter A until it is completely drained of fuel.



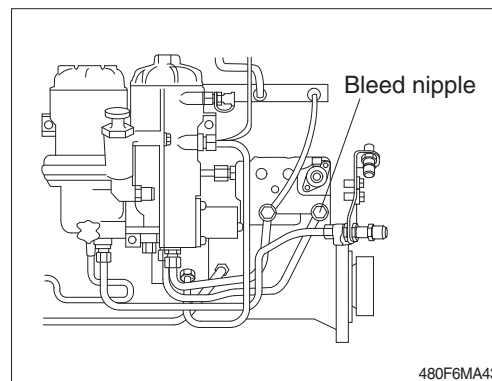
- (9) Move the suction tool to the pressure filter housing B. Draw out remaining fuel and particles.
- ※ **It is important to remove remaining fuel and particles from the filter housing to prevent fuel system contamination.**
- (10) Undo the old filter elements from the covers by carefully bending them to one side.
- ※ **Check that there is no remaining packaging material stuck to the filters.**



- (11) Fit the new O-rings to the covers. Lubricate the O-rings with O-ring grease.
- (12) 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.**

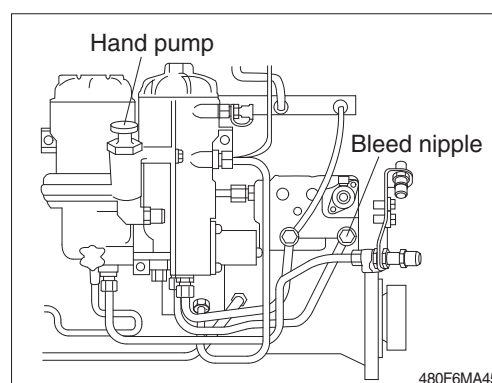
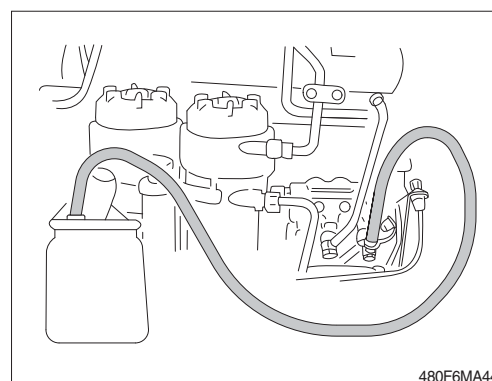


- (13) Press down the filter element with filter cover into the filter housing.
- (14) Screw on the filter cover. Use a closed tool with hexagon driver (36 mm socket).
 - Tightening torque : 2.5 kgf · m (18 lbf · ft)
- (15) Check that there is no gap between the filter cover and the filter housing. If there is a gap, repeat the procedure and make sure that the bleed nipple is open.



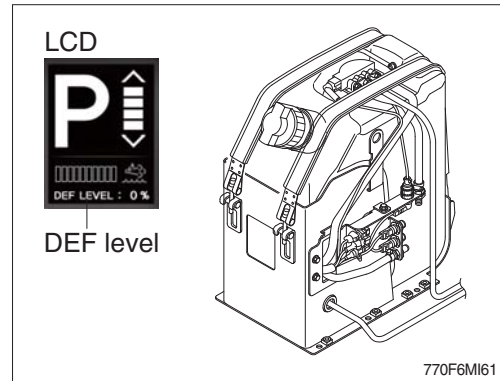
16) BLEEDING THE FUEL SYSTEM

- (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.

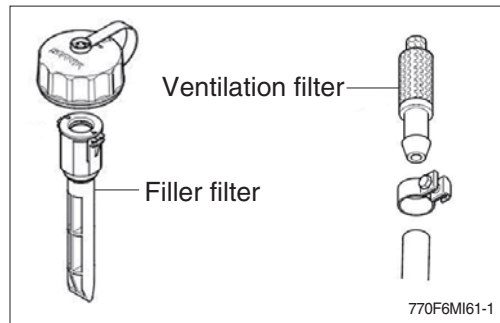


17) DEF/AdBlue® TANK

- (1) The DEF/AdBlue® tank level must be checked daily with DEF/AdBlue® level on LCD. Refer to the page 3-10.



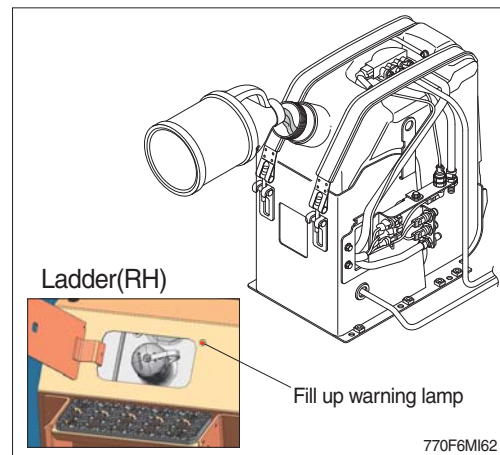
- ※ Make sure that the DEF/AdBlue® filler filter is clean. If it is dirty, clean the filler filter with clean water and refit it.
- ※ Make sure that the DEF/AdBlue® ventilation filter is clean. If it is dirty, clean the ventilation filter with clean water and refit it.



- (2) If the DEF/AdBlue® level is found to be below, DEF/AdBlue® must be added.
- (3) When fill the tank with DEF/AdBlue®, check the fill up warning lamp. If light ON, do not fill up to prevent overflow.

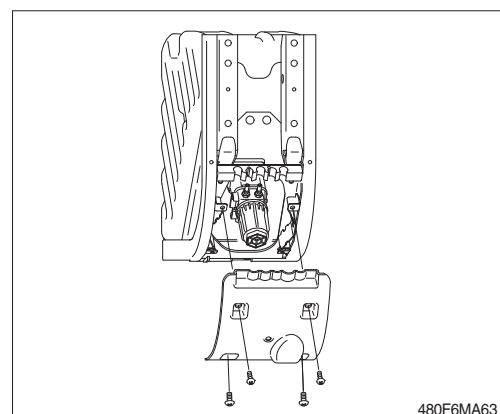
⚠ It is unlawful to tamper with or remove any component of the aftertreatment system. It is also unlawful to use a catalyst solution that does not meet the specifications provided or the operate the machine with no catalytic solution.

- ※ 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.

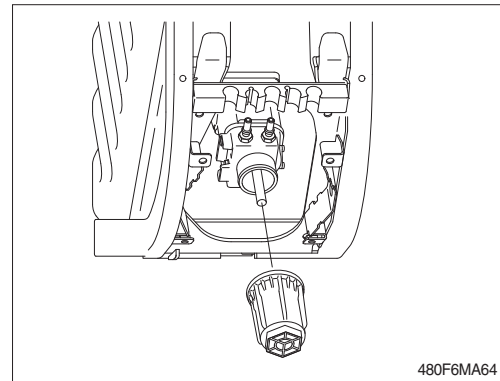


18) DEF/AdBlue® FILTER

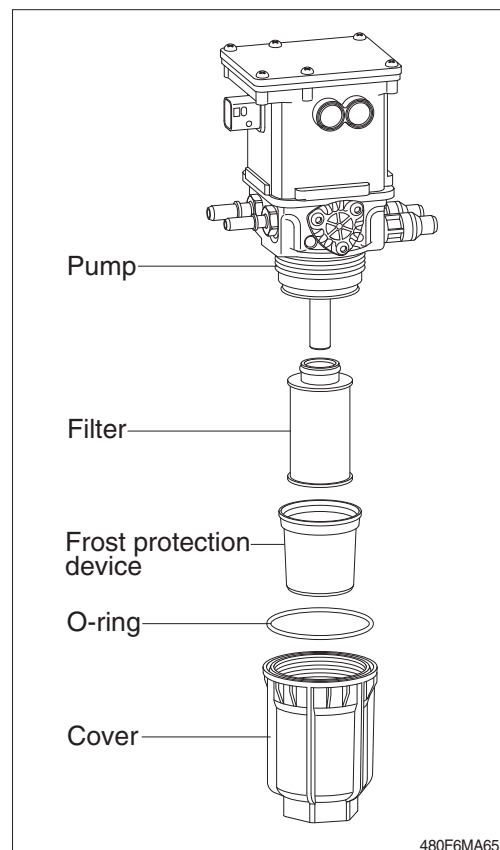
- (1) Remove the cover on the rear of the DEF/AdBlue® tank.



- (2) Place a suitable container underneath.
- (3) Unscrew the filter cover. Use a 46 mm socket.
- (4) Remove the filter cover and O-ring.

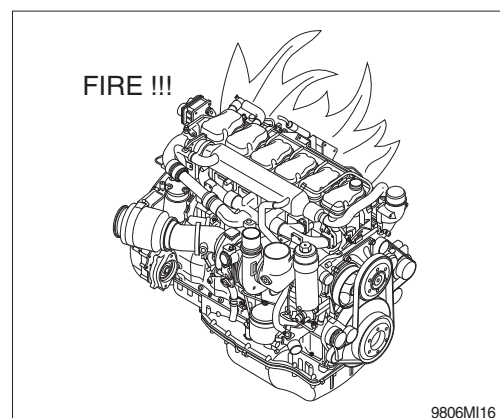


- (5) Remove the frost protection device and the filter.
- (6) Wipe the pump clean.
- (7) Check that the frost protection device and valve ring are correctly fitted in the new cover.
- (8) Fit the new filter.
- (9) Fit the new frost protection device.
- (10) Lubricate the threads with the spray.
- (11) Fit the new O-ring in the new cover.
- (12) Fit the new cover.
 - Tightening torque : 8.2 kgf · m (59 lbf · ft)



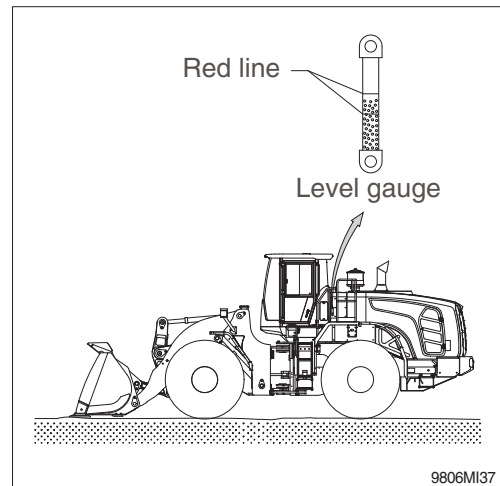
19) LEAKAGE OF FUEL

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



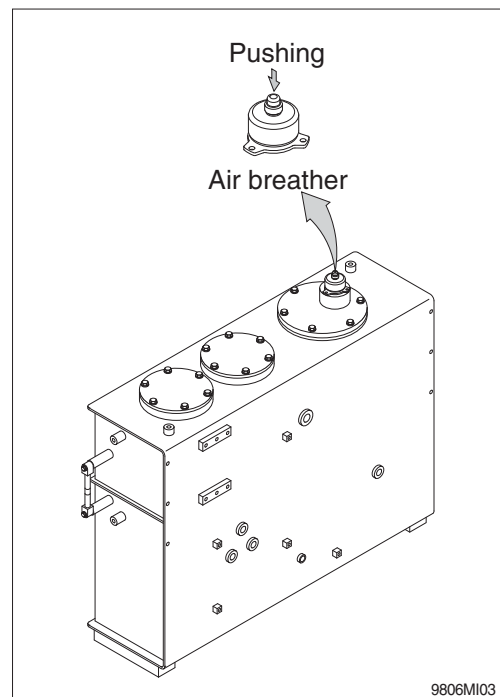
20) HYDRAULIC OIL CHECK

- (1) Lower the bucket on the ground at a flat location as in the illustration.
Stop the engine and then leave for about 5 minutes.
 - (2) Check the oil level at the level gauge. The level gauge is located on the left side of the hydraulic oil tank.
 - (3) The oil level is normal if between the red lines.
- ※ **Add hydraulic oil, If necessary.**



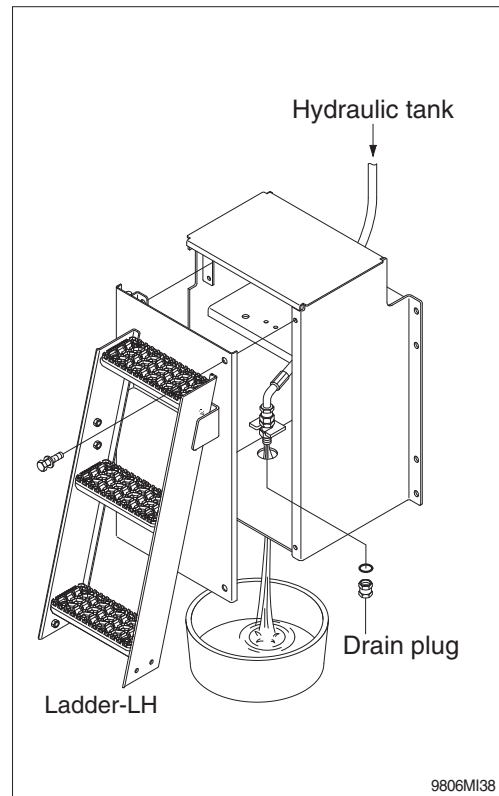
21) FILLING HYDRAULIC OIL

- (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.



22) CHANGE THE HYDRAULIC OIL

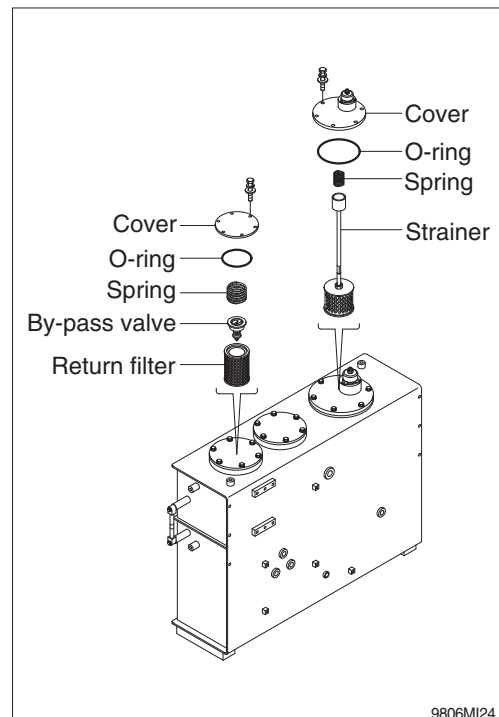
- (1) Lower the bucket on the ground extend the bucket cylinder to the maximum.
 - (2) Relieve the pressure in the tank by pushing the top of the air breather.
 - (3) Prepare a suitable container.
 - (4) To drain the oil loosen the drain plug.
 - (5) Tighten the drain plug.
 - (6) Fill proper amount of recommended oil.
 - (7) Put the breather in the right position.
 - (8) Start engine and run continually. Release the air by full stroke of control lever.
- ※ The oil must be free of bubbles. If bubbles are present in the oil, air is entering the hydraulic system. Inspect the suction hoses and hose clamps.
- ※ In case of injecting HBHO (Hyundai 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 HYUNDAI dealer.



23) CLEANING AND REPLACING RETURN FILTER

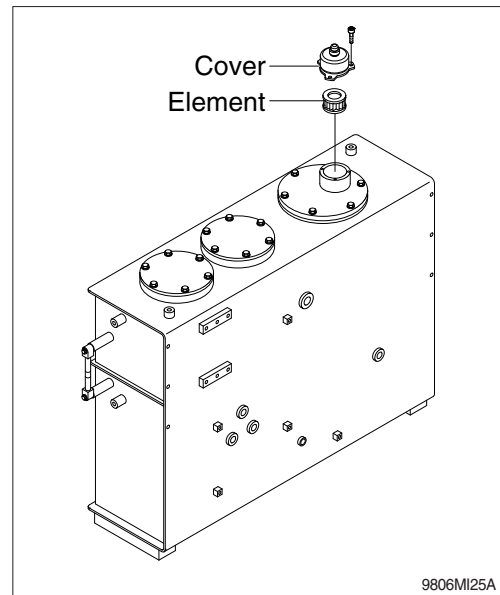
Clean and replace the return filter in the following manner.

- (1) Remove the cover.
- (2) Remove spring, by-pass valve and return filter from the tank.
- (3) Replace element with new one and assemble spring and by-pass valve after cleaning.
- (4) Install the cover on the tank.
 - Tightening torque : $6.9 \pm 1.4 \text{ kgf} \cdot \text{m}$
($50 \pm 10 \text{ lbf} \cdot \text{ft}$)



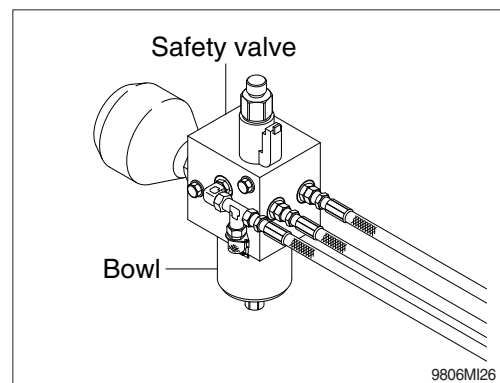
24) REPLACEMENT OF ELEMENT IN HYDRAULIC TANK BREATHER

- (1) Relieve the pressure in the tank by pushing the rubber cap 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.
 - Nut tightening torque : $0.92 \pm 0.1 \text{ kgf} \cdot \text{m}$
($6.6 \pm 0.7 \text{ lbf} \cdot \text{ft}$)



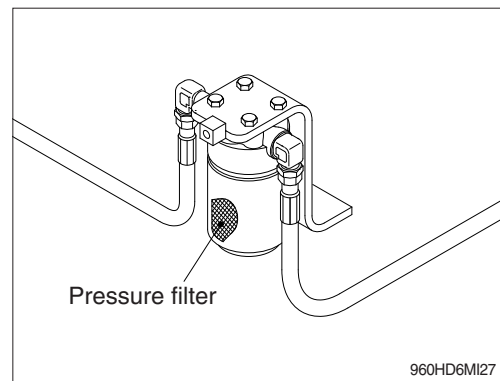
25) REPLACE OF PILOT LINE FILTER

- (1) Loosen the bowl positioned on the safety valve.
- (2) Pull out the filter element and clean the bowl.
- (3) Install the new element and tighten the bowl using spanner.
 - Spanner size : 27 mm



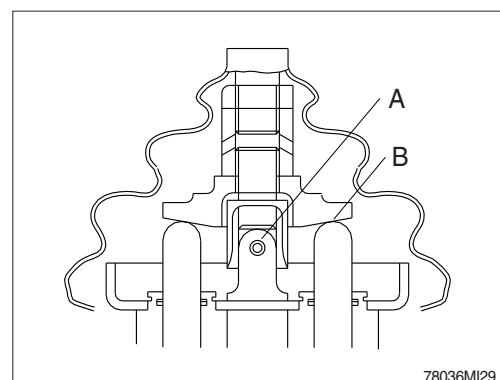
25-1) REPLACE OF PRESSURE FILTER

- (1) Loosen the pressure filter.
 - (2) Install the new filter and tighten.
- ※ The filter is located on the front side of rear frame under the cab.



26) LUBRICATE RCV LEVER

Remove bellows and grease the joint (A) and the sliding parts (B).



27) TIRE PRESSURE

- (1) Inappropriate tire pressure is a primary cause for tire damage. Insufficient tire pressure will damage internal carcass of tire. Repeated excessive bending will damage or break the carcass. Excessive pressure will also cause premature damage of tire.

- (2) Recommended tire pressure (When tire is cooled)

Size	Pressure
29.5 R25, ★(L3)	See page 5-1

- (3) Continuous operation will produce heat and increase pressure on tire. But such phenomenon was already taken into account when designing a tire. Do not try to remove normally increased air because tires may be crushed or overinflated.

- (4) The three major causes for excessive heat and pressure of tire are insufficient pressure, excessive load and overspeed. Avoid excessive load and overspeed in order to keep tires in good shape.

- ▲ **Do not inflate tires using flammable gases or alcohol injector.**

This cause explosion or personal injury.

- ▲ **Inflate tires at the pressure level recommended by the manufacturer, and check periodically pressure and wear of tires.**

- ▲ **When replacing the inflated tire, do not stand near the tire.**

- ※ **Check the tire when the tire is at normal temperature and the machine is not loaded.**

- ▲ **Do not use recycled wheel parts.**

- ▲ **When removing lockering or inflating tire, use safety cable or chain to ensure safety.**

- ※ **Be sure to bleed air before removing lockering. Never inflate tires unless the lockering is assembled in its place.**

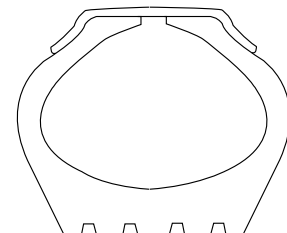
- ① Avoid the followings when traveling.

- ② Rubbing tires against road bank or rack at cargo-unloading spot.

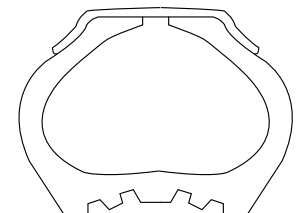
- ③ Tires slippage during working.

- ④ Abrupt starting of machine.

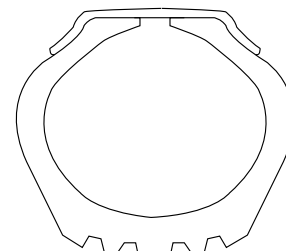
When oil, grease or gasoline smeared on tire, clean those. Otherwise it may cause of permanent deformation.



Normal



Too low pressure



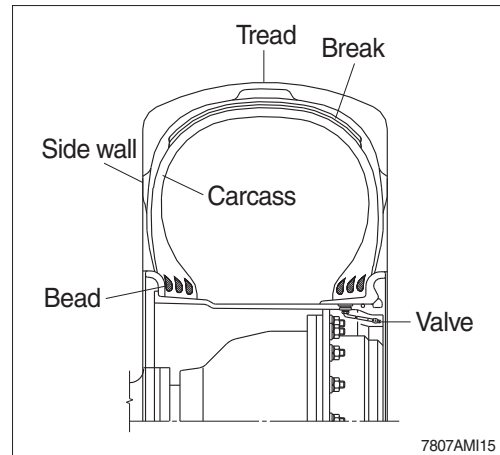
Excess pressure

28) REPLACEMENT OF TIRE

⚠ Disassembly, reassembly, replacement and repair of tire requires special skills and equipment. Contact a tire repair shop.

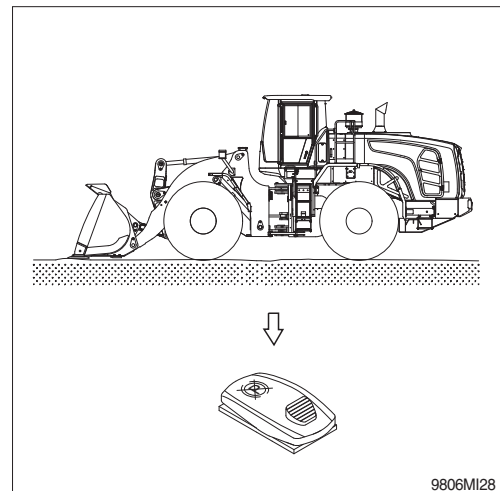
(1) Tires to be replaced

- ① Tires with broken or bent bead wires
- ② Tires exposed more than 1/4 of carcass ply.
- ③ Tires whose carcass is damaged more than 1/3 of the tire width.
- ④ Tires which show fly separation.
- ⑤ Tires which has a radial crack near the carcass.
- ⑥ Tires which are judged to be unsuitable for use because of deformation or damage.

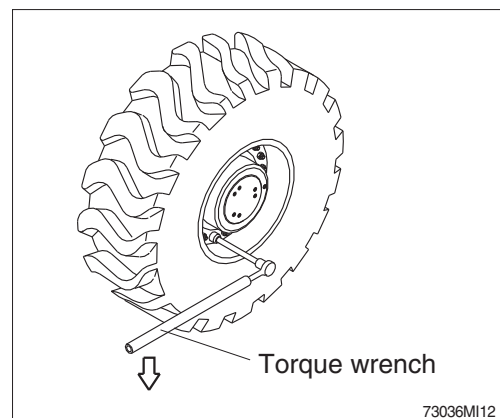


(2) Separation of tire

- ① After moving the machine to flat ground, lower the bucket to the ground and turn the parking brake switch ON.

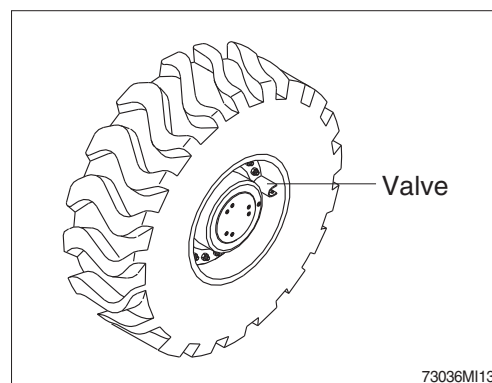


- ② Loosen slightly all wheel mounting.
 - Tools : Socket 32 mm
 - Torque wrench
 - Extension bar
- ③ Lift the machine with a jack.
- ④ Loosen all wheel mounting nuts and replace the tire.



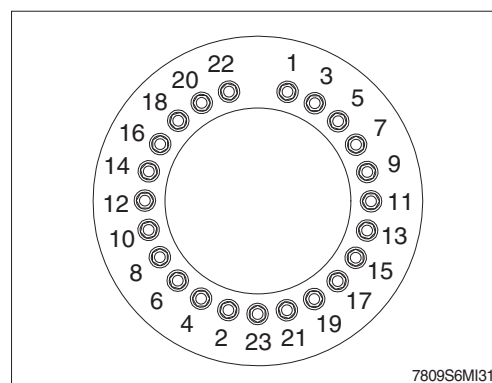
(3) Direction of tire to be installed

- ① Be careful that the valve should be facing the outside.



(4) Mounting of tire

- ① Lightly tighten nuts as shown in the illustration.
- ② Lower the jack after tire is replaced.
- ③ Tighten nuts according to the specified tighten torque.
 - Tightening torque : $79 \pm 2.5 \text{ kgf} \cdot \text{m}$
($571 \pm 18 \text{ lbf} \cdot \text{ft}$)

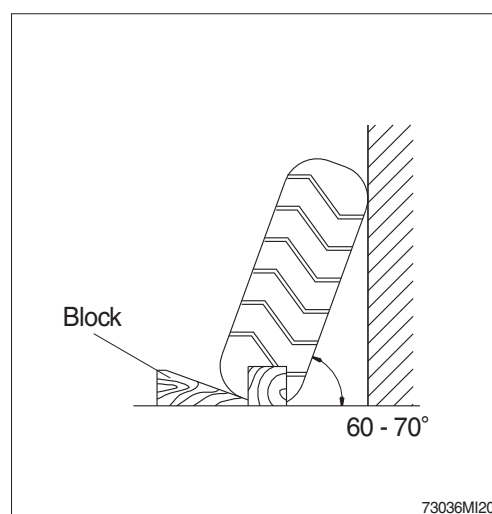


29) STORING TIRES AFTER REMOVAL

As a basic rule, store the tires in a warehouse which unauthorized persons cannot enter. If the tire are stored outside, always erect a fence around the tires and put up "No Entry" and other warning signs that even young children can understand.

Stand the tire on level ground, and block it securely so that it cannot roll or fall over.

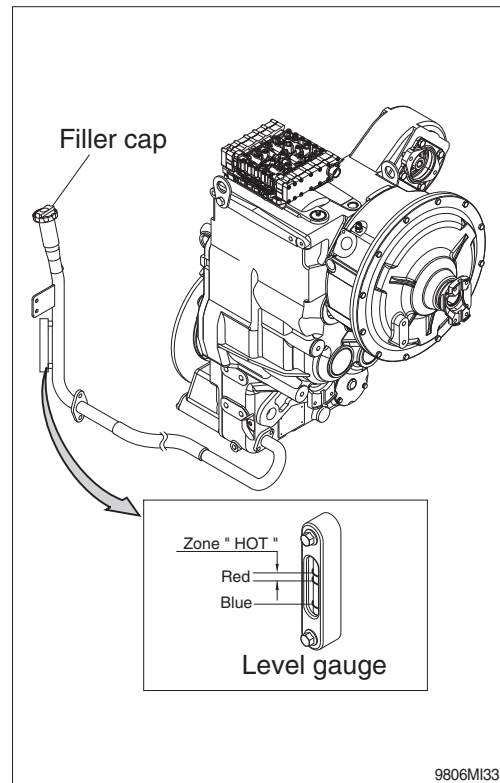
If the tire should fall over, get out of the way quickly. The tires for construction equipment are extremely heavy, so trying to hold the tire may lead to serious injury.



30) CHECK TRANSMISSION OIL LEVEL

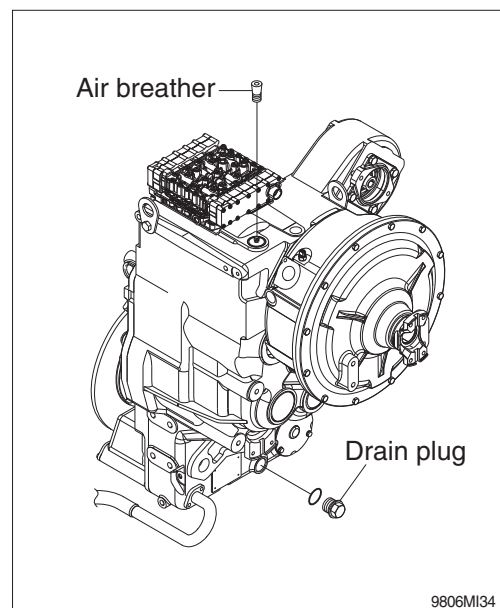
- (1) The oil level check must be carried out as follows;
oil level check (weekly).
- (2) Before the oil level check, Transmission must have been running to warm up enough.
- (3) When the oil level is checked, machine must be on flat ground and engine must be at idling speed, transmission must be in neutral position.
- (4) Check the oil level on level (sight) gauge.
- (5) Oil level
 - Operating temperature (about 80~90°C)
: The Oil level must be lying in zone HOT (between two red lines).
 - Cold phase (about 40°C)
: The Oil level must be lying near cold mark (blue line).

▲ When checking, press the parking brake switch and fix the front and rear frames with the safety lock bar.

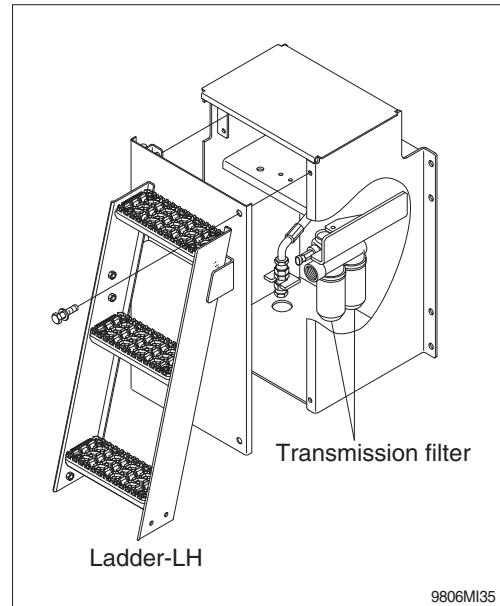


31) REPLACEMENT OF TRANSMISSION OIL AND FILTER ELEMENT

- (1) Operate the machine for a few minutes in order to warm the transmission oil.
- (2) Move the machine to flat ground. Lower the bucket to the ground and slightly apply downward force.
- (3) Press the parking brake switch and stop the engine.
- (4) Open transmission air breather to relieve internal air pressure.
- (5) Remove the transmission drain plug. Allow the transmission oil to drain into a suitable container.

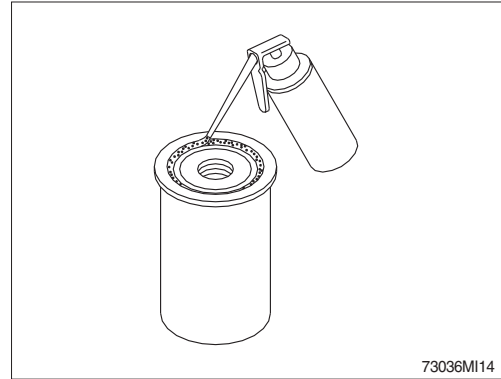


- (6) Remove the transmission oil filter cartridge.
Dispose of the used transmission oil filter cartridge properly.
- (7) Clean the filter cartridge mounting base.
Remove any part of the filter cartridge gasket that remains on the filter cartridge mounting base.



9806MI35

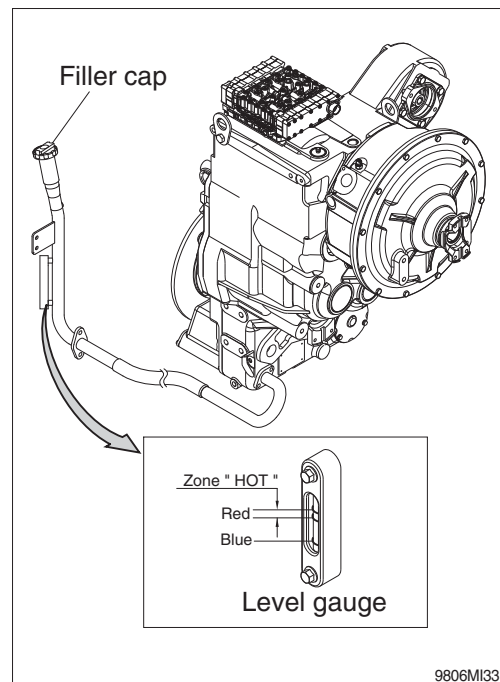
- (8) Apply a light coat of oil to the gasket of a new transmission oil filter cartridge.
- (9) Install the new transmission oil filter cartridge.
Screw the filter in until contacts with the sealing surface is obtained and tighten it now by hand about 1/3 to 1/2 turn.



73036MI14

- (10) Fill the oil through filler cap and check if the oil is at the appropriate level.
- (11) The proper oil amount is 54 liters. (14.3 U.S. gallons)

- ⚠ **As the machine is hot after operation wait until the temperature has dropped.**
- ⚠ **It is imperative to pay attention to absolute cleanliness of oil and filter.**
Binding is in any case the marking on the oil level gauge.
- ✖ **Prohibition to inject water to filler cap directly when you wash the machine.**



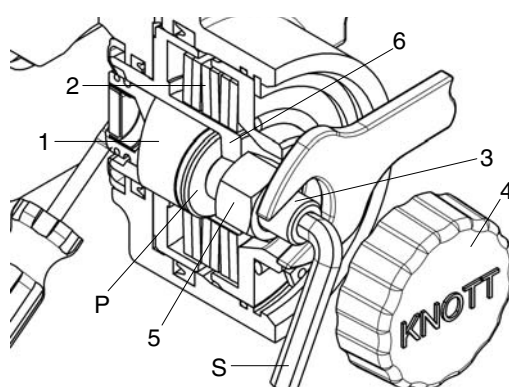
9806MI33

31-1) PARKING BRAKE CLEARANCE

(1) Safety instruction

- ① Park the machine on level ground, lower equipment to the ground.
- ② Insert wheel chocks.
- ③ Insert steering lock.
- ④ Leave the engine running.
- ※ **Isolate the machine from driving.**
- ⑤ Release the parking brake.
- ⑥ Check clearance and adjust accordingly.

(2) Check and adjusting instruction



- 1 Thrust bolt
- 2 Bank of cup springs
- 3 Adjusting screw
- 4 Screw cap
- 5 Lock nut
- 6 Piston
- P Even surface
- S Socket wrench

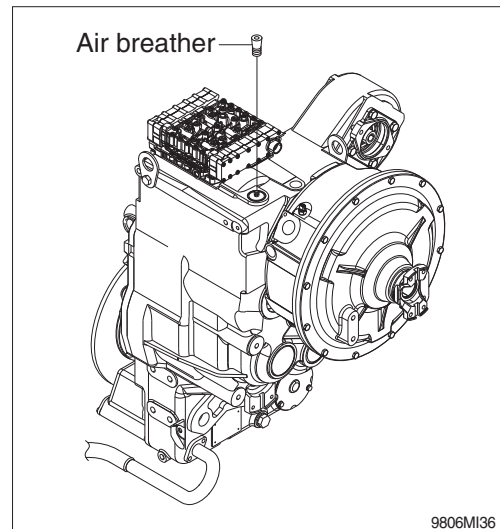
- ① Place the machine on flat ground and secure against rolling away.
- ② Start the engine and run at low idle. Release the parking brake by releasing the parking brake switch in the cabin.
- ③ Release the screw cap (4) and unscrew.
- ④ Release the lock nut (5, size 30) and turn the adjusting screw (3) with socket wrench size 10 manually clockwise until the two brake pads make contact with the brake disk.
- ⑤ Turn the adjusting screw (3) anti-clockwise and set the clearance specified in the table below.

Clearance		Turns
Min.	1.0 mm	2/5
Nominal clearance	2.0 mm	4/5
Max.	3.0 mm	1 1/5

- ⑥ Hold the adjusting screw (3) in position with the hexagonal socket wrench and lock with the lock nut (5).
 - Tightening torque for the lock nut (5) : 6.1 kgf · m (44.3 lbf · ft)
- ⑦ Mount the screw cap (4) and tighten as far as possible manually.
- ※ **Check if the parking brake is working properly with operating the parking brake switch on and off.**

32) CLEANING TRANSMISSION AIR BREATHER

- (1) Remove dust or debris around the air breather.
- (2) Remove the air breather and wash it with cleaning oil.



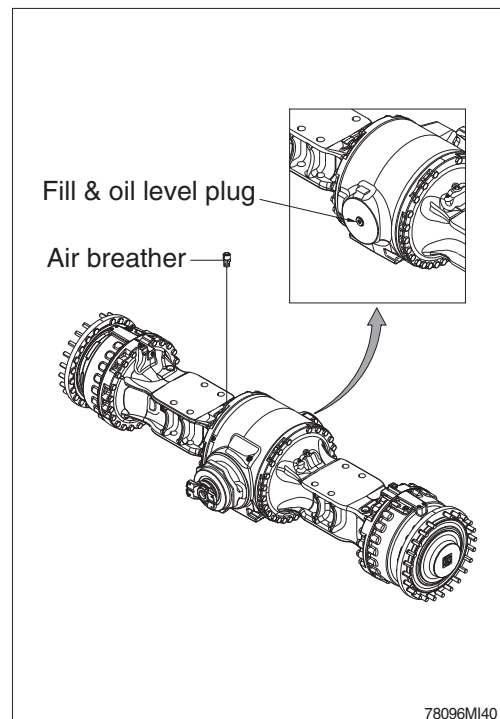
33) CHECK AND SUPPLYING AXLE OIL

- (1) Move the machine to flat ground.
- (2) Open the axle air breather to relieve internal air pressure.
- (3) Remove the plug and check the oil amount.
If the oil level is at the hole of the plug, it is normal.

※ Provide fill & level plug with O-ring and install it.

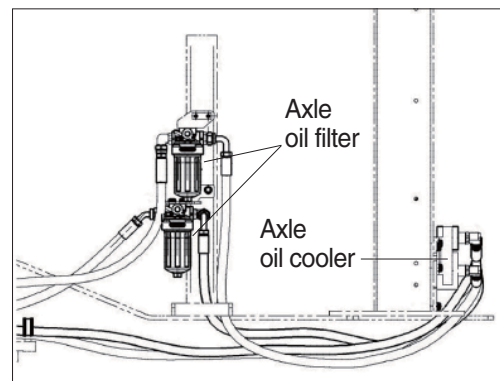
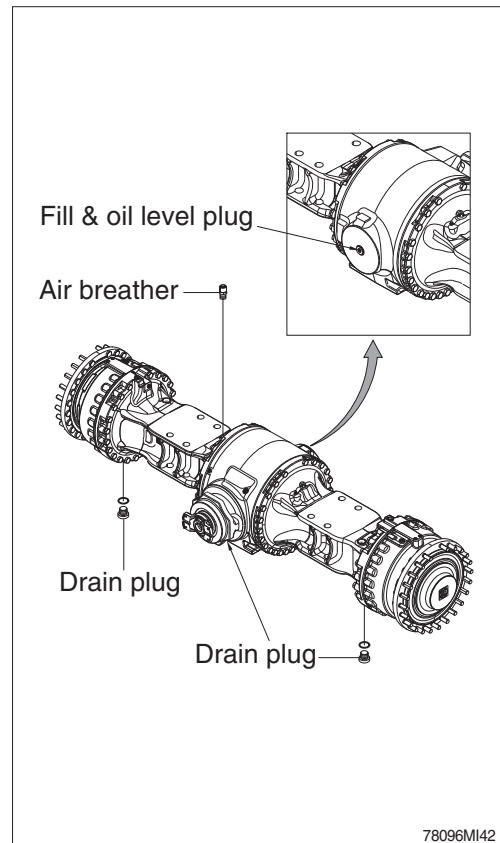
▲ When checking the oil level, press the parking brake switch and fix front and rear frames using the safety lock bar.

▲ As the machine is hot after operation, wait until the temperature has dropped.
Set the plug of planetary gear in parallel to the ground.



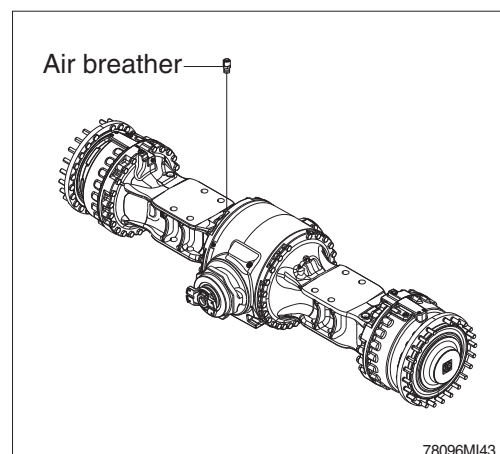
34) CHANGE THE AXLE OIL

- (1) Place a case under drain plug to catch oil.
 - (2) Remove the air breather to relieve internal pressure.
 - (3) The basic condition for a correct oil change of the axle is horizontal plane of installation in every direction.
Place machine in a horizontal position
 - (4) All plugs must be cleaned carefully before opening.
 - (5) Loosen drain plugs and drain oil.
 - (6) Provide drain plugs with new O-ring and install them.
 - (7) Fill up oil to the overflow on fill & level plug.
 - Oil amount
 - Front axle : 58 ℓ (15.3 U.S. gal)
 - Rear axle : 58 ℓ (15.3 U.S. gal)
 - If equipped with axle oil cooler (option)
 - (8) Replace two axle oil filters (front and rear).
 - (9) Run the engine for five minutes at low idle on flat ground.
 - (10) Fill up oil to the overflow on fill & level plug at low idle and install plugs.
 - Oil amount
 - Front : 65 ℓ (axle only 58 ℓ)
 - Rear : 61 ℓ (axle only 58 ℓ)
- ▲ As the machine is hot after operation, wait until the temperature has dropped.**
- ※ If a work requires frequent use of brake, replace it earlier than normal change interval.**



35) CLEANING AXLE BREATHER

- (1) Remove dust or debris around the breather.
- (2) Remove the breather and wash it with cleaning oil.



36) LUBRICATION

(1) Supply grease through the grease nipple, using grease gun.

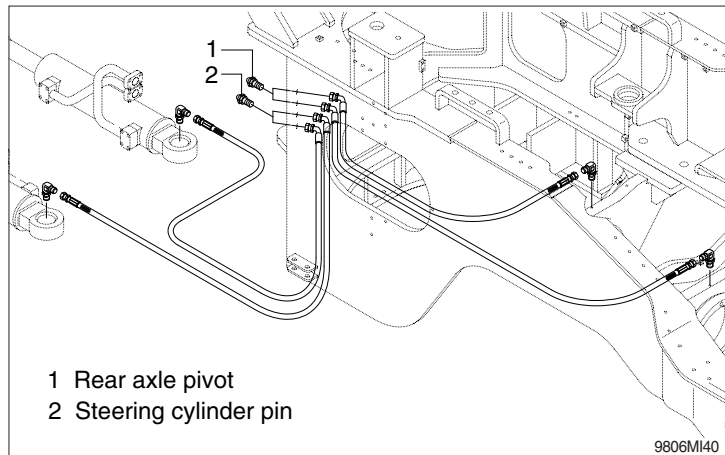
(2) After lubricating, clean off spilled grease.

▲ Press the parking brake switch and fix front and rear frames using the safety lock bar.

▲ Set the work equipment in a stable position and push the pilot cut off switch to the OFF position.

(3) Rear axle pivot : 2EA

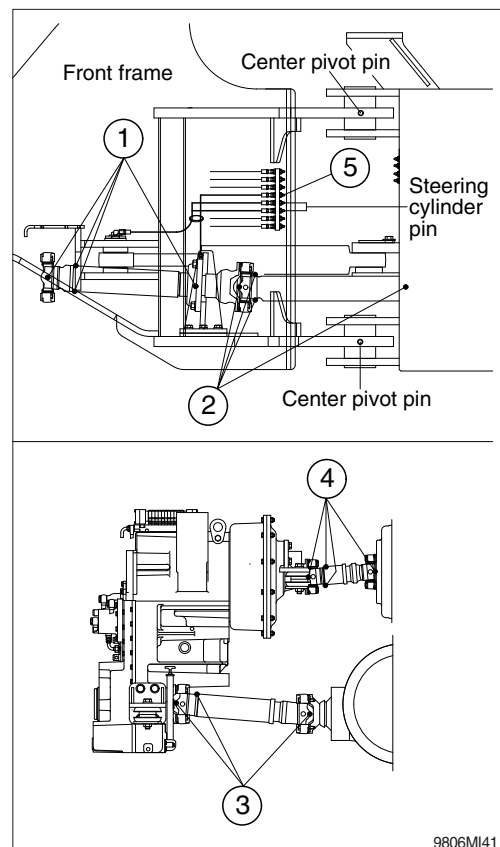
(4) Steering cylinder pin : 4EA



(5) Center pivot pin : 2EA

(6) Drive shaft

- ① Front (sleeve yoke, journal bearing) : 4EA
- ② Center (sleeve yoke, journal bearing) : 4EA
- ③ Rear (sleeve yoke, journal bearing) : 3EA
- ④ Upper (sleeve yoke, journal bearing) : 4EA
- ⑤ Center bearing : 1EA



37) REPLACEMENT OF BOLT ON CUTTING EDGE

(1) Replacement time

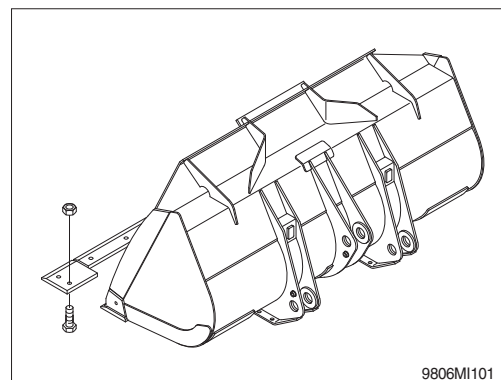
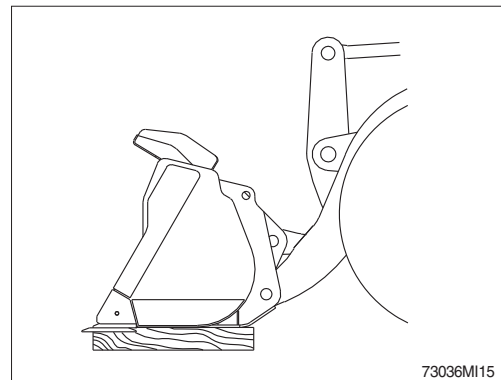
Replace the cutting edge before it has worn out to the end of bucket.

(2) Replacement method

▲ Make sure the work equipment does not move when replacing the cutting edge.

Set the work equipment in a stable position, put the pilot cut off switch in the OFF position.

- ① Lift the bucket to a proper height and insert blocks so that the bucket does not fall down.
- ② Loosen bolts and nuts, and remove the cutting edge.
- ③ Clean the contacted surface.
- ④ Turn the cutting edge and install on the bucket.
- ※ **If both sides have worn out, replace it with new ones.**
- ※ **If the contacted face of cutting edge has worn out, repair the contacted face of it.**
- ⑤ Tighten evenly bolts and nuts to remove the clearance between bucket and cutting edge.
 - Tightening torque : $275 \pm 40 \text{ kgf} \cdot \text{m}$
($1990 \pm 290 \text{ lbf} \cdot \text{ft}$)
- ⑥ After a few hours of operation, retighten bolts.



38) REPLACEMENT OF BUCKET TOOTH

(1) Replacement time

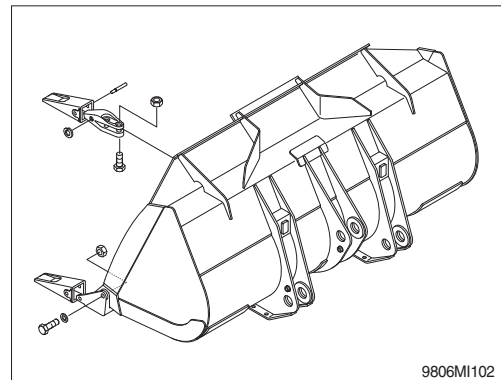
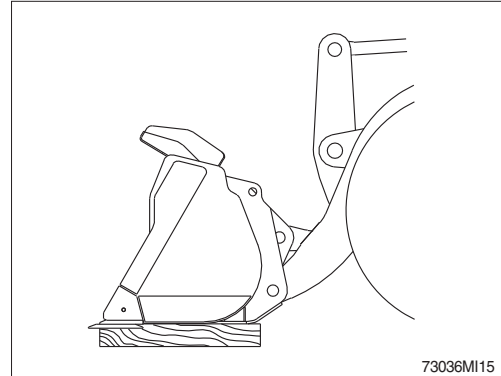
Replace the bucket tooth before it has worn out to the end of the bucket.

(2) Replacement method

▲ Make sure the work equipment does not move when replacing the bucket tooth.

Set the work equipment in a stable position, put the pilot cut off switch in the OFF position and stop the engine.

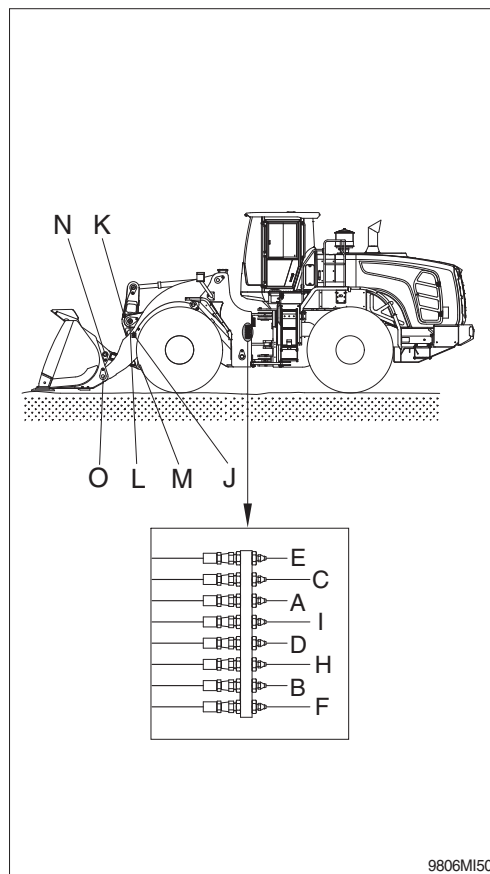
- ① Lift the bucket to a proper height and insert blocks so that the bucket does not fall down.
- ② Loosen bolts and nuts, and remove bucket tooth.
- ③ Clean the contacted surface.
- ※ **If the contacted face of bucket tooth has worn out, repair the contacted face of it.**
- ④ Install new bucket tooth on the bucket, and tighten bolts and nuts.
 - Tightening torque : $275 \pm 40 \text{ kgf} \cdot \text{m}$
($1990 \pm 290 \text{ lbf} \cdot \text{ft}$)
- ⑤ After a few hours of operation, retighten bolts.



39) MAINTENANCE OF WORK EQUIPMENT

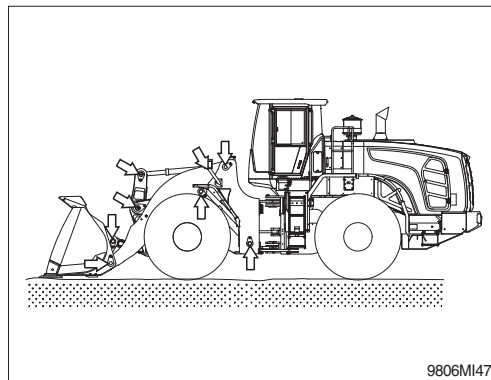
- (1) Lubricate to each pin of working device.
Lubricate the grease to grease nipple in accordance with lubrication intervals.

No.	Description	Qty
A	Bucket cylinder (front frame side) pin	1
B	Boom cylinder (front frame side) right pin	1
C	Boom-front frame right connection pin	1
D	Steering cylinder (front frame side) right pin	1
E	Boom-front frame left connection pin	1
F	Boom cylinder (front frame side) left pin	1
H	Steering cylinder (front frame side) left pin	1
I	Center bearing	1
J	Boom cylinder-boom connection pin	2
K	Bucket cylinder-bell crank connection pin	1
L	Boom-bell crank connection pin	1
M	Bell crank-bucket link connection pin	1
N	Bucket-bucket link connection pin	1
O	Bucket-boom connection pin	2



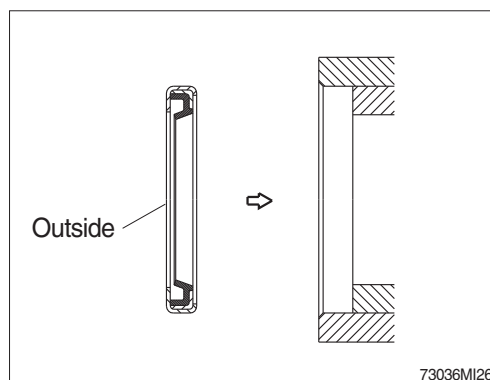
- ※ **Shorten lubricating interval when working in the water or dusty place.**

- (2) Check for wear and tear of work equipment pins and bushings.
(3) Check for damage of boom and bell crank.



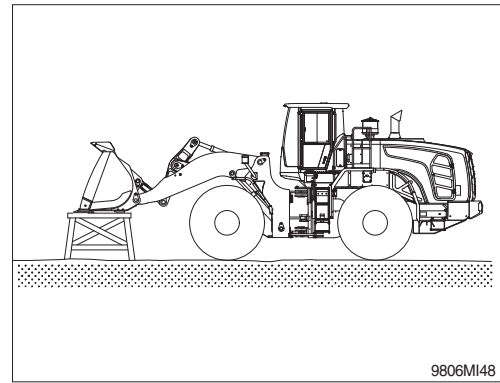
- (4) Dust seal are mounted on the rotating part of working device to extend the lubricating interval.

- ※ **Mount the lip to be faced out side 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.**
※ **Make sure the seals are not damaged or deformed.**



40) WORK EQUIPMENT SUPPORT

When carrying out inspection and maintenance with the equipment raised, fit a stand under the lift arm securely to prevent the work equipment from coming down. In addition, set the work equipment control levers to the Hold position and put the pilot cut off switch to the OFF position.



41) BOOM SAFETY LOCK BAR (option)

(1) Supporting

▲ If it is necessary to carry out any maintenance operation or to stop the machine with raised boom, always use the boom safety lock bar and put the pilot cut off switch to the OFF position.

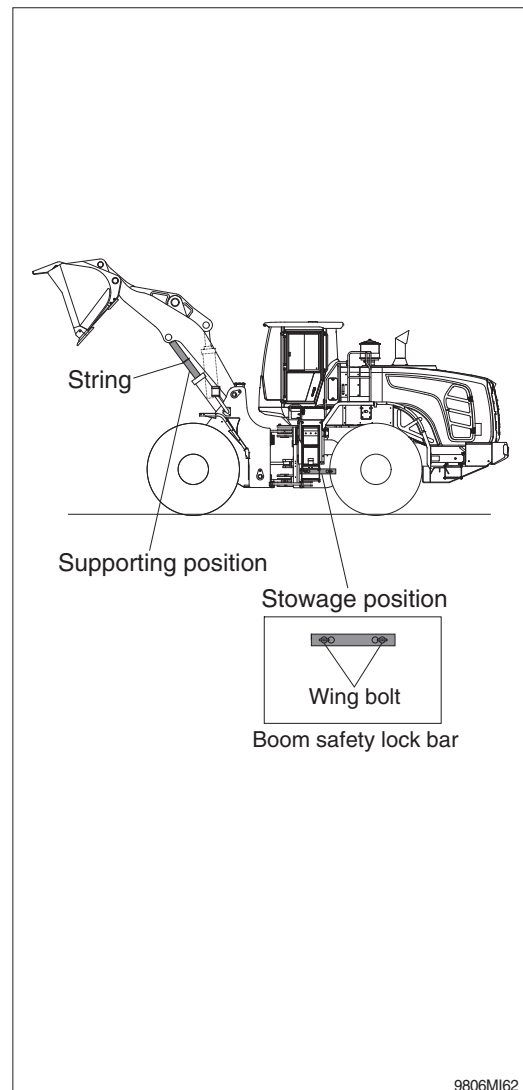
※ The attachment should be empty.

- ① Raise the boom fully.
- ② Stop the engine and remove the starter key.
- ③ Loosen the two wing bolts and remove safety lock bar from its stowage position.
- ④ Place the safety lock bar onto the boom cylinder and secure the safety lock bar by tying the string shown as figure.
- ⑤ Slowly lower the boom to fix the safety lock bar.

※ When lowering the boom, operate the control lever very slowly.

(2) Lowering

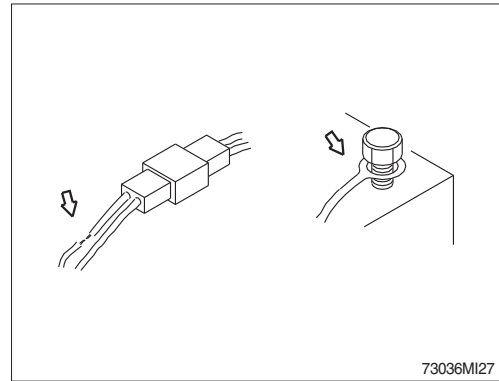
- ① Raise the boom to take the weight off the safety lock bar.
- ② Stop the engine and remove the starter key.
- ③ Loosen the string and remove the safety lock bar carefully.
- ④ Reinstall the safety lock bar onto its stowage position using the wing bolts.



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.

⚠ Avoid short-circuiting the battery terminals through accidental contact with metallic objects, such as tools, across the terminals.

⚠ Do not store tools, bucket tooth and other flammable things in battery box. They could cause a fire.

⚠ Tighten the battery terminals securely.

Loosened terminals can generate sparks and lead to explosion.

⚠ Make sure that the battery terminal's caps always are installed.



7579A0FW30

(2) Recycle

Never discard a battery.

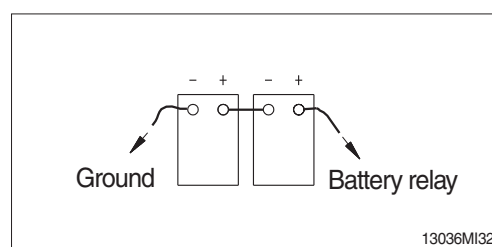
Always return used batteries to one of the following locations.

- 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.

※ Pay attention to the correct polarity.



3) STARTING THE ENGINE WITH A BOOSTER CABLE

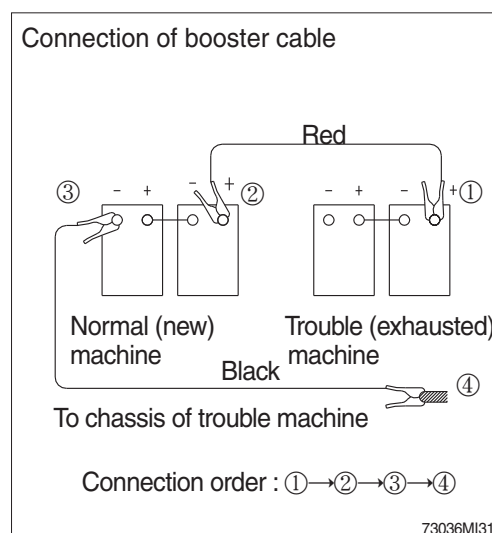
Keep following order when you are going to start engine using booster cable.

(1) Connection of booster cable

※ Use the same capacity of battery for starting

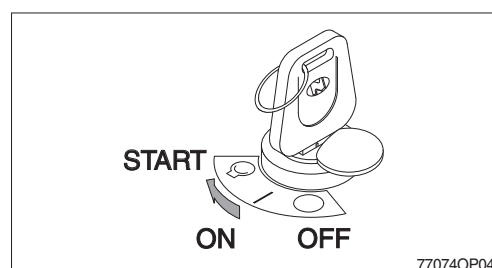
- ① Connect the red terminal of booster cable to the battery(+) terminal between exhausted and new battery.
- ② Connect the black terminal of the booster cable to the battery (-) terminal between exhausted and new battery.

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



(2) Starting the engine

- ① Start engine with starting key.
- ② 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.

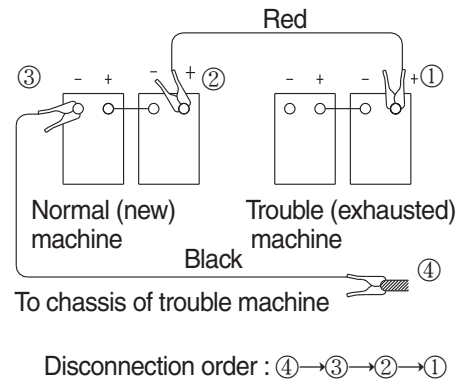
▲ Explosive gas is generated while using the battery or charging it. Keep away flame and be careful not to cause the spark.

※ Charge the battery in the well ventilated place.

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

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

Disconnection of booster cable



73036MI31

4) Welding repair

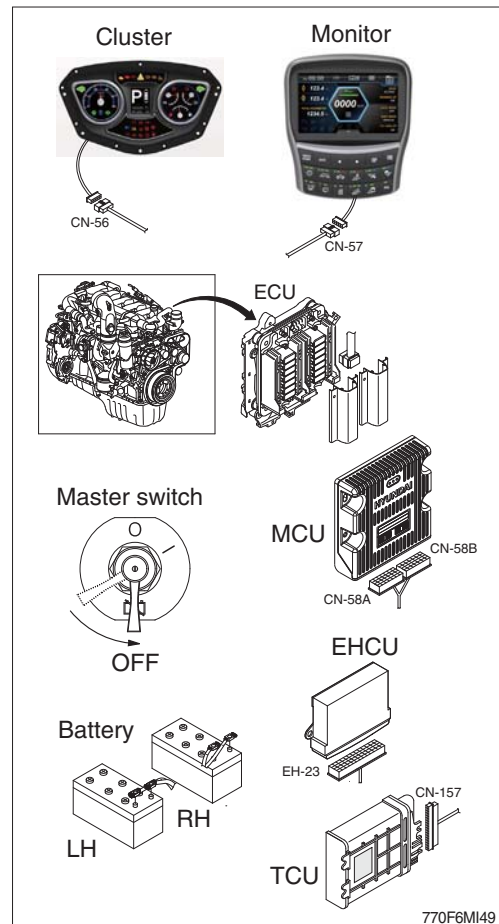
Before start to welding, follow the below procedure.

- (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, TCU, ECU, EHCu, cluster, monitor etc).
- (4) Connect the earth (ground) lead of the welding equipment as close to the welding points 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.



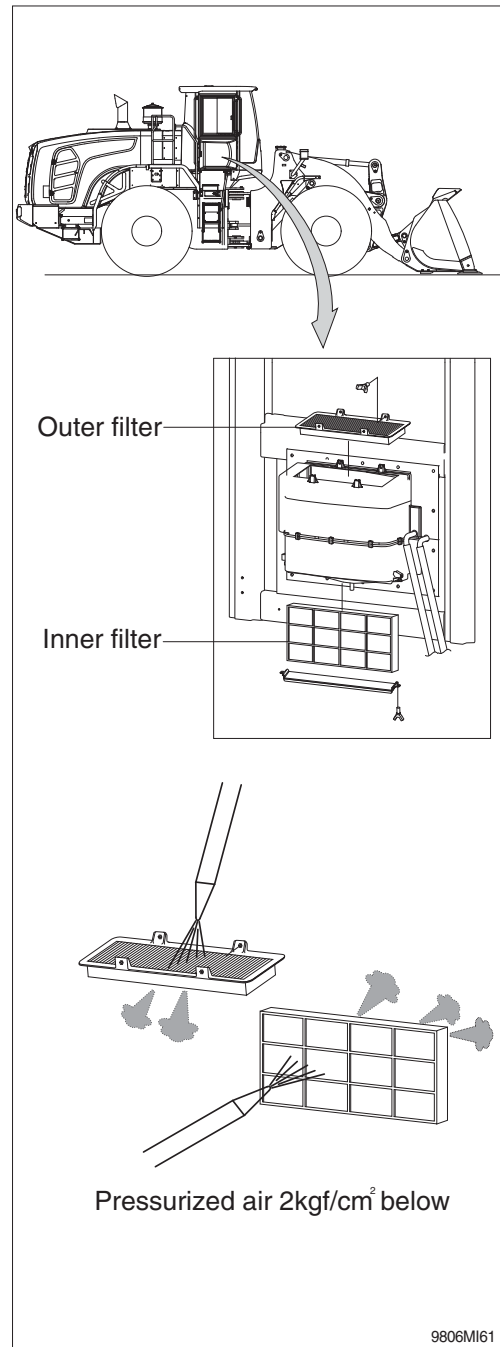
770F6MI49

8. AIR CONDITIONER AND HEATER

1) CLEAN AND REPLACE OF INNER AND OUTER FILTER

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

- (1) Open the air conditioner cover, loosen the wing bolt and remove the inner and outer filter.
- (2) Clean the filter using a pressurized air (below 2 kgf/cm^2 , 28 psi).
- △ **When using pressurized air, be sure to safety glasses.**
- (3) Inspect the filter after cleaning. If it is damaged or badly contaminated, use a new filter.



2) 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.

3) CHECK DURING SEASON

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

4) 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.

5) REFRIGERANT

(1) Equipment contains fluorinated greenhouse gas.

Model	Type	Quantity	GWP
HL980	HFC-134a	0.75 kg (1.65 lb)	1073 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 fluorinated 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 perform 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.