

SECTION 1 GENERAL

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SECTION 1 GENERAL

GROUP 1 SAFETY HINTS

FOLLOW SAFE PROCEDURE

Unsafe work practices are dangerous. Understand service procedure before doing work ; Do not attempt shortcuts.

WEAR PROTECTIVE CLOTHING

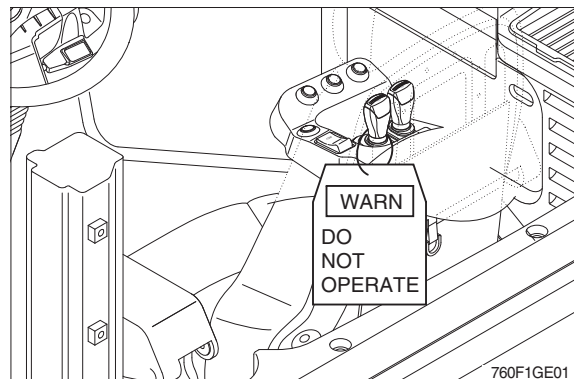
Wear close fitting clothing and safety equipment appropriate to the job.



WARN OTHERS OF SERVICE WORK

Unexpected machine movement can cause serious injury.

Before performing any work on the wheel loader, attach a 「Do Not Operate」 tag on the right side controller lever.



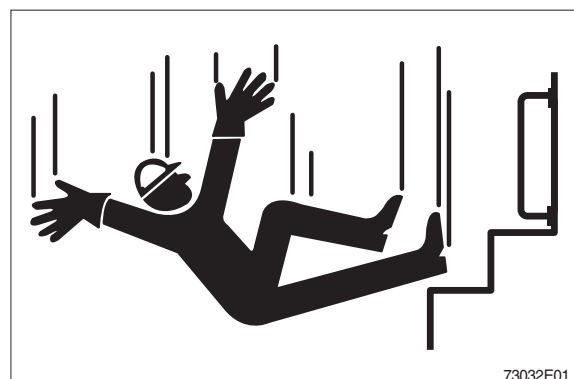
USE HANDHOLDS AND STEPS

Falling is one of the major causes of personal injury.

When you get on and off the machine, always maintain a three point contact with the steps and handrails and face the machine. Do not use any controls as handholds.

Never jump on or off the machine. Never mount or dismount a moving machine.

Be careful of slippery conditions on platforms, steps, and handrails when leaving the machine.

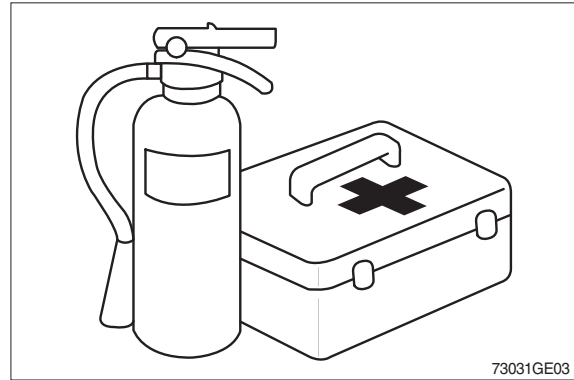


PREPARE FOR EMERGENCIES

Be prepared if a fire starts.

Keep a first aid kit and fire extinguisher handy.

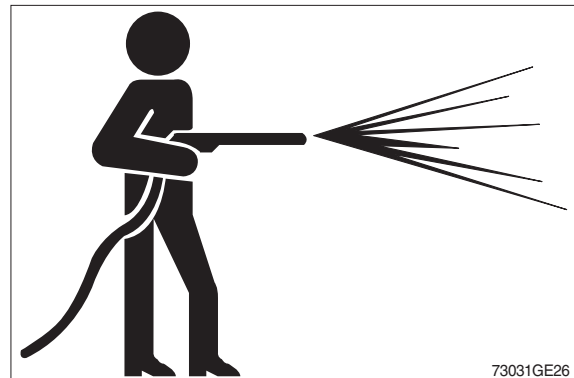
Keep emergency numbers for doctors, ambulance service, hospital, and fire department near your telephone.



WORK IN CLEAN AREA

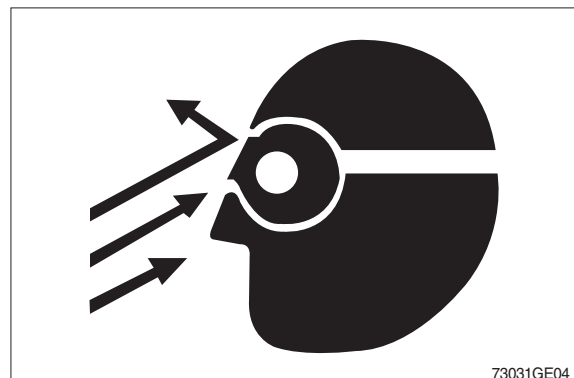
Before starting a job :

- Clean work area and machine.
- Make sure you have all necessary tools to do your job.
- Have the right parts on hand.
- Read all instructions thoroughly; Do not attempt shortcuts.



PROTECT AGAINST FLYING DEBRIS

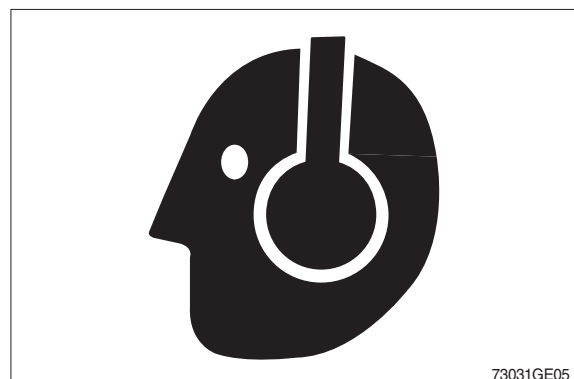
Guard against injury from flying pieces of metal or debris; Wear goggles or safety glasses.



PROTECT AGAINST NOISE

Prolonged exposure to loud noise can cause impairment or loss of hearing.

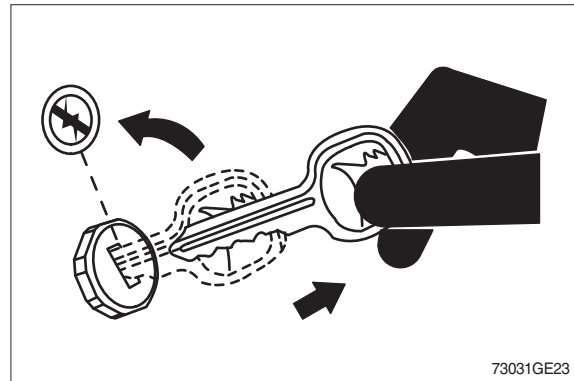
Wear a suitable hearing protective device such as earmuffs or earplugs to protect against objectionable or uncomfortable loud noises.



PARK MACHINE SAFELY

Before working on the machine:

- Park machine on a level surface.
- Lower bucket to the ground.
- Turn key switch to OFF to stop engine. Remove key from switch.
- Move pilot control shutoff lever to locked position.
- Allow engine to cool.



SUPPORT MACHINE PROPERLY

Always lower the attachment or implement to the ground before you work on the machine. If you must work on a lifted machine or attachment, securely support the machine or attachment.

Do not support the machine on cinder blocks, hollow tiles, or props that may crumble under continuous load.

Do not work under a machine that is supported solely by a jack. Follow recommended procedures in this manual.



SERVICE COOLING SYSTEM SAFELY

Explosive release of fluids from pressurized cooling system can cause serious burns.

Shut off engine. Only remove filler cap when cool enough to touch with bare hands.



HANDLE FLUIDS SAFELY-AVOID FIRES

Handle fuel with care; It is highly flammable. Do not refuel the machine while smoking or when near open flame or sparks. Always stop engine before refueling machine. Fill fuel tank outdoors.



Store flammable fluids away from fire hazards. Do not incinerate or puncture pressurized containers.

Make sure machine is clean of trash, grease, and debris.

Do not store oily rags ; They can ignite and burn spontaneously.



BEWARE OF EXHAUST FUMES

Prevent asphyxiation. Engine exhaust fumes can cause sickness or death.

If you must operate in a building, be positive there is adequate ventilation. Either use an exhaust pipe extension to remove the exhaust fumes or open doors and windows to bring enough outside air into the area.

REMOVE PAINT BEFORE WELDING OR HEATING

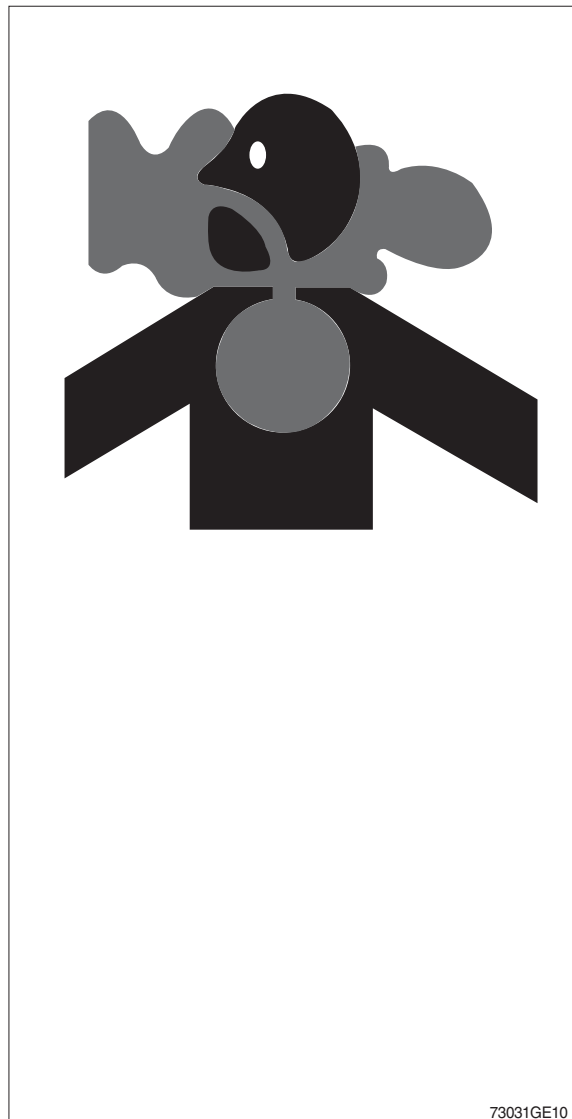
Avoid potentially toxic fumes and dust.

Hazardous fumes can be generated when paint is heated by welding, soldering, or using a torch.

Do all work outside or in a well ventilated area. Dispose of paint and solvent properly.

Remove paint before welding or heating:

- If you sand or grind paint, avoid breathing the dust. Wear an approved respirator.
- If you use solvent or paint stripper, remove stripper with soap and water before welding. Remove solvent or paint stripper containers and other flammable material from area. Allow fumes to disperse at least 15 minutes before welding or heating.



ILLUMINATE WORK AREA SAFELY

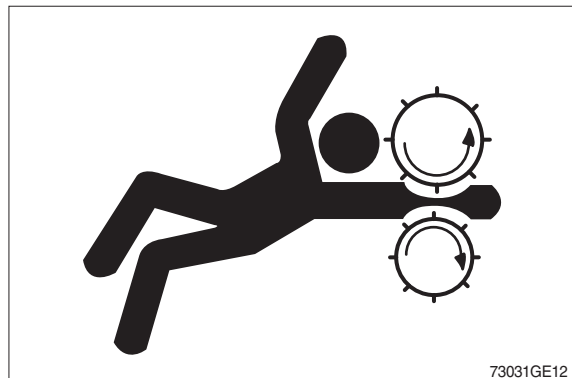
Illuminate your work area adequately but safely. Use a portable safety light for working inside or under the machine. Make sure the bulb is enclosed by a wire cage. The hot filament of an accidentally broken bulb can ignite spilled fuel or oil.



SERVICE MACHINE SAFELY

Tie long hair behind your head. Do not wear a necktie, scarf, loose clothing or necklace when you work near machine tools or moving parts. If these items were to get caught, severe injury could result.

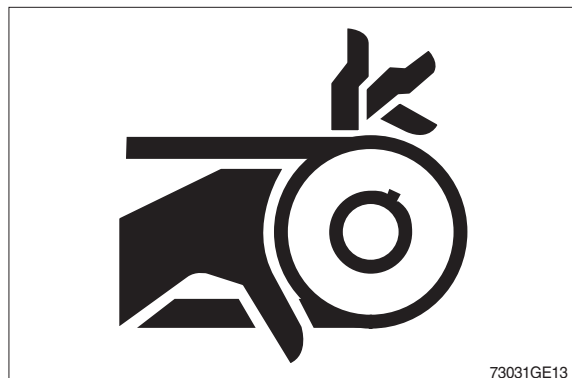
Remove rings and other jewelry to prevent electrical shorts and entanglement in moving parts.



STAY CLEAR OF MOVING PARTS

Entanglements in moving parts can cause serious injury.

To prevent accidents, use care when working around rotating parts.



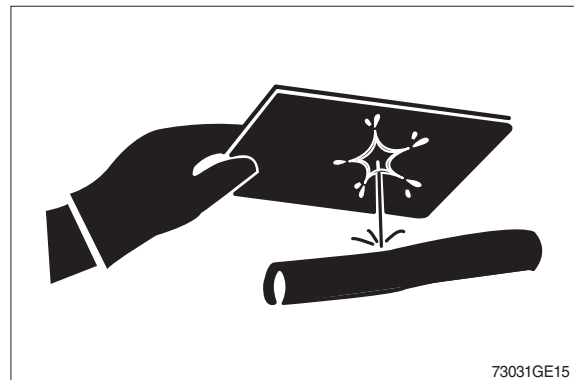
AVOID HIGH PRESSURE FLUIDS

Escaping fluid under pressure can penetrate the skin causing serious injury.

Avoid the hazard by relieving pressure before disconnecting hydraulic or other lines. Tighten all connections before applying pressure.

Search for leaks with a piece of cardboard. Protect hands and body from high pressure fluids.

If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result.



AVOID HEATING NEAR PRESSURIZED FLUID LINES

Flammable spray can be generated by heating near pressurized fluid lines, resulting in severe burns to yourself and bystanders. Do not heat by welding, soldering, or using a torch near pressurized fluid lines or other flammable materials.

Pressurized lines can be accidentally cut when heat goes beyond the immediate flame area. Install fire resisting guards to protect hoses or other materials.



PREVENT BATTERY EXPLOSIONS

Keep sparks, lighted matches, and flame away from the top of battery. Battery gas can explode.

Never check battery charge by placing a metal object across the posts. Use a volt-meter or hydrometer.

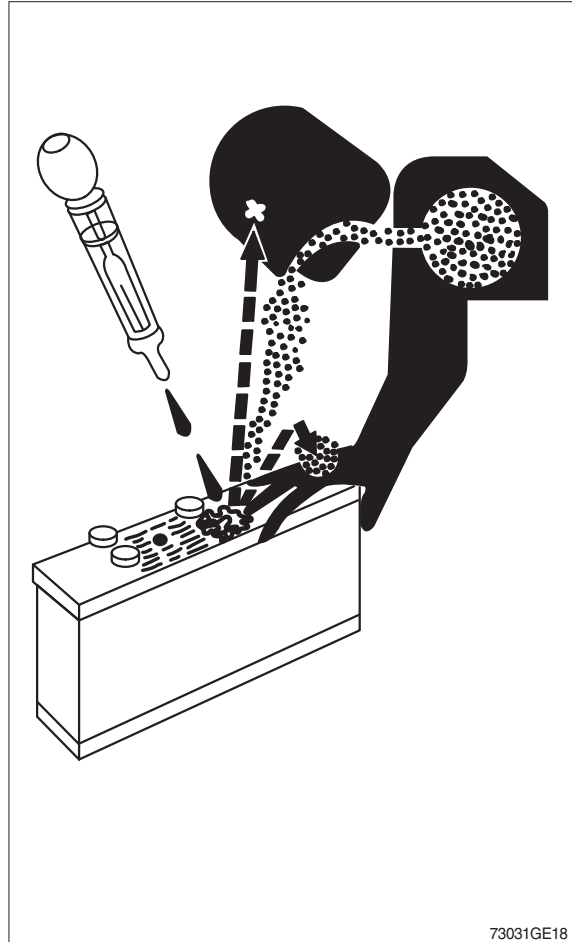
Do not charge a frozen battery; It may explode. Warm battery to 16°C (60°F).



PREVENT ACID BURNS

Sulfuric acid in battery electrolyte is poisonous. It is strong enough to burn skin, eat holes in clothing, and cause blindness if splashed into eyes.

1. Avoid the hazard by:
 2. Filling batteries in a well-ventilated area.
 3. Wearing eye protection and rubber gloves.
Avoiding breathing fumes when electrolyte is added.
 4. Avoiding spilling or dripping electrolyte.
 5. Use proper jump start procedure.
1. If you spill acid on yourself:
 2. Flush your skin with water.
Apply baking soda or lime to help neutralize the acid.
 3. Flush your eyes with water for 10-15 minutes.
Get medical attention immediately.
1. If acid is swallowed:
 2. Drink large amounts of water or milk.
Then drink milk of magnesia, beaten eggs, or vegetable oil.
 3. Get medical attention immediately.



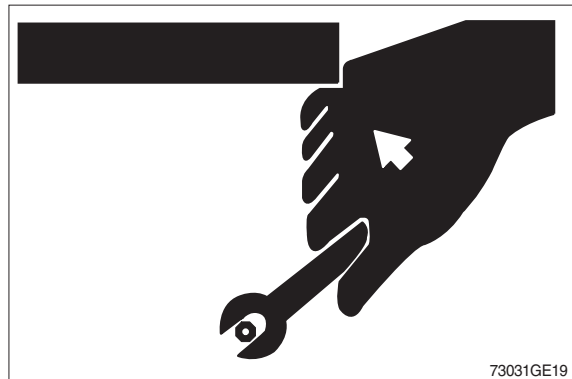
USE TOOLS PROPERLY

Use tools appropriate to the work. Makeshift tools, parts, and procedures can create safety hazards.

Use power tools only to loosen threaded tools and fasteners.

For loosening and tightening hardware, use the correct size tools. Avoid bodily injury caused by slipping wrenches.

Use only recommended replacement parts.
(See Parts manual)



SERVICE TIRES SAFELY

Explosive separation of a tire and rim parts can cause serious injury or death.

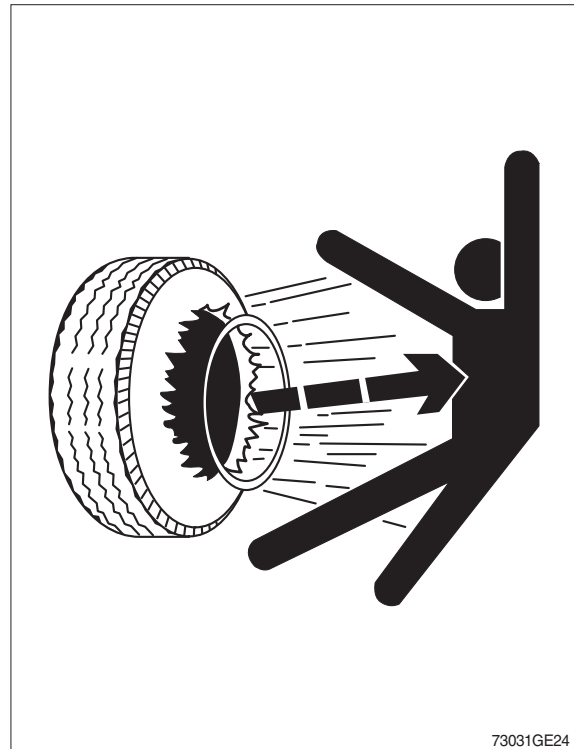
Do not attempt to mount a tire unless you have the proper equipment and experience to perform the job.

Always maintain the correct tire pressure. Do not inflate the tires above the recommended pressure. Never weld or heat a wheel and tire assembly. The heat can cause an increase in air pressure resulting in a tire explosion.

Welding can structurally weaken or deform the wheel.

When inflating tires, use a clip-on chuck and extension hose long enough to allow you to stand to one side and not in front of or over the tire assembly. Use a safety cage if available.

Check wheels for low pressure, cuts, bubbles, damaged rims or missing lug bolts and nuts.

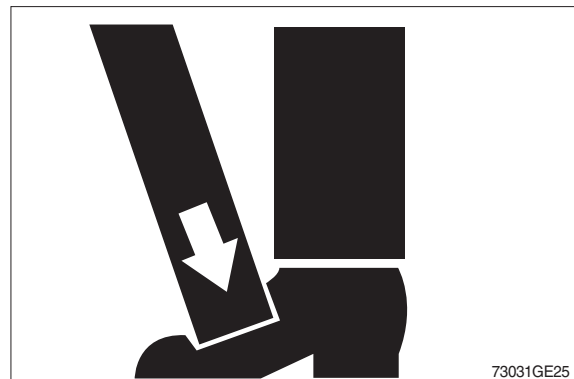


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USE PROPER LIFTING EQUIPMENT

Lifting heavy components incorrectly can cause severe injury or machine damage.

Follow recommended procedure for removal and installation of components in the manual.



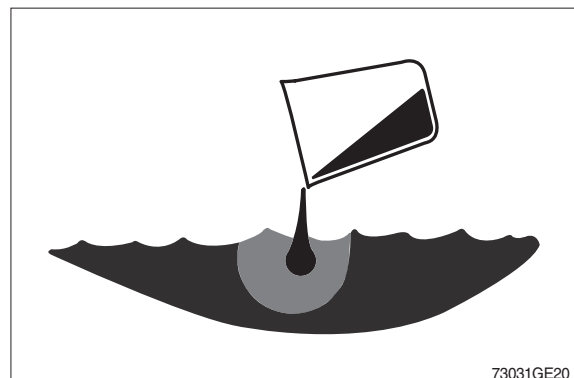
73031GE25

DISPOSE OF FLUIDS PROPERLY

Improperly disposing of fluids can harm the environment and ecology. Before draining any fluids, find out the proper way to dispose of waste from your local environmental agency.

Use proper containers when draining fluids. Do not use food or beverage containers that may mislead someone into drinking from them.

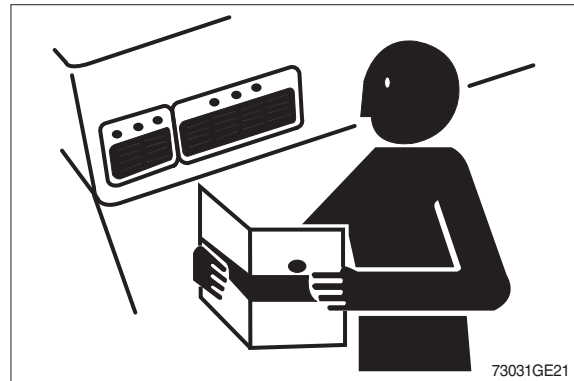
DO NOT pour oil into the ground, down a drain, or into a stream, pond, or lake. Observe relevant environmental protection regulations when disposing of oil, fuel, coolant, brake fluid, filters, batteries, and other harmful waste.



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REPLACE SAFETY SIGNS

Replace missing or damaged safety signs. See the machine operator's manual for correct safety sign placement.



LIVE WITH SAFETY

Before returning machine to customer, make sure machine is functioning properly, especially the safety systems.

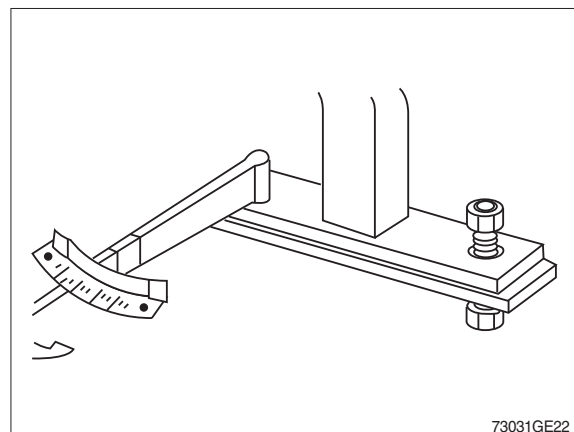
Install all guards and shields.

KEEP ROPS INSTALLED PROPERLY

Make certain all parts are reinstalled correctly if the roll-over protective structure (ROPS) is loosened or removed for any reason.

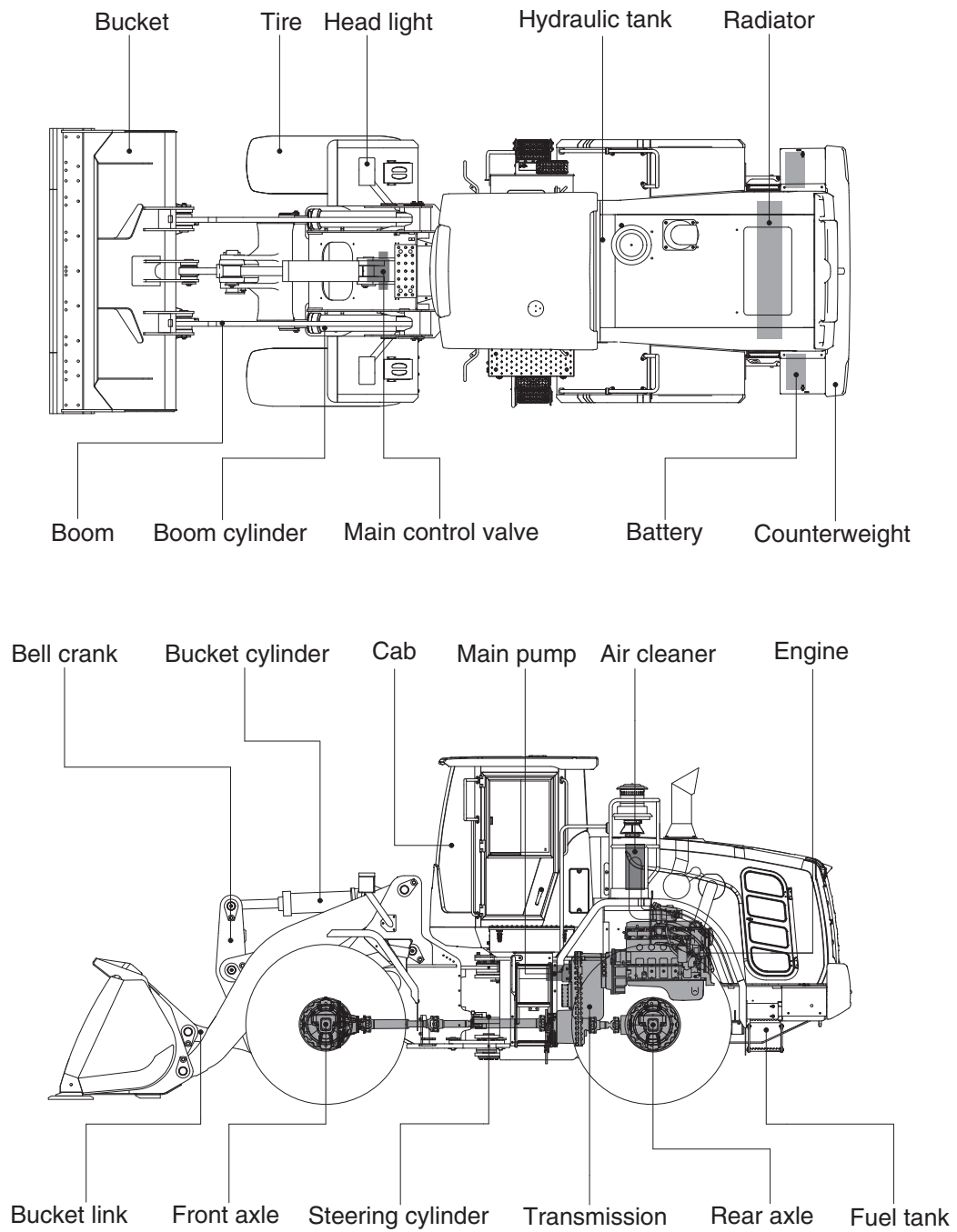
Tighten mounting bolts to proper torque.

The protection offered by ROPS will be impaired if ROPS is subjected to structural damage, is involved in an overturn incident, or is in any way altered by welding, bending, drilling, or cutting. A damaged ROPS should be replaced, not reused.



GROUP 2 SPECIFICATIONS

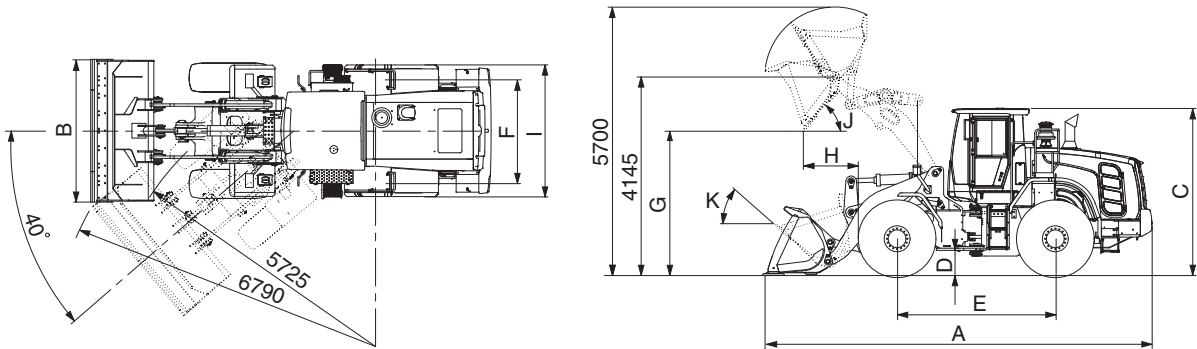
1. MAJOR COMPONENT



760F2SE01

2. SPECIFICATIONS

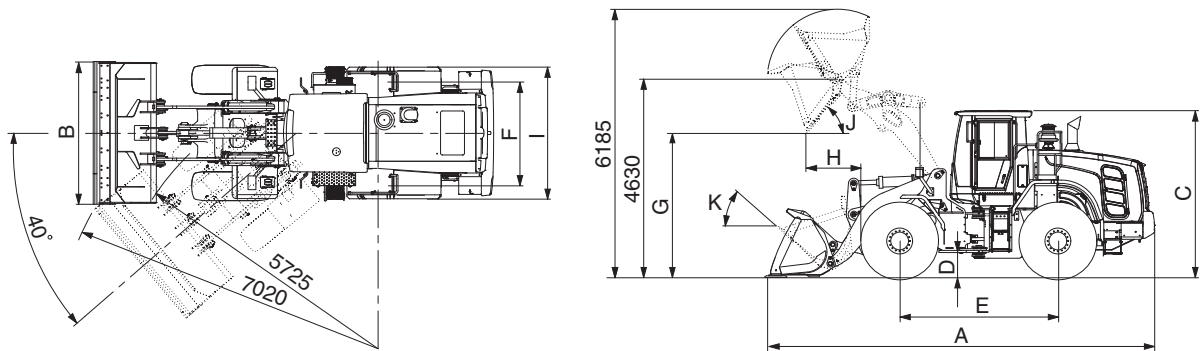
1) WITH BOLT-ON CUTTING EDGE TYPE BUCKET (HL965)



765F2SE03

Description		Unit	Specification	
Operating weight		kg (lb)	20100 (44315)	
Bucket capacity	Struck	m ³ (yd ³)	3.1 (4.05)	
	Heaped		3.6 (4.71)	
Overall length	A	mm (ft-in)	8280 (27' 2")	
Overall width	B		3000 (9' 10")	
Overall height	C		3450 (11' 4")	
Ground clearance	D		410 (1' 4")	
Wheelbase	E		3300 (10' 10")	
Tread	F		2160 (7' 1")	
Dump clearance at 45°	G		2955 (9' 8")	
Dump reach (full lift)	H		1400 (4' 7")	
Width over tires	I		2770 (9' 1")	
Dump angle	J		degree (°)	50
Roll back angle (carry position)	K			47
Cycle time	Lift (with load)	sec	5.8	
	Dump (with load)		1.4	
	Lower (empty)		3.1	
Maximum travel speed		km/hr (mph)	37.4 (23.2)	
Braking distance		m (ft-in)	11.6 (38' 1")	
Minimum turning radius (center of outside tire)			5.725 (17' 9")	
Gradeability		degree (°)	30	
Breakout force		kg (lb)	17400 (38360)	
Travel speed	Forward	First gear	6.0 (3.7)	
		Second gear	11.4 (7.1)	
		Third gear	22.9 (14.2)	
		Fourth gear	37.4 (23.2)	
	Reverse	First gear	6.3 (3.9)	
		Second gear	12.0 (7.4)	
Third gear		24.2 (15.0)		

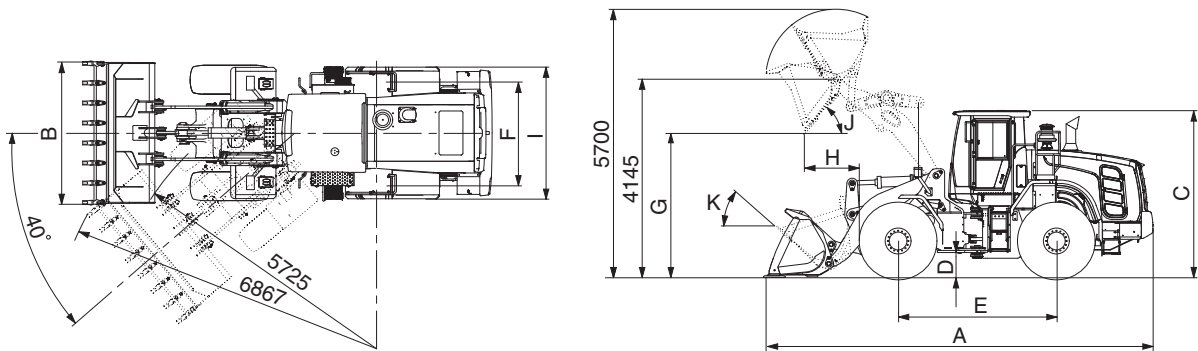
WITH BOLT-ON CUTTING EDGE TYPE BUCKET (HL965 XT)



9652SE03-1

Description		Unit	Specification	
Operating weight		kg (lb)	20960 (46210)	
Bucket capacity	Struck	m ³ (yd ³)	3.1 (4.05)	
	Heaped		3.6 (4.71)	
Overall length	A	mm (ft-in)	8850 (29' 0")	
Overall width	B		3000 (9' 10")	
Overall height	C		3450 (11' 4")	
Ground clearance	D		410 (1' 4")	
Wheelbase	E		3300 (10' 10")	
Tread	F		2160 (7' 1")	
Dump clearance at 45°	G		3440 (11' 3")	
Dump reach (full lift)	H		1455 (4' 9")	
Width over tires	I		2770 (9' 1")	
Dump angle	J		degree (°)	50
Roll back angle (carry position)	K			49
Cycle time	Lift (with load)		sec	5.8
	Dump (with load)	1.4		
	Lower (empty)	3.1		
Maximum travel speed		km/hr (mph)	37.4 (23.2)	
Braking distance		m (ft-in)	11.6 (38' 1")	
Minimum turning radius (center of outside tire)			5.725 (17' 9")	
Gradeability		degree (°)	30	
Breakout force		kg (lb)	17265 (38060)	
Travel speed	Forward	First gear	6.0 (3.7)	
		Second gear	11.4 (7.1)	
		Third gear	22.9 (14.2)	
		Fourth gear	37.4 (23.2)	
	Reverse	First gear	6.3 (3.9)	
		Second gear	12.0 (7.4)	
Third gear		24.2 (15.0)		

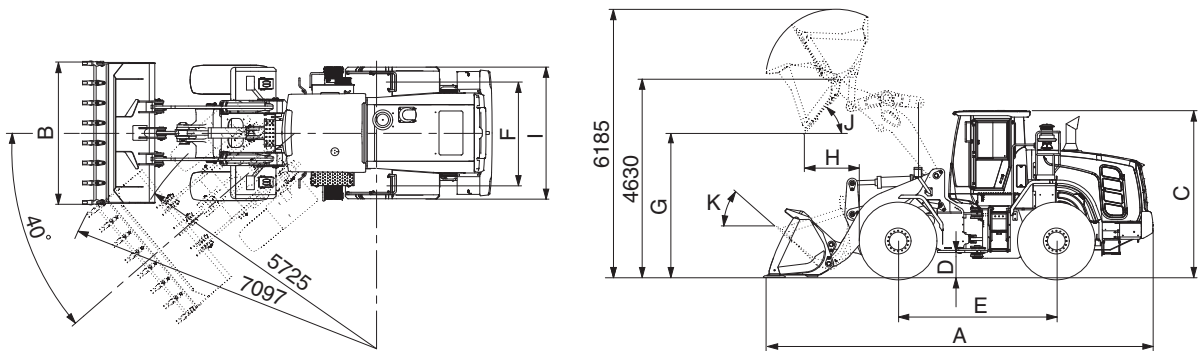
2) WITH TOOTH TYPE BUCKET (HL965)



9652SE02

Description		Unit	Specification	
Operating weight		kg (lb)	20015 (44125)	
Bucket capacity	Struck	m ³ (yd ³)	2.9 (3.8)	
	Heaped		3.4 (4.45)	
Overall length	A	mm (ft-in)	8430 (27' 7")	
Overall width	B		3050 (10' 0")	
Overall height	C		3450 (11' 4")	
Ground clearance	D		410 (1' 4")	
Wheelbase	E		3300 (10' 10")	
Tread	F		2160 (7' 1")	
Dump clearance at 45°	G		2830 (9' 3")	
Dump reach (full lift)	H		1485 (4' 10")	
Width over tires	I		2770 (9' 1")	
Dump angle	J		degree (°)	50
Roll back angle (carry position)	K			47
Cycle time	Lift (with load)	sec	5.8	
	Dump (with load)		1.4	
	Lower (empty)		3.1	
Maximum travel speed		km/hr (mph)	37.4 (23.2)	
Braking distance		m (ft-in)	11.6 (38' 1")	
Minimum turning radius (center of outside tire)			5.725 (17' 9")	
Gradeability		degree (°)	30	
Breakout force		kg (lb)	18465 (40710)	
Travel speed	Forward	First gear	6.0 (3.7)	
		Second gear	11.4 (7.1)	
		Third gear	22.9 (14.2)	
		Fourth gear	37.4 (23.2)	
	Reverse	First gear	6.3 (3.9)	
		Second gear	12.0 (7.4)	
Third gear		24.2 (15.0)		

WITH TOOTH TYPE BUCKET (HL965 XT)



9652SE02-1

Description		Unit	Specification	
Operating weight		kg (lb)	20875 (46020)	
Bucket capacity	Struck	m ³ (yd ³)	2.9 (3.8)	
	Heaped		3.4 (4.45)	
Overall length	A	mm (ft-in)	9000 (29' 6")	
Overall width	B		3050 (10' 0")	
Overall height	C		3450 (11' 4")	
Ground clearance	D		410 (1' 4")	
Wheelbase	E		3300 (10' 10")	
Tread	F		2160 (7' 1")	
Dump clearance at 45°	G		3315 (10' 10")	
Dump reach (full lift)	H		1540 (5' 1")	
Width over tires	I		2770 (9' 1")	
Dump angle	J		degree (°)	50
Roll back angle (carry position)	K			49
Cycle time	Lift (with load)	sec	5.8	
	Dump (with load)		1.4	
	Lower (empty)		3.1	
Maximum travel speed		km/hr (mph)	37.4 (23.2)	
Braking distance		m (ft-in)	11.6 (38' 1")	
Minimum turning radius (center of outside tire)			5.725 (17' 9")	
Gradeability		degree (°)	30	
Breakout force		kg (lb)	18330 (40410)	
Travel speed	Forward	First gear	6.0 (3.7)	
		Second gear	11.4 (7.1)	
		Third gear	22.9 (14.2)	
		Fourth gear	37.4 (23.2)	
	Reverse	First gear	6.3 (3.9)	
		Second gear	12.0 (7.4)	
Third gear		24.2 (15.0)		

3. WEIGHT

Item		kg	lb
Front frame assembly		1650	3640
Rear frame assembly		2010	4430
Front fender (LH & RH)		64	143
Counterweight	HL965	1075	2370
	HL965 XT	1705	3759
Cab assembly		1070	2360
Engine assembly		708	1561
Transmission assembly (4-speed/5-speed)		535/560	1180/1230
Drive shaft (front)		28	61
Drive shaft (center)		23	51
Drive shaft (rear)		17	37
Front axle (include differential)		1200	2650
Rear axle (include differential)		1090	2400
Tire (23.5 R25, ★ L3)		330	728
Hydraulic tank assembly		166	366
Fuel tank assembly		365	805
Main pump assembly		68	150
Brake pump assembly		12	26
Main control valve (2/3 spool)		68/81	150/179
Steering valve (EHPS)		10	22
Boom assembly	HL965	1275	2810
	HL965 XT	1495	3295
Bell crank assembly		365	805
Bucket link		63	140
3.6 m ³ bucket, with bolt on cutting edge		1895	4180
3.4 m ³ bucket, with tooth		1810	3990
Boom cylinder assembly		171	377
Bucket cylinder assembly (HL965)		163	359
Bucket cylinder assembly (HL965 XT)		181	399
Steering cylinder assembly		29	64
Seat		80	176
Battery		44	97

4. SPECIFICATION FOR MAJOR COMPONENTS

1) ENGINE

Item	Specification
Model	Cummins QSL9
Type	4-cycle turbocharged, charge air cooled diesel engine
Control type	Electronic control
Cooling method	Water cooling
Number of cylinders and arrangement	6 cylinders, in-line
Firing order	1-5-3-6-2-4
Combustion chamber type	Direct injection type
Cylinder bore × stroke	114 × 145 mm (4.5" × 5.7")
Piston displacement	8900 cc (543 cu in)
Compression ratio	17.8 : 1
Rated horse power (Gross)	272 hp at 2100 rpm
Maximum torque (1400 rpm)	148 kgf · m (1070 lbf · ft)
Engine oil quantity	19 l (5.0 U.S. gal)
Wet weight	708 kg (1560 lb)
High idling speed	2130 ± 50 rpm
Low idling speed	800 ± 25 rpm
Rated fuel consumption (at rated)	226 g/kW · hr
Starting motor	Denso PA90L (24V-7.8kW)
Alternator	Denso, 24V-95Amp
Battery	2 × 12V × 200Ah

2) MAIN PUMP

Item	Specification	
	Steering	Loader
Type	Variable piston pump	
Capacity	60 cc/rev	70 cc/rev
Maximum operating pressure	280 kgf/cm ² (3980 psi)	
Rated oil quantity	115 l /min (30.4 U.S.gpm)	134 l /min (35.4 U.S.gpm)
Maximum speed	2130 rpm	

3) FAN AND BRAKE PUMP

Item	Specification
Type	Variable piston pump
Capacity	28 cc/rev
Maximum operating pressure	250 kgf/cm ² (3560 psi)
Rated oil quantity	54 l /min (14.3 U.S.gpm)
Maximum speed	2130 rpm

4) MAIN CONTROL VALVE

Item	Specification
Type	2 spool
Operating method	Hydraulic pilot assist
System pressure	280 kgf/cm ² (3980 psi)
Overload relief valve pressure	340 kgf/cm ² (4840 psi) / *300 kgf/cm ² (4270 psi)

* : Bucket dump

5) ELECTRO-HYDRAULIC BLOCK

Item	Specification
Type	Proportional pressure reducing valve
Control current	0~950 mA
Resistance	10.5 Ω
Normal flow	12 l /min (3.17 U.S.gpm)

6) REMOTE CONTROL VALVE (EH TYPE)

Item	Specification
Type	Fingertip
Axle	Single axle for boom, bucket, auxiliary
Operating voltage	4.5~5.5 V
Output signal	0.5~4.5 V (neutral 2.5 V)

7) REMOTE CONTROL VALVE (FNR TYPE)

Item	Specification
Type	Joystick
Axle	Two axle for boom, bucket, roller for auxiliary
Operating type	CAN J1939
Baud rate	500 Kbps

8) CYLINDER

Item	Specification
Boom cylinder	Bore dia × Rod dia × Stroke ∅ 140 × ∅ 80 × 785 mm
Bucket cylinder	Bore dia × Rod dia × Stroke ∅ 160 × ∅ 85 × 560 mm
Steering cylinder	Bore dia × Rod dia × Stroke ∅ 75 × ∅ 45 × 424 mm

9) DYNAMIC POWER TRANSMISSION DEVICES

Item	Specification		
4-speed transmission (std)	Model	ZF 4WG 210	
	Type	Converter	Single-stage, single-phase
		Transmission	Full-automatic power shift
	Gear shift	Forward fourth gear, reverse third gear	
	Control	Electrical single lever type, kick-down system	
	Travel speed	See the page 2-2.	
5-speed transmission (opt)	Model	ZF 5WG210	
	Type	Converter	Single-stage, double-phase (with lock up clutch)
		Transmission	Full-automatic power shift
	Gear shift	Forward fifth gear, reverse third gear	
	Control	Electrical single lever type, kick-down system	
	Travel speed	Forward 1/2/3/4/5	6.3/11.1/17.1/26.6/40.0 km/hr
Reverse 1/2/3		6.7/11.7/28.0 km/hr	
Axle	Drive devices	4-wheel drive	
	Front	Front fixed location	
	Rear	Oscillation ± 12° of center pin-loaded	
Wheels	Tires	23.5 R25, ★(L3)	
Brakes	Travel	Four-wheel, wet-disc type, full hydraulic	
	Parking	Spring applied, hydraulic released brake on transmission	
Steering	Type	Full hydraulic, articulated	
	Steering angle	40° to both right and left angle, respectively	
	Relief pressure	235 kgf/cm ² (3340 psi)	

5. TIGHTENING TORQUE OF MAJOR COMPONENT

No.	Descriptions	Bolt size	Torque		
			kgf · m	lbf · ft	
1	Engine	Engine mounting bolt, nut (rubber, 2EA)	M24 × 3.0	76.5 ± 7.7	553 ± 55.7
2		Engine mounting bolt (bracket, 8EA)	M12 × 1.75	11 ± 1.8	79.6 ± 13.0
3		Engine mounting bolt (T/C housing, 3EA)	M10 × 1.5	4.6 ± 0.9	33.3 ± 6.5
4		Engine mounting bolt (adapter-flywheel, 8EA)	M10 × 1.5	6.9 ± 0.6	49.9 ± 4.3
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 housing mounting bolt	M16 × 2.0	29.7 ± 4.5	215 ± 32.5
9		Fan & brake pump housing mounting bolt	M10 × 1.5	6.9 ± 1.4	50 ± 10.1
10		Main control valve mounting bolt	M12 × 1.75	12.8 ± 3.0	92.6 ± 21.7
11		Steering unit mounting bolt	M10 × 1.5	6.9 ± 1.4	50 ± 10.1
12		Steering valve (EHPS) mounting bolt	M8 × 1.25	2.5 ± 0.5	18.1 ± 3.6
13		Brake valve mounting bolt	M8 × 1.25	2.5 ± 0.5	18.1 ± 3.6
14		Cut-off valve mounting bolt	M8 × 1.25	2.5 ± 0.5	18.1 ± 3.6
15		EH control block mounting bolt	M8 × 1.25	2.5 ± 0.5	18.1 ± 3.6
16		Safety valve	M10 × 1.5	6.9 ± 1.4	50 ± 10.1
17		Hydraulic oil tank mounting bolt	M16 × 2.0	29.7 ± 4.5	215 ± 32.5
18	Power train system	Transmission mounting bolt, nut (rubber, 2EA)	M24 × 3.0	100 ± 15	723 ± 108
19		Transmission mounting bolt (bracket, 6EA)	M20 × 2.5	56.9 ± 8.4	412 ± 60.8
20		Front axle mounting bolt, nut	M33 × 2.0	225 ± 20	1627 ± 145
21		Rear axle support mounting bolt, nut	M36 × 3.0	308 ± 46.2	2227 ± 334
22		Tire mounting nut	M22 × 1.5	79 ± 2.5	571 ± 18.1
23		Drive shaft joint mounting bolt	1/2-20UNF	15 ± 2.0	108 ± 14.5
24	Others	Counterweight mounting bolt	M30 × 3.5 M24 × 3.0	199 ± 30 100 ± 15	1439 ± 216 723 ± 108
25		Operator's seat mounting bolt	M8 × 1.25	3.4 ± 0.8	24.6 ± 5
26		ROPS Cab mounting bolt (4EA)	M30 × 3.5	199 ± 29.9	1440 ± 216
		ROPS Cab mounting nut (4EA)	M16 × 2.0	20.5 ± 4.7	148 ± 34

6. 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

7. RECOMMENDED LUBRICANTS

Use only oils listed below or equivalent.

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)
Engine oil pan	Engine oil	19 (5.0)	* ² SAE 5W-40						
			SAE 30						
			SAE 10W						
			SAE 10W-30						
			SAE 15W-40						
DEF/ AdBlue® tank	Mixture of urea and deionized water	27 (7.1)	ISO 22241, High-purity urea + deionized water (32.5 : 67.5)						
Transmission	Engine oil	33 (8.7)	SAE 10W-30						
			SAE 15W-40						
Axle* ⁴	UTTO	Front : 42 (11.1) Rear : 40 (10.6)	*Refer to below list						
Hydraulic tank	Hydraulic oil	Tank: 115 (30.4) System: 215 (56.8)	* ² ISO VG 15						
			ISO VG 46, HBHO VG 46* ⁵						
			ISO VG 68						
Fuel tank	Diesel fuel* ¹	300 (79.3)	* 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	44 (11.6)	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 6-40 of operator's manual.

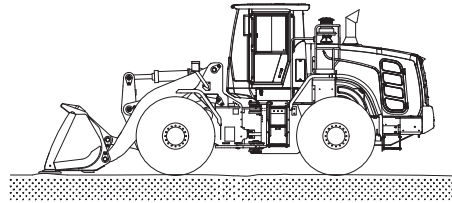
*⁵ : Hyundai Bio Hydraulic Oil

- For more information, contact HYUNDAI dealers.

GROUP 3 OPERATIONAL CHECKOUT RECORD SHEET

- Owner : _____
- Date : _____
- Hours : _____
- Serial No. : _____
- Technician : _____

※ **Use this sheet to record operational checkout results.**
Perform the operational check before installing any test equipment.



760F1GE02

Item	OK	NOT OK	Comments
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1. Monitor indicator and gauge checks (engine OFF)

- Hourmeter and gauge check _____
- Battery check _____
- Monitor indicator circuit check _____
- Cluster turn signals and warning indicator check _____

2. Transmission, axle and engine, neutral start switch and reverse warning alarm switch checks

- Transmission control lever and neutral _____
- Neutral start and reverse warning _____
- Alarm circuit checks _____

3. Monitor indicator and gauge checks (engine running)

- Monitor display and alternator output checks _____
- Monitor bypass circuit and seat belt indicator check _____
- Monitor primary and secondary level check _____
- Transmission oil warm up procedure _____
- Transmission temperature gauge check _____

4. Brake system and clutch cut off checks

- Park brake capacity check _____
- Park brake transmission lockout check _____
- Service brake pump flow check _____
- Service brake capacity check _____
- Brake accumulator precharge check _____
- Brake system leakage check _____
- Service brake pedal check _____
- Service and park brake system drag check _____
- Clutch cut off check _____

5. Driving checks

- Transmission oil warm up procedure _____
- Transmission noise check _____
- Speedometer check _____
- Transmission kick down system check _____
- 1st, 2nd, 3rd and 4th speed clutch pack drag check _____
- Transmission pressure, pump flow and leakage check _____
- Transmission shift modulation check _____
- Torque converter check _____
- Engine power check _____

6. Hydraulic system checks

- Hydraulic system warm up procedure _____
- Hydraulic pump performance check _____
- Pilot control valve boom float check _____
- Boom down solenoid valve check _____
- Control valve lift check _____
- Bucket rollback circuit relief valve check _____
- Bucket dump circuit relief
- Low pressure check _____
- High pressure check _____
- Boom and bucket cylinder drift check _____
- Boom down solenoid valve leakage check _____
- Pilot controller check _____
- Return to dig check _____
- Boom height kickout check-if equipped _____

7. Steering system checks

- Steering unit check _____
- Steering system leakage check _____
- Steering valve (EHPS)
 Low check pressure _____
- High check pressure _____

8. Accessory checks

- Operating lights check _____
- Work light check _____
- Brake light check _____
- Cab light check _____
- Horn circuit check _____
- Windshield washer and wiper check _____
- Defroster blower check _____
- Heater/Air conditioner blower check _____
- Heater functional check _____
- Air conditioner functional check _____
- Start aid system check _____

9. Cab components and vandal protection checks

- Cab door latch check _____
- Cab door hold open latch check _____
- Cab door release button check _____
- Cab door lock check _____
- Cab door window check _____
- Cab window latch check _____
- Steering column adjustment check _____
- Seat and seat belt check _____
- Air intake filter door check _____
- Engine side panels check _____
- Radiator cap access door check _____
- Frame locking bar check _____
- Boom lock check _____
- Service decal check _____