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### **GROUP 1 SAFETY HINTS**

Careless performing of the easy work may cause injuries.

Take care to always perform work safely, at least observing the following.

• Oil is a dangerous substance. Never handle oil, grease or oily clothes in places where there is any fire of flame.

As preparation in case of fire, always know the location and directions for use of fire extinguishers and other fire fighting equipment.

- Wear well-fitting helmet, safety shoes and working clothes. When drilling, grinding or hammering, always wear protective goggles. Always do up safety clothes properly so that they do not catch on protruding parts of machines. Do not wear oily clothes.
  When checking, always release battery plug.
- Flames should never be used instead of lamps. Never use a naked flame to check leaks or the level of oil or electrolyte.







• Exhaust gas is dangerous. Provide adequate ventilation when working a closed space.



- ▲ Be particularly careful when removing the radiator cap and the hydraulic oil tank filler cap, if this is done immediately after using the machine, there is a danger that boiled oil may spurt out.
- The procedure for releasing the hydraulic pressure is as follows : lower the fork to the ground, and stop the engine (Motor), move the control levers to each position two or three times.
- When working on top of the machine, be careful not to lose your balance and fall.





 Hand a caution sign in the operator's compartment (For example Do not start or Maintenance in progress).

This will prevent anyone from starting or moving the machine by mistake.

▲ It is extremely dangerous to try to check the fan belt tension while he engine is running.

When inspecting the engine is running parts, or near such parts, always stop the engine first.

Before checking or servicing accumulator or piping, depress brake pedal repeatedly to release pressure.

Park the machine on firm, flat ground.
Lower the fork to the ground and stop the engine.

Return each lever to **NEUTRAL** and apply the brake lock.





· Immediately remove any oil or grease on the floor of the operator's compartment, or on the handrail. It is very dangerous if someone slips while on the machine.

· When working with others, choose a group leader and work according to his instructions. Do not perform any maintenance beyond the agreed work.

· Always remember that the hydraulic oil circuit is under pressure. When feeding or draining the oil or carrying out inspection and maintenance, release the pressure first.

· Unless you have special instructions to the contrary, maintenance should always be carried out with the engine stopped. lf maintenance is carried out with the engine running, there must be two men present : one sitting in the operator's seat and the other one performing the maintenance. In such a case, never touch any moving part.









- Thoroughly clean the machine. In particular, be careful to clean the filler caps, grease fittings and the area around the dipsticks. Be careful not to let any dirt or dust into the system.
- · Always use HYUNDAI Forklift genuine parts for replacement.
- Always use the grades of grease and oil recommended by HYUNDAI Forklift. Choose the viscosity specified for the ambient temperature.
- · Always use pure oil or grease, and be sure to use clean containers.
- When checking or changing the oil, do it in a place free of dust, and prevent any dirt from getting into the oil.
- Before draining the oil, warm it up to a temperature of 30 to 40°C.
- · After replacing oil, filter element or strainer, bleed the air from circuit.
- When the strainer is located in the oil filler, the strainer must not be removed while adding oil.
- When changing the oil filter, check the drained oil and filter for any signs of excessive metal particles or other foreign materials.
- When removing parts containing O-ring, gaskets or seals, clean the mounting surface and replace with new sealing parts.
- · After injecting grease, always wipe off the oil grease that was forced out.
- Do not handle electrical equipment while wearing wet places, as this can cause electric shock.
- · During maintenance do not allow any unauthorized person to stand near the machine.
- Be sure you fully understand the contents of the operation. It is important to prepare necessary tools and parts and to keep the operating area clean.
- When checking an open gear case there is a risk of dropping things in. Before removing the covers to inspect such cases, empty everything from your pockets. Be particularly careful to remove wrenches and nuts.
- · Way to use dipstick

Push the dipstick fully into the guide, and then pull out.

Carrying out other difficult maintenance work carelessly can cause unexpected accidents. If you consider the maintenance is too difficult, always request the HYUNDAI Forklift distributor to carry out it.

# **GROUP 2 SPECIFICATIONS**

#### **1. GENERAL LOCATIONS**



22D9TOM54

- 1 Mast
- 2 Lift chain
- 3 Lift cylinder
- 4 Backrest
- 5 Tilt cylinder
- 6 Lift bracket

- 7 Forks
- 8 Overhead guard
- 9 Turn signal lamp
- 10 Head lamp
- 11 Operator's seat
- 12 Bonnet

- 13 Counterweight
- 14 Rear wheel
- 15 Front wheel
- 16 Rear combination lamp
- 17 Pre-cleaner
- 18 Silencer

# 2. SPECIFICATIONS





22D9TSP01

Model			Unit	22D-9T	25D-9T	30D-9T	33D-9T
Capacity			kg (lb)	2200 (4400)	2500 (5000)	3000 (6000)	3300 (6500)
Load	center	R	mm (in)	500 (24")	←	←	←
Weig	ht (Unloaded)		kg (lb)	3587 (7910)	3897 (8590)	4298 (7475)	4567 (10070)
	Lifting height	Α	mm (ft ⋅ in)	3305 (10' 10")	←	←	←
	Free lift	В	mm (in)	155 (6.1")	←	←	←
Fork	Lifting speed (Unload/Load)		mm/sec	550/530	550/520	460/440	460/430
	Lowering speed (Unload/Load	d)	mm/sec	450/500	←	←	←
	L×W×T	L,W,T	mm (in)	1050×100×45 (41.3×3.9×1.8)	←	1050×122×45 (41.3×4.8×1.8)	←
	Tilt angle (forward/backward)	C/C'	degree	6/10	$\leftarrow$	←	←
Mast	Max height	D	mm (ft ⋅ in)	4485 (14' 9")	$\leftarrow$	←	←
	Min height		mm (ft ⋅ in)	2175 (7' 2")	←	2190 (7' 2")	2260 (7' 5")
	Travel speed (Unload)	km/h	18.7	16.5	20.0	19.8	
Body	Gradeability (Load)	%	33.7	30.2	23.8	22.0	
	Min turning radius (Outside)	F	mm (ft ⋅ in)	2286 (7' 6")	2342 (7' 8")	2413 (7' 11")	2463 (8' 1")
	Operating pressure		kgf/cm <sup>2</sup>	200	$\leftarrow$	←	←
ETC	Hydraulic oil tank		l (usgal)	36	Ļ	38	←
	Fuel tank		l (usgal)	60	$\leftarrow$	←	←
Overa	all length	G	mm (ft ⋅ in)	2577 (8' 5")	2607 (8' 7")	2676 (8' 9")	2732 (9' 0")
Overall width		Н	mm (ft ⋅ in)	1160 (3' 10")	$\leftarrow$	1230 (4' 0")	1228 (4' 0")
Overhead guard height I		mm (ft ⋅ in)	2160 (7' 1")	Ļ	2180 (7' 2")	$\leftarrow$	
Ground clearance J		J	mm (in)	130 (3.1")	Ļ	145 (5.7")	←
Wheel base K		mm (ft ⋅ in)	1650 (5' 5")	$\leftarrow$	1700 (5' 7")	←	
Wheel tread front/rear		M/M'	mm (ft · in)	999/980 (3' 3"/3' 3")	←	1005/980 (3' 6"/3' 3")	←

### 3. SPECIFICATION FOR MAJOR COMPONENTS

#### 1) ENGINE

Item	Unit	Specification
Model	-	HMC D4BB
Туре	-	Vertical, water-cooled, 4-cycle diesel, Turbo
Cooling Method	-	Water cooling
Number of cylinders and arrangement	-	4 cylinders, in-line
Firing order	-	1-3-4-2
Combustion type	-	Swirl
Cylinder bore X stroke	mm (in)	91.1×100 (3.6×3.9)
Piston displacement	cc (cu in)	2607 (159)
Compression ratio	-	22
Rated gross horse power	ps/rpm	60/2500
Maximum gross torque at rpm	kgf ∙ m/rpm	17.3/2000
Engine oil quantity	l (U.S.gal)	5.4 (1.43)
Dry weight	kg (lb)	200 (440)
High idling speed	rpm	2570
Low idling speed	rpm	850±50
Rated fuel consumption	g/ps.hr	173
Starting motor	V-kW	12V, 2.2kW
Alternator	V-A	12V, 65A
Battery	V-AH	12V, 72AH
Fan belt deflection	mm (in)	10~13 (0.39~0.51)

# 2) MAIN PUMP

ltem	Unit	Specification
Туре	-	Fixed displacement gear pump
Capacity	cc/rev	27.7
Maximum operating pressure	bar	250
Rated speed (Max/Min)	rpm	2700/500

# 3) MAIN CONTROL VALVE

ltem	Unit	Specification
Туре	-	Sectional
Operating method	-	Mechanical
Main relief valve pressure	kg/cm <sup>2</sup>	200/165
Flow capacity	lpm	60

#### 4) POWER TRAIN DEVICES

Item			Specification		
	Model		KAPEC 280 DB		
Torque converter	Туре		3 Element, 1 stage, 2 phase		
	Stall ratio		2.90		
	Туре		Power shift		
	Gear shift(FWD/F	REV)	1/1		
Transmission	Control		Solenoid ON/OFF type		
	Overboul retio	FWD	1.143		
	Overnaul ratio	REV	1.143		
	Туре		Front-wheel drive type, fixed location		
Axle	Gear ratio		14.2 : 1		
	Gear		Spiral bevel gear type		
	Q'ty (FR/RR)		Single : 2/2, Double : 4/2		
		2 2/2 5	Single : 7.00-12-14 PR (STD), 8.15-15-14 PR (OPT)		
	2.2/		Double : 6.00-15-10 PR		
Wheels	Fiolit (drive)	20/22	Single : 8.5-15-14 PR		
		3.0/3.3	Double : 6.00-15-10 PR		
	Boor (stear)	00.00	Single : 6.50-10-14 PR		
	Hear (Sieer)	2.2~3.3	Double : 6.50-10-12 PR		
Brokoo	Travel		Front wheel, wet disk brake		
Diakes	Parking		Wet disk (negative brake)		
Stooring	Туре		Full hydraulic, power steering		
Sieenny	Steering angle		78.9° to both right and left angle, respectively		

No.		Items	Size	kgf ∙ m	lbf ∙ ft
1		Engine mounting bolt (bracket-frame)	M12×1.75	12.8±3	92.6±21
2	Facino	Engine mounting bolt (engine-bracket)	M10×1.25	9.7±1.9	70±13
3	Engine	Radiator mounting bolt, nut	M 8×1.25	2.5±0.5	18±3.6
4		Torque converter mounting bolt (8EA)	M10×1.25	7.4±1.5	53.5±10
5		MCV mounting bolt	M10×1.5	4±0.5	29±3.6
6	Hydraulic system	Steering unit mounting bolt	M10×1.5	4±0.5	29±3.6
7	- Oyotoini	Pump mounting bolt	M10×1.0	5.3±0.5	38.3±3.6
8		Transmission mounting bolt, nut	M16×2.0	7.5	54
9	Power	Drive axle mounting bolt, nut	M20×1.5	65±3	470±21
10	train	Steering axle mounting bolt	M20×2.5	58±8.5	420±61
11	system	Front wheel mounting nut	M20×1.5	$40\pm10$	289±72
12		Rear wheel mounting nut	M14×1.5	18±2	$130\!\pm\!14$
13		Counterweight mounting bolt	M30×3.5	199±30	1439±217
14	Others	Operator's seat mounting nut	M 8×1.25	2.5±0.5	18.1±3.6
15		Head guard mounting bolt, nut	M12×1.75	12.3±1.2	89.0±8.7

#### 4. TIGHTENING TORQUE FOR MAJOR COMPONENTS

### **5. TORQUE CHART**

Use following table for unspecified torque.

# 1) BOLT AND NUT

# (1) Coarse thread

Polt size	8	3T	10T		
BOIL SIZE	kg∙m	lb∙ft	kg∙m	lb ∙ ft	
M 6×1.0	0.85 ~ 1.25	6.15 ~ 9.04	1.14 ~ 1.74	8.2 ~ 12.6	
M 8×1.25	2.0 ~ 3.0	14.5 ~ 21.7	2.73 ~ 4.12	19.5 ~ 29.8	
M10 × 1.5	4.0 ~ 6.0	28.9 ~ 43.4	5.5 ~ 8.3	39.8 ~ 60	
M12 × 1.75	7.4 ~ 11.2	53.5 ~ 79.5	9.8 ~ 15.8	71 ~ 114	
$M14 \times 2.0$	12.2 ~ 16.6	88.2 ~ 120	16.7 ~ 22.5	121 ~ 167	
M16 × 2.0	18.6 ~ 25.2	135 ~ 182	25.2 ~ 34.2	182 ~ 247	
M18 × 2.5	25.8 ~ 35.0	187 ~ 253	35.1 ~ 47.5	254 ~ 343	
M20  imes 2.5	36.2 ~ 49.0	262 ~ 354	49.2 ~ 66.6	356 ~ 482	
$M22 \times 2.5$	48.3 ~ 63.3	350 ~ 457	65.8 ~ 98.0	476 ~ 709	
M24  imes 3.0	62.5 ~ 84.5	452 ~ 611	85.0 ~ 115	615 ~ 832	
M30 × 3.0	124 ~ 168	898 ~ 1214	169 ~ 229	1223 ~ 1655	
M36 × 4.0	174 ~ 236	1261 ~ 1703	250 ~ 310	1808 ~ 2242	

# (2) Fine thread

Deltaine	8	зт	1	от
Boit Size	kg∙m	lb∙ft	kg∙m	lb ∙ ft
M 8×1.0	2.17 ~ 3.37	15.7 ~ 24.3	3.04 ~ 4.44	22.0 ~ 32.0
M10 × 1.25	4.46 ~ 6.66	32.3 ~ 48.2	5.93 ~ 8.93	42.9 ~ 64.6
M12 × 1.25	7.78 ~ 11.58	76.3 ~ 83.7	10.6 ~ 16.0	76.6 ~ 115
M14 × 1.5	13.3 ~ 18.1	96.2 ~ 130	17.9 ~ 24.1	130 ~ 174
M16 × 1.5	19.9 ~ 26.9	144 ~ 194	26.6 ~ 36.0	193 ~ 260
M18 × 1.5	28.6 ~ 43.6	207 ~ 315	38.4 ~ 52.0	278 ~ 376
M20 × 1.5	40.0 ~ 54.0	289 ~ 390	53.4 ~ 72.2	386 ~ 522
M22 × 1.5	52.7 ~ 71.3	381 ~ 515	70.7 ~ 95.7	512 ~ 692
M24 × 2.0	67.9 ~ 91.9	491 ~ 664	90.9 ~ 123	658 ~ 890
M30 × 2.0	137 ~ 185	990 ~ 1338	182 ~ 248	1314 ~ 1795
M36 × 3.0	192 ~ 260	1389 ~ 1879	262 ~ 354	1893 ~ 2561

# 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

#### 6. RECOMMENDED LUBRICANTS

Use only oils listed below or equivalent. Do not mix different brand oil.

Service point	Kind of fluid	Capacity <i>t</i> (U.S. gal)	-50	-30	-2	Ambi 20	ent ter -10	npe (	erature ° 0 10	°C(°F) 2020	) 30	40
			(-58)	(-22)	(-	4)	(14)	(32	2) (50	) (68)	) (86)	(104)
Engine oil pan	Engine oil	5.4 (1.45)			<b>*</b> S	SAE 5	W-40					
										SAE	E 30	
						SA	E 10V	V				
								•				
				SAE 10W-30								
									SAE 1	5W-40		
Torque	Transmission oil	10 (2.6)										
transmission								DE/				
	Gear oil	5 (1.3)										
Axle						1	S	hell	DONA	X TD		
	Hydraulic oil	22/25D-9T : 36 (9.5) 30/33D-9T : 38 (10.0)						2 4 1	_			
				* ISO VG 15								
Hydraulic tank						ISO VG 46						
									IS	SO VG 6	8	
	Diesel fuel*1	60 (15.9)										
Fuel tank				1	AS	TM D	975 N	D.1				
									ASTN	/I D975	NO.2	
Fitting (Grease nipple)	Grease	-	*NLGI NO.1									
									N	I GI NO	2	
				_								
Brake reservoir tank	Brake oil	0.5 (0.13)	*	AZOL	.LA	ZS1	) (ISO	VG	10)			
						7011			-,			
					A	ZULI	A ZSC	52 (I	⊣yaraul	IC OII, IS	O VG32	2)
Radiator	Antifreeze : Soft water* <sup>2</sup>	9.4 (2.48)				Ethul			basan	ormono	nt turna (	50.50)
						Eury		ycol	base p	ermane	пі туре (	50.50)
			*Ethylen	e glycol b	ase p	permanel	nt type (60	: 40)				

#### NOTES :

- SAE numbers given to engine oil should be selected according to ambient temperature.
- ② For engine oil used in engine oil pan, use SAE 10W oil when the temperature at the time of engine start up is below 0°C, even if the ambient temperature in daytime is expected to rise to 10°C or more.
- ③ If any engine oil of API service class CF is used instead of class CH4 engine oil, the frequency of oil change must be doubled.
  - $\star$  : Cold region $\star^1$  : Ultra low sulfur diesel $\star^2$  : Soft waterRussia, CIS, Mongolia- sulfur content  $\leq 15$  ppmCity water or distilled water

# **GROUP 3 PERIODIC REPLACEMENT**

For operation safety, never fail to perform periodic maintenance or make periodic replacement of the consumable parts listed in the following.

These parts may deteriorate in time and are susceptible to wear. It is difficult to estimate the degree of wear at time of periodic maintenance; therefore, even if no apparent wear is found, always replace with new parts within the prescribed period of replacement (Or earlier if trouble is found). Note that periodic replacement has nothing to do with guarantee service.

No.	Description	Period of replacement				
1	Master cylinder and wheel cylinder caps, dust seals	Every 1 year				
2	Brake hose or tube	Every 1 or 2 years				
3	Brake reservoir tank and tube	Every 2 to 4 years				
4	Power steering hose	Every 2 years				
5	Stop lamp switch (Oil pressure type)	Every 2 years				
6	Fuel hose	Every 2 to 4 years				
7	Packing, seal and O-ring of steering cylinder	Every 2 to 4 years				
8	Lift chain	Every 2 to 4 years				
9	Lift, tilt, side shift cylinder hose	Every 1 or 2 years				
10	Hydraulic pump hose	Every 2 years				