

YAMAHA

Service Hand Book

LH, LY, LP, CX

Pleasure Boat Engine

Service Hand Book

LH, LY, LP, CX

Mar. 1. 2000



YANMAR DIESEL ENGINE CO.

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Engine model 4LH-TE				Cooling system		Type	-	Water cooled
Type	Configuration	-	Vertical Diesel	Fresh water pump	Type	-	Centrifugal	
	Stroke cycle	-	4		Displacement	liter/h	9700	
	Cooling system	-	Water cooled		Tank	liter	14	
	Combustion system	-	Direct injection		Sub tank	liter	0.8	
Number of cylinder	-	4		F/W cooler capacity	m ²			
Bore X Stroke	mm	100 X 110		L/O cooler capacity	m ²			
Displacement	liter	3.456		Sea water pump	Type	-	Jabsco	
Continuous duty	Output	kW	73.6	Fuel system	Displacement	liter/h	5500	
		hp	100		Water separator	-		
	Speed	min ⁻¹	3200		FO pump model	-	VE-HDI (Zaxel)	
	Mean effect pressure	Mpa	0.8		Injection timing (FID)	degree	6 to 8	
		kgf/cm ²	8.14		Injection pressure	Mpa	19.61 to 20.59	
	Piston speed	m/s	11.73			kgf/cm ²	200 to 210	
		Fuel consumption	g/kW-h		Below 241	Injection nozzle	-	5 - 0.30 X 150
		g/hp-h	Below 180		Fuel filter	Type	-	Paper
	Exhaust temperature	C-degree	Below 530		Area	micron	35 (1400cm ²)	
	Exhaust smoke	Bosch	Below 2.5		Applicable fuel oil	-	Diesel fuel	
Maximum duty	Output	kW	80.9	Starting system	Type	-	Electric	
		hp	110		Motor	V - kW	12V - 2.5kW	
	Speed	min ⁻¹	3300		Battery	V - Ah	12V - 120Ah	
	Mean effect pressure	Mpa	0.85		Alternator	V - A	12V - 55A	
		kgf/cm ²	8.68	Valve clearance	Suction	mm	0.07 to 0.13	
	Piston speed	m/s	12.1	Exhaust	mm	0.27 to 0.33		
		Fuel consumption	g/kW-h	Below 248	Valve seat angle	Suction	degree	120
		g/hp-h	Below 185	Exhaust	degree	90		
	Exhaust temperature	C-degree	Below 610	Cylinder liner	Inside diameter	mm	100.00 to 100.03	
	Exhaust smoke	Bosch	Below 2.5	Outside diameter	mm	103.00 to 103.03		
Firing order	-	1 - 3 - 4 - 2 - 1	Projection	mm	0.025 to 0.090			
Position of FO Pump (viewed from stern)	-	Right	Piston	Outside diameter	mm	99.895 to 99.925		
Direction of rotation (Viewed from stern)	Crank shaft	-	Counter clockwise	Pin hole diameter	mm	34.000 to 34.011		
	Propeller	-	Clockwise	Pin outside diameter	mm	33.989 to 34.000		
Lubricant	Pump type	-	Trochoid	Ring groove	Top ring	mm	2.095 to 2.110	
	Pump capacity	liter/h	2600	2nd ring	mm	2.045 to 2.060		
	Pressure	Mpa	0.34 to 0.44	3rd ring	mm	-		
		kgf/cm ²	3.5 to 4.5	Oil ring	mm	3.020 to 3.035		
	Capacity of oil pan	liter	10	Crank shaft	Journal O/Diameter	mm	69.952 to 69.964	
	Effective of oil pan	liter	5.5	Pin O/Diameter	mm	70.000 to 70.045		
	Oil consumption	g/kW-h	0.14 to 0.54	Pin O/Diameter	mm	59.952 to 59.964		
		g/hp-h	0.1 to 0.4	Con-rod	Small end bearing I/D	mm	34.04 to 34.04	
Applicable oil (API/SAE)	-	CD Class 15W40	Large end bearing I/D	mm	60.000 to 60.042			
Lube oil filter	-	Paper	Cam shaft	Cam height	Suction	mm	48.435 to 48.585	
Top clearance	mm	0.71 to 0.89	Exhaust	mm	48.435 to 48.585			
Compression ratio	-	16.4	Journal Outside D.	mm	56.91 to 56.94			
Combustion maximum pressure	Mpa	9.81	Bearing Inside D.	mm	56.98 to 57.05			
	kgf/cm ²	100	Side clearance	mm	0.05 to 0.20			
Idling speed	min ⁻¹	725 to 775	Piston ring	Thickness	Top ring	mm	1.47 to 1.49	
High idling speed	min ⁻¹	3660 to 3710	2nd ring	mm	1.97 to 1.99			
Turbocharger	Model	-	RHC61W (IH)	3rd ring	mm	-		
	Cooling system	-	Water cooled	Oil ring	mm	2.97 to 2.99		
Air cooler	Lube system	-	Common	Breadth	Top ring	mm	1.975 to 1.990	
	Type	-	-	2nd ring	mm	1.975 to 1.990		
	Cooling area	m ²	-	3rd ring	mm	-		
Marine gear	Model	-	KM5A	Oil ring	mm	2.92 to 2.99		
		Type	-	Mecha. Angle 7	End gap	Top ring	mm	0.25 to 0.40
	Reduction ratio	Ahead	-	1.46, 2.07, 2.57	2nd ring	mm	0.25 to 0.40	
		Astern	-	1.46, 2.07, 2.57	3rd ring	mm	-	
	Capacity of oil pan	liter	2.1	Oil ring	mm	0.30 to 0.50		
	Effective of oil pan	liter	0.3	Ring groove clearance	Top ring	mm	0.105 to 0.135	
	Hydraulic oil pressure	MPa	-	2nd ring	mm	0.055 to 0.085		
		kgf/cm ²	100	3rd ring	mm	-		
	Lube oil pressure	MPa	-	(Splash)	Oil ring	mm	0.030 to 0.065	
		kgf/cm ²	100	Lube oil filter	-	Paper		
Lube oil filter	-	Paper	Applicable oil (API/SAE)	-	GD Class SAE30			
Dry weight	kgf	48	Dimension	Length	mm	1058		
Length	mm	1058	Width	mm	630			
Width	mm	630	Height	mm	726			
Height	mm	726	Drawing out hight of piston	mm				
Drawing out hight of piston	mm		Dry weight (with Marine gear)	kgf	370			
Dry weight (with Marine gear)	kgf	370	Tightening torque	Cylinder head	Across flat	mm	17	
Tightening torque	Cylinder head	Across flat	mm	Torque	kgf-m	15 to 17		
Main bearing	Across flat	mm	19	Torque	kgf-m	19.5 to 20.5		
Con. rod	Across flat	mm	17	Torque	kgf-m	11.5 to 12.5		
FW bolt	Across flat	mm	22	Torque	kgf-m	19 to 21		
Injection V	Across flat	mm	10	Torque	kgf-m	0.40 to 0.50		

Engine model				4LH-HTE				
Type	Configuration	-	Vertical Diesel	Cooling system	Type	-	Water cooled	
	Stroke cycle	-	4		Fresh water pump	Type	-	Centrifugal
	Cooling system	-	Water cooled			Displacement	liter/h	9700
	Combustion system	-	Direct injection			Tank	liter	14
			Sub tank	liter		0.8		
Number of cylinder	-	4		F/W cooler capacity	m ³			
Bore X Stroke	mm	100 X 110		L/O cooler capacity	m ³			
Displacement	liter	3.456		Sea water pump	Type	-	Jabsco	
Continuous duty	Output	kW	93.4	Fuel system	Water separator	-		
		hp	127		FO pump model	-	VE-HDI (Zexel)	
	Speed	min ⁻¹	3200		Injection timing (FID)	degree	6 to 8	
	Mean effect pressure	Mpa	1.01		Injection pressure	Mpa	19.61 to 20.59	
		kgf/cm ²	10.34				kgf/cm ²	200 to 210
	Piston speed	m/s	11.73		Injection nozzle	-	5 - 0.30 X 150	
	Fuel consumption	g/kW-h	Below 241		Fuel filter	Type	-	Paper
		g/hp-h	Below 180			Area	micron	35 (1400cm ²)
	Exhaust temperature	C-degree	Below 550		Applicable fuel oil	-	Diesel fuel	
	Exhaust smoke	Bosch	Below 2.0		Starting system	Type	-	Electric
Output	kW	103	Motor	V - kW		12V - 2.5kW		
	hp	140	Battery	V - Ah		12V - 120Ah		
Speed	min ⁻¹	3300	Alternator	V - A		12V - 55A		
Mean effect pressure	Mpa	1.08	Valve clearance	Suction	mm	0.07 to 0.13		
	kgf/cm ²	11.05		Exhaust	mm	0.27 to 0.33		
Piston speed	m/s	12.1	Valve seat angle	Suction	degree	120		
Fuel consumption	g/kW-h	Below 241		Exhaust	degree	90		
	g/hp-h	Below 180	Cylinder liner	Inside diameter	mm	100.00 to 100.03		
Exhaust temperature	C-degree	Below 630		Outside diameter	mm	103.00 to 103.03		
Exhaust smoke	Bosch	Below 2.5		Projection	mm	0.025 to 0.090		
Firing order	-	1 - 3 - 4 - 2 - 1	Piston	Outside diameter	mm	99.825 to 99.925		
Position of FO Pump (viewed from stern)	-	Right		Pin hole diameter	mm	34.000 to 34.011		
Direction of rotation (Viewed from stern)	Crank shaft	-		Counter clockwise	Pin outside diameter	mm	33.989 to 34.000	
	Propeller	-		Clockwise	Ring groove	Top ring	mm	2.095 to 2.110
Lubricant	Pump type	-	Trochoid	2nd ring	mm	2.045 to 2.060		
	Pump capacity	liter/h	2600	3rd ring	mm	-		
	Pressure	Mpa	0.34 to 0.44	Oil ring	mm	3.020 to 3.035		
		kgf/cm ²	3.5 to 4.5	Crank shaft	Journal O/Diameter	mm	69.962 to 69.964	
	Capacity of oil pan	liter	10		Pin O/Diameter	mm	70.000 to 70.045	
	Effective of oil pan	liter	5.5		Pin O/Diameter	mm	59.952 to 59.964	
	Oil consumption	g/kW-h	0.14 to 0.54	Con-rod	Small end bearing I/D	mm	34.04 to 34.04	
		g/hp-h	0.1 to 0.4		Large end bearing I/D	mm	60.000 to 60.042	
	Applicable oil (API/SAE)	-	CD Class 15W40	Cam shaft	Cam height	Suction	mm	48.435 to 48.565
	Lube oil filter	-	Paper			Exhaust	mm	49.435 to 48.565
Top clearance	mm	0.71 to 0.89	Journal Outside D.		mm	56.91 to 56.94		
Compression ratio	-	16.4	Piston ring	Bearing Inside D.	mm	56.98 to 57.05		
Combustion maximum pressure	Mpa	11.3		Side clearance	mm	0.05 to 0.20		
	kgf/cm ²	115		Thickness	Top ring	mm	1.47 to 1.49	
Idling speed	min ⁻¹	725 to 775			2nd ring	mm	1.97 to 1.99	
High idling speed	min ⁻¹	3680 to 3710	Turbocharger	3rd ring	mm	-		
Model	-	RHC61W (IH)		Oil ring	mm	2.97 to 2.99		
	Cooling system	-		Water cooled	Breadth	Top ring	mm	1.975 to 1.990
Lube system	-	Common			2nd ring	mm	1.975 to 1.990	
Air cooler	Type	-	Plate fin	3rd ring	mm	-		
	Cooling area	m ²	-	Oil ring	mm	2.92 to 2.99		
Marine gear	Model	-	KM5A	End gap	Top ring	mm	0.25 to 0.40	
		Type	-		Mecha. Angle 7	2nd ring	mm	0.25 to 0.40
	Reduction ratio	Ahead	1.46, 2.07, 2.57		3rd ring	mm	-	
		Astern	1.46, 2.07, 2.57		Oil ring	mm	0.30 to 0.50	
	Capacity of oil pan	liter	2.1	Ring groove clearance	Top ring	mm	0.105 to 0.135	
	Effective of oil pan		0.3		2nd ring	mm	0.055 to 0.085	
	Hydraulic oil pressure	MPa			3rd ring	mm	-	
		kgf/cm ²			Oil ring	mm	0.030 to 0.065	
	Lube oil pressure	Mpa	(Splash)	Tightening torque	Cylinder head	Across flat	mm	17
	Lube oil filter	-	Paper			Torque	kgf-m	15 to 17
Applicable oil (API/SAE)	-	CD Class SAE30	Main bearing		Across flat	mm	19	
	Dry weight	kgf			48	Torque	kgf-m	19.5 to 20.5
Dimension	Length	mm	1058	Con. rod	Across flat	mm	17	
		Torque	kgf-m		11.5 to 12.5			
	Width	mm	630	FW bolt	Across flat	mm	22	
Height	mm	726			Torque	kgf-m	19 to 21	
Drawing out height of piston	mm			Injection V	Across flat	mm	10	
Dry weight (with Marine gear)	kgf	380				Torque	kgf-m	0.40 to 0.50

Engine model 4LH-DTE				Cooling system		Type	-	Water cooled	
Type	Configuration	-	Vertical Diesel	Fresh water pump	Type	-	Centrifugal		
	Stroke cycle	-	4		Displacement	liter/h	9700		
	Cooling system	-	Water cooled		Tank	liter	14		
	Combustion system	-	Direct injection		Sub tank	liter	0.8		
Number of cylinder		-	4	F/W cooler capacity	m ³				
	L/O cooler capacity								
Bore X Stroke		mm	100 X 110	Sea water pump	Type	-	Jabsco		
	Displacement	liter	3.456		Displacement	liter/h	5500		
Continuous duty	Output	kW	113.3	Fuel system	Water separator	-			
		hp	154		FO pump model	-	YPES-4AL		
	Speed	min ⁻¹	3200		Injection timing (FID)	degree	12 to 14		
	Mean effect pressure	Mpa	1.23		Injection pressure	Mpa	21.57 to 223.55		
		kgf/cm ²	12.53			kgf/cm ²	240 to 250		
	Piston speed	m/s	11.73		Injection nozzle	-	5 - 0.31 X 150		
	Fuel consumption	g/kW-h	Below 241		Fuel filter	Type	-	Paper	
		g/hp-h	Below 180			Area	micron	35 (1400cm ²)	
	Exhaust temperature	C-degree	Below 620		Applicable fuel oil	-	Diesel fuel		
	Exhaust smoke	Boech	Below 2.5		Starting system	Type	-	Electric	
Maximum duty	Output	kW	125	Motor	V - kW	12V - 2.5kW			
		hp	170	Battery	V - Ah	12V - 120Ah			
	Speed	min ⁻¹	3300	Alternator	V - A	12V - 55A			
	Mean effect pressure	Mpa	1.32	Valve clearance	Suction	mm	0.07 to 0.13		
		kgf/cm ²	13.42	Exhaust	mm	0.27 to 0.33			
	Piston speed	m/s	12.1	Valve seat angle	Suction	degree	120		
	Fuel consumption	g/kW-h	Below 248	Exhaust	degree	90			
		g/hp-h	Below 185	Cylinder liner	Inside diameter	mm	100.00 to 100.03		
	Exhaust temperature	C-degree	Below 670		Outside diameter	mm	103.00 to 103.03		
	Exhaust smoke	Boech	Below 2.5	Piston	Projection	mm	0.025 to 0.090		
Firing order		-	1 - 3 - 4 - 2 - 1	Outside diameter	mm	99.895 to 99.925			
Position of FO Pump (viewed from stern)		-	Right	Pin hole diameter	mm	34.000 to 34.011			
Direction of rotation (Viewed from stern)	Crank shaft	-	Counter clockwise	Pin outside diameter	mm	33.989 to 34.000			
	Propeller	-	Clockwise	Ring groove	Top ring	mm	2.095 to 2.110		
Lubricant	Pump type	-	Trochoid	2nd ring	mm	2.045 to 2.060			
	Pump capacity	liter/h	3700	3rd ring	mm	-			
	Pressure	Mpa	0.343 to 0.441	Oil ring	mm	3.020 to 3.035			
		kgf/cm ²	3.5 to 4.5	Crank shaft	Journal O/Diameter	mm	69.952 to 69.964		
	Capacity of oil pan	liter	10		Pin O/Diameter	mm	70.000 to 70.045		
	Effective of oil pan	liter	5.5	Pin O/Diameter	mm	59.952 to 59.964			
	Oil consumption	g/kW-h	0.45 to 0.54	Con-rod	Small end bearing I/D	mm	34.04 to 34.04		
g/hp-h		0.1 to 0.4		Large end bearing I/D	mm	60.000 to 60.042			
Applicable oil (API/SAE)	-	CD Class 15W40	Cam shaft	Cam height	Suction	mm	48.435 to 48.565		
Lube oil filter	-	Paper		Exhaust	mm	49.435 to 48.565			
Top clearance	mm	0.81 to 0.99		Journal Outside D.	mm	56.91 to 56.94			
Compression ratio	-	15.9		Bearing Inside D.	mm	56.98 to 57.05			
Combustion maximum pressure	Mpa	12.3		Side clearance	mm	0.05 to 0.20			
	kgf/cm ²	125		Piston ring	Thickness	Top ring	mm	1.47 to 1.49	
Idling speed	min ⁻¹	725 to 775				2nd ring	mm	1.97 to 1.99	
High idling speed	min ⁻¹	3660 to 3710				3rd ring	mm	-	
Turbocharger	Model	-	K26-3262MAA 8,71			Oil ring	mm	2.97 to 2.99	
	Cooling system	-	Water cooled	Breadth	Top ring	mm	1.975 to 1.990		
Air cooler	Lube system	-	Common			2nd ring	mm	1.975 to 1.990	
	Type	-	Plate fin			3rd ring	mm	-	
	Cooling area	m ²	2.77			Oil ring	mm	2.92 to 2.99	
Marine gear	Model	-	KM5A	End gap	Top ring	mm	0.25 to 0.40		
	Type	-	Mecha. Angle 7			2nd ring	mm	0.25 to 0.40	
	Reduction ratio	Ahead	-	1.46, 2.07, 2.57			3rd ring	mm	-
		Astern	-	1.46, 2.07, 2.57			Oil ring	mm	0.30 to 0.50
	Capacity of oil pan	liter	2.1	Ring groove clearance	Top ring	mm	0.105 to 0.135		
	Effective of oil pan		0.3				2nd ring	mm	0.055 to 0.085
		Hydraulic oil pressure	MPa				3rd ring	mm	-
		kgf/cm ²					Oil ring	mm	0.030 to 0.065
	Lube oil pressure	Mpa	(Splash)	Tightening torque	Cylinder head	Across flat	mm	17	
		kgf/cm ²					Torque	kgf-m	15 to 17
Lube oil filter	-	Paper		Main bearing	Across flat	mm	19		
Applicable oil (API/SAE)	-	CC Class SAE30				Torque	kgf-m	19.5 to 20.5	
Dimension	Dry weight	kgf	48	Con. rod	Across flat	mm	17		
	Length	mm	1058			Torque	kgf-m	11.5 to 12.5	
	Width	mm	669	FW bolt	Across flat	mm	22		
Height	mm	726				Torque	kgf-m	19 to 21	
Drawing out hight of piston	mm			Injection V	Across flat	mm	10		
Dry weight (with Marine gear)	kgf		406			Torque	kgf-m	0.40 to 0.50	

Engine model 4LH-STE				Cooling system					
Type	Configuration	-	Vertical Diesel	Fresh water pump	Type	-	Water cooled		
	Stroke cycle	-	4		Displacement	liter/h	9700		
	Cooling system	-	Water cooled		Tank	liter	15		
	Combustion system	-	Direct injection		Sub tank	liter	0.8		
Number of cylinder		-	4	F/W cooler capacity		m ²			
Bore X Stroke		mm	100 X 110	L/O cooler capacity		m ²			
Displacement		liter	3.456	Sea water pump	Type	-	Jabsco		
Continuous duty	Output	kW	139.7		Displacement	liter/h	6400		
		hp	190	Water separator					
	Speed	min ⁻¹	3100	FO pump model				-	
	Mean effect pressure	Mpa	1.57	Injection timing (FID)				degree	12 to 16
		kgf/cm ²	15.96	Injection pressure		Mpa	25.5 to 26.48		
	Piston speed	m/s	11.37			kgf/cm ²	260 to 270		
		g/hp-h	Below 180	Injection nozzle				-	5 - 0.35 X 140
	Fuel consumption	g/kW-h	Below 241	Fuel filter	Type	-	Paper		
		g/hp-h	Below 180		Area	micron	35 (1400cm ²)		
	Exhaust temperature	C-degree	Below 660	Applicable fuel oil				-	Diesel fuel
Exhaust smoke	Bosch	Below 2.0	Starting system				Type	-	Electric
Maximum duty Output	kW	169.2					Motor	V - kW	12V - 2.5kW
	hp	230					Battery	V - Ah	12V - 120Ah
Speed	min ⁻¹	3300					Alternator	V - A	12V - 65A
Mean effect pressure	Mpa	1.78	Valve clearance				Suction	mm	0.07 to 0.13
	kgf/cm ²	18.15					Exhaust	mm	0.47 to 0.53
Piston speed	m/s	12.1	Valve seat angle				Suction	degree	120
	g/hp-h	Below 185					Exhaust	degree	90
Fuel consumption	g/kW-h	Below 248	Cylinder liner	Inside diameter	mm	100.0 to 100.03			
	g/hp-h	Below 185		Outside diameter	mm	103.00 to 103.03			
Exhaust temperature	C-degree	Below 730		Projection	mm	0.025 to 0.090			
Exhaust smoke	Bosch	Below 2.5	Piston	Outside diameter	mm	98.895 to 99.925			
Firing order	-	1 - 3 - 4 - 2 - 1		Pin hole diameter	mm	34.000 to 34.011			
Position of FO Pump (viewed from stern)	-	Right		Pin outside diameter	mm	33.989 to 34.000			
Direction of rotation (Viewed from stern)	Crank shaft	-		Counter clockwise	Ring groove	Top ring	mm	2.095 to 2.110	
(Viewed from stern)	Propeller	-		Clockwise		2nd ring	mm	2.045 to 2.060	
Lubricant	Pump type	-		Trochoid	3rd ring	mm	-		
	Pump capacity	liter/h	3700	Oil ring	mm	3.020 to 3.035			
	Pressure	Mpa	0.392 to 0.490	Crank shaft	Journal O/Diameter	mm	69.952 to 69.964		
		kgf/cm ²	3.8 to 4.8		Pin O/Diameter	mm	70.000 to 70.045		
	Capacity of oil pan	liter	10	Pin O/Diameter	mm	59.952 to 59.964			
	Effective of oil pan	liter	5.5	Con-rod	Small end bearing I/D	mm	34.04 to 34.04		
	Oil consumption	g/kW-h	0.27 to 0.68		Large end bearing I/D	mm	60.000 to 60.042		
		g/hp-h	0.2 to 0.5	Cam shaft	Cam height	Suction	mm	48.435 to 48.585	
	Applicable oil (API/SAE)	-	CD Class 15W40		Exhaust	mm	49.435 to 48.565		
	Lube oil filter	-	Paper		Journal Outside D.	mm	56.91 to 56.94		
Top clearance	mm	0.71 to 0.89	Bearing Inside D.		mm	56.98 to 57.05			
Compression ratio	-	15.2	Side clearance	mm	0.05 to 0.20				
Combustion maximum pressure	Mpa	15.2	Piston ring	Thickness	Top ring	mm	1.47 to 1.49		
	kgf/cm ²	155			2nd ring	mm	1.97 to 1.99		
Idling speed	min ⁻¹	725 to 775			3rd ring	mm	-		
High idling speed	min ⁻¹	3675 to 3725		Breadth	Top ring	mm	1.975 to 1.990		
Turbocharger	Model	-			RHC61W (IH)	2nd ring	mm	1.975 to 1.990	
	Cooling system	-			Water cooled	3rd ring	mm	-	
Air cooler	Lube system	-		Common	Oil ring	mm	2.97 to 2.99		
	Type	-		Plate fin (Toyo)	Top ring	mm	1.975 to 1.990		
Marine gear	Cooling area			m ²	2nd ring	mm	2.92 to 2.99		
	End gap	Top ring		mm	0.25 to 0.40	3rd ring	mm	-	
		2nd ring	mm	0.25 to 0.40	Oil ring	mm	0.30 to 0.50		
	Ring groove clearance	Top ring	mm	0.105 to 0.135	Tightening torque	Cylinder head	Across flat	mm	17
		2nd ring	mm	0.055 to 0.085			Torque	kgf-m	15 to 17
	3rd ring	mm	-	Main bearing		Across flat	mm	19	
	Oil ring	mm	0.030 to 0.065			Torque	kgf-m	19.5 to 20.5	
	Ring groove clearance	Top ring	mm	0.105 to 0.135	Con. rod	Across flat	mm	17	
		2nd ring	mm	0.055 to 0.085		Torque	kgf-m	11.5 to 12.5	
	3rd ring	mm	-	FW bolt	Across flat	mm	22		
	Oil ring	mm	0.030 to 0.065		Torque	kgf-m	19 to 21		
	Tightening torque	Cylinder head	Across flat	mm	17	Injection V	Across flat	mm	10
			Torque	kgf-m	15 to 17		Torque	kgf-m	0.40 to 0.50
	Main bearing	Across flat	mm	19	Con. rod	Across flat	mm	17	
Torque			kgf-m	19.5 to 20.5		Torque	kgf-m	11.5 to 12.5	
Con. rod	Across flat	mm	17	FW bolt	Across flat	mm	22		
		Torque	kgf-m		19 to 21	Torque	kgf-m	19 to 21	
FW bolt	Across flat	mm	22	Injection V	Across flat	mm	10		
		Torque	kgf-m		19 to 21	Torque	kgf-m	0.40 to 0.50	
Drawing out hight of piston	mm	mm	490 (375)						
		kgf	490 (375)						
Dry weight (with Marine gear)		kgf	490 (375)						

Engine model 4LHA-DTE				Cooling system		Type	-	Water cooled
Type	Configuration	-	Vertical Diesel	Fresh water pump	Type	-	Centrifugal	
	Stroke cycle	-	4		Displacement	liter/h	9700	
	Cooling system	-	Water cooled		Tank	liter	15	
	Combustion system	-	Direct injection		Sub tank	liter	0.8	
Number of cylinder	-	4		F/W cooler capacity	m ²			
Bore X Stroke	mm	100 X 110		L/O cooler capacity	m ²			
Displacement	liter	3.456		Sea water pump	Type	-	Jabsco	
Continuous duty	Output	kW	116.2	Fuel system	Water separator	-		
		hp	158			FO pump model	-	YPES-AL
	Speed	min ⁻¹	3100		Injection timing (FID)	degree	11 to 13	
	Mean effect pressure	Mpa	1.3		Injection pressure	Mpa	24.5 to 25.48	
		kgf/cm ²	13.27				kgf/cm ²	25.0 to 26.0
	Piston speed	m/s	11.37		Injection nozzle	-	5 - 0.32 X 140	
	Fuel consumption	g/kW-h	Below 228		Fuel filter	Type	-	Paper
		g/hp-h	Below 170			Area	micron	35 (1400cm ²)
	Exhaust temperature	C-degree	Below 560		Applicable fuel oil	-	Diesel fuel	
	Exhaust smoke	Bosch	Below 2.0		Starting system	Type	-	Electric
Maximum duty	Output	kW	139.7	Valve clearance	Motor	V - kW	12V - 2.5kW	
		hp	190		Battery	V - Ah	12V - 120Ah	
	Speed	min ⁻¹	3300		Alternator	V - A	12V - 55A	
	Mean effect pressure	Mpa	1.47		Suction	mm	0.05 to 0.15	
		kgf/cm ²	14.99	Exhaust	mm	0.35 to 0.45		
	Piston speed	m/s	12.1	Valve seat angle	Suction	degree	120	
	Fuel consumption	g/kW-h	Below 241	Exhaust	degree	90		
		g/hp-h	Below 180	Cylinder liner	Inside diameter	mm	100.00 to 100.03	
	Exhaust temperature	C-degree	Below 630	Outside diameter	mm	103.00 to 103.03		
	Exhaust smoke	Bosch	Below 2.5	Projection	mm	0.025 to 0.090		
Firing order	-	1 - 3 - 4 - 2 - 1	Piston	Outside diameter	mm	98.895 to 99.925		
Position of FO Pump (viewed from stern)	-	Right	Pin hole diameter	mm	34.009 to 34.011			
Direction of rotation	Crank shaft	-	Counter clockwise	Pin outside diameter	mm	33.989 to 34.000		
(Viewed from stern)	Propeller	-	Clockwise	Ring groove	Top ring	mm	2.095 to 2.110	
Lubricant	Pump type	-	Trochoid	2nd ring	mm	2.045 to 2.060		
		Pump capacity	liter/h	3700	3rd ring	mm	-	
	Pressure	Mpa	0.34 to 0.44	Oil ring	mm	3.020 to 3.035		
		kgf/cm ²	3.5 to 4.5	Crank shaft	Journal O/Diameter	mm	69.952 to 69.964	
	Capacity of oil pan	liter	13	Pin O/Diameter	mm	70.000 to 70.045		
	Effective of oil pan	liter	5	Pin O/Diameter	mm	59.952 to 59.964		
	Oil consumption	g/kW-h	0.27 to 0.68	Con-rod	Small end bearing I/D	mm	34.04 to 34.04	
		g/hp-h	0.2 to 0.5	Large end bearing I/D	mm	60.000 to 60.042		
Applicable oil (API/SAE)	-	CD Class 15W40	Cam shaft	Cam height	Suction	mm	48.435 to 48.565	
Lube oil filter	-	Paper	Exhaust	mm	49.435 to 48.565			
Top clearance	mm	0.71 to 0.89	Journal Outside D.	mm	58.91 to 58.94			
Compression ratio	-	15.8	Bearing Inside D.	mm	56.98 to 57.05			
Combustion maximum pressure	Mpa	14.2	Side clearance	mm	0.05 to 0.20			
	kgf/cm ²	145	Piston ring	Thickness	Top ring	mm	1.975 to 1.990	
Idling speed	min ⁻¹	725 to 775	2nd ring	mm	1.975 to 1.990			
High idling speed	min ⁻¹	3675 to 3725	3rd ring	mm	-			
Turbocharger	Model	-	RHC61W (IH)	Oil ring	mm	2.92 to 2.99		
	Cooling system	-	Water cooled	Breadth	Top ring	mm	1.975 to 1.990	
Lube system	-	-	Common	2nd ring	mm	1.975 to 1.990		
	Type	-	Plate fin (SERCK)	3rd ring	mm	-		
Air cooler	Cooling area	m ²	-	Oil ring	mm	2.92 to 2.99		
	Model	-	HSW450A2	End gap	Top ring	mm	0.25 to 0.40	
Marine gear	Type	-	Angle 8	2nd ring	mm	0.25 to 0.40		
		Reduction ratio	Ahead	1.26, 1.51, 2.03, 2.43	3rd ring	mm	-	
		Astern	1.26, 1.51, 2.03, 2.43	Oil ring	mm	0.30 to 0.50		
	Capacity of oil pan	liter	-	Ring groove clearance	Top ring	mm	0.105 to 0.135	
	Effective of oil pan	liter	2	2nd ring	mm	0.055 to 0.085		
	Hydraulic oil pressure	MPa	2.1 to 2.3	3rd ring	mm	-		
		kgf/cm ²	21 to 23	Oil ring	mm	0.030 to 0.065		
	Lube oil pressure	Mpa	-	Tightening torque	Cylinder head	Across flat	mm	17
		kgf/cm ²	-	Torque	kgf-m	15 to 17		
	Lube oil filter	-	-	Main bearing	Across flat	mm	19	
Applicable oil (API/SAE)	-	-	Torque	kgf-m	19.5 to 20.5			
Dry weight	kgf	28	Con. rod	Across flat	mm	17		
Dimension	Length	mm	837.2 (1021.9)	Torque	kgf-m	11.5 to 12.5		
	Width	mm	686	FW bolt	Across flat	mm	22	
	Height	mm	741	Torque	kgf-m	19 to 21		
Drawing out height of piston	mm	-	Injection V	Across flat	mm	10		
Dry weight (with Marine gear)	kgf	365	Torque	kgf-m	0.40 to 0.50			

Engine model 4LHA-STE				Cooling system	Type		-	Water cooled
Type	Configuration	-	Vertical Diesel		Fresh water pump	Type	-	Centrifugal
	Stroke cycle	-	4	Displacement		liter/h	9700	
	Cooling system	-	Water cooled	Tank		liter	15	
	Combustion system	-	Direct injection	Sub tank		liter	0.8	
Number of cylinder	-	4		F/W cooler capacity	m ²			
Bore X Stroke	mm	100 X 110		L/O cooler capacity	m ²			
Displacement	liter	3.456		Sea water pump	Type	-	Jabsco	
Continuous duty	Output	kW	139.7	Fuel system	Displacement	liter/h	6500	
		hp	190		Water separator	-	-	
	Speed	min ⁻¹	3100		FO pump model	-	YPES-4AL	
	Mean effect pressure	Mpa	1.57		Injection timing (FID)	degree	12 to 14	
		kgf/cm ²	15.96		Injection pressure	Mpa	26.6 to 27.58	
	Piston speed	m/s	11.37			kgf/cm ²	270 to 280	
	Fuel consumption	g/kW-h	Below 241		Injection nozzle	-	5 - 0.35 X 140	
		g/hp-h	Below 180		Fuel filter	Type	-	Paper
	Exhaust temperature	C-degree	Below 660		Area	micron	35 (1400cm ²)	
	Exhaust smoke	Bosch	Below 2.0		Applicable fuel oil	-	Diesel fuel	
Maximum duty	Output	kW	169.2	Starting system	Type	-	Electric	
		hp	230		Motor	V - kW	12V - 2.5kW	
	Speed	min ⁻¹	3300		Battery	V - Ah	12V - 120Ah	
	Mean effect pressure	Mpa	1.78		Alternator	V - A	12V - 55A	
		kgf/cm ²	18.15	Valve clearance	Suction	mm	0.05 to 0.15	
	Piston speed	m/s	12.1	Exhaust	mm	0.45 to 0.55		
	Fuel consumption	g/kW-h	Below 248	Valve seat angle	Suction	degree	120	
		g/hp-h	Below 185	Exhaust	degree	90		
	Exhaust temperature	C-degree	Below 730	Cylinder liner	Inside diameter	mm	100.00 to 100.03	
	Exhaust smoke	Bosch	Below 2.5		Outside diameter	mm	103.00 to 103.03	
Firing order	-	1 - 3 - 4 - 2 - 1	Piston	Projection	mm	0.025 to 0.090		
Position of FO Pump (viewed from stern)	-	Right		Outside diameter	mm	99.895 to 99.925		
Direction of rotation (Viewed from stern)	Crank shaft	-		Counter clockwise	Pin hole diameter	mm	34.000 to 34.011	
Propeller	-	Clockwise		Pin outside diameter	mm	33.989 to 34.000		
Lubricant	Pump type	-	Trochoid	Ring groove	Top ring	mm	2.095 to 2.110	
		Pump capacity	liter/h		3700	2nd ring	mm	2.045 to 2.060
	Pressure	Mpa	0.392 to 0.490		3rd ring	mm	-	
		kgf/cm ²	3.8 to 4.8		Oil ring	mm	3.020 to 3.035	
	Capacity of oil pan	liter	10	Crank shaft	Journal O/Diameter	mm	69.952 to 69.964	
	Effective of oil pan	liter	5.5		P/O/Diameter	mm	70.000 to 70.045	
	Oil consumption	g/kW-h	0.27 to 0.68	Pin O/Diameter	mm	59.952 to 59.964		
		g/hp-h	0.2 to 0.5	Con-rod	Small end bearing I/D	mm	34.04 to 34.04	
	Applicable oil (API/SAE)	-	CD Class 15W40		Large end bearing I/D	mm	60.000 to 60.042	
	Lube oil filter	-	Paper	Cam shaft	Cam height	Suction	mm	48.435 to 48.565
Top clearance	mm	0.71 to 0.89	Exhaust		mm	49.435 to 48.565		
	Compression ratio	-	15.2		Journal Outside D.	mm	56.91 to 56.94	
Combustion maximum pressure	Mpa	15.2	Bearing Inside D.		mm	56.98 to 57.05		
	kgf/cm ²	155	Side clearance	mm	0.05 to 0.20			
Idling speed	min ⁻¹	725 to 775	Piston ring	Thickness	Top ring	mm	1.975 to 1.990	
High idling speed	min ⁻¹	3675 to 3725			2nd ring	mm	1.975 to 1.990	
Turbocharger	Model	-			RHC61W (IHI)	3rd ring	mm	-
	Cooling system	-			Water cooled	Oil ring	mm	2.92 to 2.99
Air cooler	Lube system	-		Common	Breadth	Top ring	mm	1.975 to 1.990
	Type	-		Plate fin (SERCK)		2nd ring	mm	1.975 to 1.990
Marine gear	Cooling area	m ²		-		3rd ring	mm	-
		Oil ring		mm	2.92 to 2.99			
	End gap	Top ring		mm	0.25 to 0.40			
		2nd ring		mm	0.25 to 0.40			
	Ring groove clearance	3rd ring	mm	-				
		Oil ring	mm	0.30 to 0.50				
		Top ring	mm	0.105 to 0.135				
		2nd ring	mm	0.055 to 0.085				
	Tightening torque	3rd ring	mm	-				
		Oil ring	mm	0.030 to 0.065				
Cylinder head	Across flat	mm	17					
	Torque	kgf-m	15 to 17					
Main bearing	Across flat	mm	19					
	Torque	kgf-m	19.5 to 20.5					
Con. rod	Across flat	mm	17					
	Torque	kgf-m	11.5 to 12.5					
FW bolt	Across flat	mm	22					
	Torque	kgf-m	19 to 21					
Injection V	Across flat	mm	10					
	Torque	kgf-m	0.40 to 0.50					
Dimension	Length	mm	1001 (1059)					
	Width	mm	686					
	Height	mm	741					
Drawing out height of piston	mm	-						
Dry weight (with Marine gear)	kgf	365						

Engine model				4LHA-S TE					
Type	Configuration	-	Vertical Diesel	Cooling system	Type	-	Water cooled		
	Stroke cycle	-	4		Fresh water pump	Type	-	Centrifugal	
	Cooling system	-	Water cooled		Displacement	liter/h	9700		
	Combustion system	-	Direct injection		Tank	liter	15		
Number of cylinder	Displacement	liter	3.456		Sub tank	liter	0.8		
	Bore X Stroke	mm	100 X 110		F/W cooler capacity	m ³	-		
	Continuous duty	Output	kW		139.7	L/O cooler capacity	m ³	-	
		Stroke cycle	hp		190	Sea water pump	Type	-	Jabeco
Maximum duty	Speed	min ⁻¹	3100		Displacement	liter/h	6400		
	Mean effect pressure	Mpa	1.57		Water separator	Type	-		
		kgf/cm ²	15.96		FO pump model	-	-	YPES-4AL	
	Piston speed	m/s	11.37		Injection timing (FID)	degree	12 to 16		
		g/kW-h	Below 241	Injection pressure	Mpa	25.5 to 26.48			
	Fuel consumption	g/hp-h	Below 180	Injection pressure	kgf/cm ²	260 to 270			
		C-degree	Below 660	Injection nozzle	-	5 - 0.35 X 140			
	Exhaust temperature	g/hp-h	Below 180	Fuel filter	Type	-	Paper		
		hp	230	Area	micron	35 (1400cm ²)			
	Firing order	Exhaust smoke	C-degree	Below 660	Applicable fuel oil	-	Diesel fuel		
		Output	kW	169.2	Starting system	Type	-	Electric	
			hp	230		Motor	V - kW	12V - 2.5kW	
Speed		min ⁻¹	3300	Battery		V - Ah	12V - 120Ah		
Mean effect pressure		Mpa	1.78	Alternator	V - A	12V - 55A			
		kgf/cm ²	18.15	Valve clearance	Suction	mm	0.07 to 0.13		
Piston speed		m/s	12.1		Exhaust	mm	0.47 to 0.53		
		Fuel consumption	g/kW-h	Below 248	Valve seat angle	Suction	degree	120	
g/hp-h			Below 185	Exhaust		degree	90		
Exhaust temperature		C-degree	Below 730	Cylinder liner	Inside diameter	mm	100.00 to 100.03		
		Bosch	Below 2.5		Outside diameter	mm	103.00 to 103.03		
Position of FO Pump (viewed from stern)		Exhaust smoke	Bosch	Below 2.5	Projection	mm	0.025 to 0.090		
	Direction of rotation	Crank shaft	-	Counter clockwise	Piston	Outside diameter	mm	99.895 to 99.925	
		Propeller	-	Clockwise		Pin hole diameter	mm	34.000 to 34.011	
	Lubricant	Pump type	-	Trochoid		Pin outside diameter	mm	33.989 to 34.000	
		Pump capacity	liter/h	3700		Ring groove	Top ring	mm	2.095 to 2.110
	Pressure	Mpa	0.392 to 0.490	Crank shaft		2nd ring	mm	2.045 to 2.060	
		kgf/cm ²	3.8 to 4.8			3rd ring	mm	-	
	Capacity of oil pan	liter	10			Journal O/Diameter	mm	3.020 to 3.035	
		Effective of oil pan	liter			5.5	Pin O/Diameter	mm	69.952 to 69.964
	Oil consumption	g/kW-h	0.27 to 0.68			Con-rod	Pin O/Diameter	mm	70.000 to 70.045
		g/hp-h	0.2 to 0.5				Small end bearing I/D	mm	59.952 to 59.964
	Applicable oil (API/SAE)	-	CD Class 15W40			Cam shaft	Large end bearing I/D	mm	34.04 to 34.04
Lube oil filter		-	Paper				Cam height	Suction	mm
Top clearance	mm	0.71 to 0.89	Exhaust		mm		48.435 to 48.565		
	Compression ratio	-	15.2		Journal Outside D.		mm	48.435 to 48.565	
Combustion maximum pressure	Mpa	15.2	Bearing Inside D.		mm		56.91 to 56.94		
	kgf/cm ²	155	Side clearance		mm		56.98 to 57.05		
Idle speed	min ⁻¹	725 to 775	Piston ring	Thickness	Top ring		mm	0.05 to 0.20	
	High idling speed	min ⁻¹		3675 to 3725	2nd ring		mm	1.47 to 1.49	
Turbocharger	Model	-		RHC61W (IH)	3rd ring		mm	1.97 to 1.99	
	Cooling system	-		Water cooled	Oil ring		mm	-	
Air cooler	Lube system	-		Common	Breadth		Top ring	mm	2.97 to 2.99
	Type	-		Plate fin (Toyo)	2nd ring		mm	1.975 to 1.990	
Marine gear	Cooling area	m ²		-	3rd ring	mm	1.975 to 1.990		
	Model	-		YX-30-4	Oil ring	mm	-		
		Type		-	Hydraulic	End gap	Top ring	mm	2.92 to 2.99
	Reduction ratio	Ahead		-	1.51, 2.03, 2.55, 2.96	2nd ring	mm	0.25 to 0.40	
		Astern		-	1.51, 2.03, 2.55, 2.96	3rd ring	mm	0.25 to 0.40	
	Capacity of oil pan	liter		3.2	Oil ring	mm	0.30 to 0.50		
		Effective of oil pan	liter	0.4	Ring groove clearance	Top ring	mm	0.105 to 0.135	
	Hydraulic oil pressure	MPa	2.35 to 2.60	2nd ring	mm	0.055 to 0.085			
		kgf/cm ²	24.0 to 26.5	3rd ring	mm	-			
	Lube oil pressure	Mpa	-	Oil ring	mm	0.030 to 0.065			
		kgf/cm ²	-	Tightening torque	Cylinder head	Across flat	mm	17	
	Lube oil filter	-	-		Torque	kgf-m	15 to 17		
Applicable oil (API/SAE)		-	-		Main bearing	Across flat	mm	19	
Dry weight	kgf	68.5	Torque		kgf-m	19.5 to 20.5			
	Length	mm	1131 (1035)		Con. rod	Across flat	mm	17	
Dimension	Width	mm	723 (685)		Torque	kgf-m	11.5 to 12.5		
	Height	mm	762 (732)		FW bolt	Across flat	mm	22	
Drawing out height of piston	mm	-	-		Torque	kgf-m	19 to 21		
	Dry weight (with Marine gear)	kgf	490 (375)		Injection V	Across flat	mm	10	
					Torque	kgf-m	0.40 to 0.50		

Engine model 6LY-UTE				
Type	Configuration	-	Vertical Diesel	
	Stroke cycle	-	4	
	Cooling system	-	Water cooled	
	Combustion system	-	Direct injection	
Number of cylinder	-	6		
Bore X Stroke	mm	100 X 110		
Displacement	liter	5.184		
Continuous duty	Output	kW	191.2	
		hp	260	
	Speed	min ⁻¹	3100	
	Mean effect pressure	Mpa	1.43	
		kgf/cm ²	14.56	
	Piston speed	m/s	11.37	
	Fuel consumption	g/kW-h	Below 233	
		g/hp-h	Below 174	
	Exhaust temperature	C-degree	Below 620	
	Exhaust smoke	Bosch	Below 2.0	
			kW	231.7
	Maximum duty	Output	hp	315
min ⁻¹			3300	
Mean effect pressure		Mpa	1.62	
		kgf/cm ²	16.57	
Piston speed		m/s	12.1	
Fuel consumption		g/kW-h	Below 241	
		g/hp-h	Below 180	
Exhaust temperature		C-degree	Below 660	
Exhaust smoke		Bosch	Below 2.5	
Firing order		-	1 - 4 - 2 - 6 - 3 - 5 - 1	
Position of FO Pump (viewed from stern)		-	Right	
Direction of rotation (Viewed from stern)	Crank shaft	-	Counter clockwise	
	Propeller	-	Clockwise	
Lubricant	Pump type	-	Trochoid	
	Pump capacity	liter/h	5670	
		Pressure	Mpa	0.44 to 0.54
	Capacity of oil pan	liter	20	
		Effective of oil pan	liter	8
	Oil consumption	g/kW-h	0.27 to 0.68	
		g/hp-h	0.2 to 0.5	
	Applicable oil (API/SAE)	-	CD Class 15W40	
	Lube oil filter	-	Paper	
	Top clearance	mm	0.71 to 0.89	
Compression ratio	-	15.02		
Combustion maximum pressure	Mpa	14.7		
	kgf/cm ²	150		
Idling speed	min ⁻¹	675 to 725		
High idling speed	min ⁻¹	3695 to 3745		
Turbocharger	Model	-	RHC7W (IH)	
	Cooling system	-	Water cooled	
	Lube system	-	Common	
Air cooler	Type	-	Colgate fin	
	Cooling area	m ²	-	
Marine gear	Model	-	KMH6A	
	Type	-	Hydraulic Angle 8	
	Reduction ratio	Ahead	1.58, 1.92, 2.26	
		Astern	1.58, 1.92, 2.26	
	Capacity of oil pan	liter	4	
	Effective of oil pan		0.3	
	Hydraulic oil pressure	MPa	2.7 to 2.8	
		kgf/cm ²	275 to 285	
	Lube oil pressure	Mpa		
		kgf/cm ²		
	Lube oil filter	-		
	Applicable oil (API/SAE)	-	CD Class SAE30	
Dimension	Dry weight	kgf	102	
	Length	mm	1316	
	Width	mm	716	
	Height	mm	709	
Drawing out height of piston	mm	-		
Dry weight (with Marine gear)	kgf	600		
Cooling system	Fresh water pump	Type	-	Centrifugal
		Displacement	liter/h	17000
		Tank	liter	24
		Sub tank	liter	1.5
		F/W cooler capacity	m ²	
	L/O cooler capacity	m ²		
	Sea water pump	Type	-	Jabsco
		Displacement	liter/h	8300
	Water separator	-		
	Fuel system	FO pump model	-	YPES-6AL
		Injection timing (FID)	degree	12 to 14
			Mpa	23.5 to 24.5
Injection pressure		kgf/cm ²	240 to 250	
			-	5 - 0.34 X 145
Fuel filter		Type	-	Paper
Applicable fuel oil		Area	micron	35 (1400cm ²)
		-	Diesel fuel	
Starting system	Type	-	Electric	
	Motor	V - kW	12V - 2.5kW	
	Battery	V - Ah	12V - 120Ah	
	Alternator	V - A	12V - 80A	
Valve clearance	Suction	mm	0.05 to 0.15	
	Exhaust	mm	0.35 to 0.45	
Valve seat angle	Suction	degree	120	
	Exhaust	degree	90	
Cylinder liner	Inside diameter	mm	100.00 to 100.03	
	Outside diameter	mm	102.98 to 103.10	
	Projection	mm	0.025 to 0.090	
Piston	Outside diameter	mm	99.905 to 99.915	
	Pin hole diameter	mm	37	
	Pin outside diameter	mm	36.989 to 37.000	
	Ring groove	Top ring	mm	2.025 to 2.040
		2nd ring	mm	2.025 to 2.040
		3rd ring	mm	-
	Oil ring	mm	3.020 to 3.035	
Crank shaft	Journal O/Diameter	mm	74.952 to 74.964	
	Pin O/Diameter	mm	75.000 to 75.045	
	Pin O/Diameter	mm	64.952 to 64.964	
Con-rod	Small end bearing I/D	mm	37.03 to 37.05	
	Large end bearing I/D	mm	65.000 to 65.042	
Cam shaft	Cam height	Suction	mm	6.5
		Exhaust	mm	6.5
	Journal Outside D.	mm	56.91 to 56.94	
	Bearing Inside D.	mm		
Side clearance	mm	0.05 to 0.20		
Piston ring	Thickness	Top ring	mm	3.630 to 3.870
		2nd ring	mm	4.08 to 4.32
		3rd ring	mm	-
		Oil ring	mm	2.2 to 2.6
	Breath	Top ring	mm	1.975 to 1.990
		2nd ring	mm	1.980 to 1.990
		3rd ring	mm	-
Oil ring	mm	2.97 to 2.99		
End gap	Top ring	mm		
	2nd ring	mm		
	3rd ring	mm	-	
	Oil ring	mm		
Ring groove clearance	Top ring	mm	0.090 to 0.125	
	2nd ring	mm	0.035 to 0.070	
	3rd ring	mm	-	
	Oil ring	mm	0.030 to 0.065	
Tightening torque	Cylinder head	Across flat	mm	(M14)
		Torque	kgf-m	11 to 17 to 19,22
	Main bearing	Across flat	mm	(M15)
		Torque	kgf-m	23 to 25
	Con. rod	Across flat	mm	(M12)
		Torque	kgf-m	13.5 to 14.5
FW bolt	Across flat	mm	(M16)	
	Torque	kgf-m	29 to 31	
Injection V	Across flat	mm	(M6)	
	Torque	kgf-m	0.40 to 0.50	

Engine model 6LY-STE				Cooling system	Type	-	Water cooled	
Type	Configuration	-	Vertical Diesel		Fresh water pump	Type	-	Centrifugal
	Stroke cycle	-	4	Displacement		liter/h	17000	
	Cooling system	-	Water cooled	Tank		liter	24	
	Combustion system	-	Direct injection	Sub tank		liter	1.5	
Number of cylinder	-	6		F/W cooler capacity	m ²			
Bore X Stroke	mm	100 X 110		L/O cooler capacity	m ²			
Displacement	liter	5.184		Sea water pump	Type	-	Jabsco	
Continuous duty	Output	kW	213.3	Fuel system	Displacement	liter/h	8300	
		hp	290		Water separator	-		
	Speed	min ⁻¹	3100		FO pump model	-	YPES-6AL	
	Mean effect pressure	Mpa	1.59		Injection timing (FID)	degree	12 to 14	
		kgf/cm ²	16.24		Injection pressure	Mpa	24.5 to 26.46	
	Piston speed	m/s	11.37		Injection nozzle	kgf/cm ²	260 to 270	
		g/kW-h	Below 241			Fuel filter	Type	-
	Fuel consumption	g/hp-h	Below 180		Fuel filter	Area	micron	35 (1400cm ²)
	Exhaust temperature	C-degree	Below 700			Applicable fuel oil	-	Diesel fuel
	Maximum duty	Exhaust smoke	Bosch		Below 2.3	Starting system	Type	-
Output			kW	257.4	Motor		V - kW	12V - 2.5kW
hp		350	Battery	V - Ah	12V - 120Ah			
Speed		min ⁻¹	3300	Valve clearance	Alternator	V - A	12V - 80A	
		Mean effect pressure	Mpa		1.81	Suction	mm	0.05 to 0.15
kgf/cm ²			18.41	Exhaust	mm	0.47 to 0.53		
Piston speed		m/s	12.1	Valve seat angle	Suction	degree	120	
		g/kW-h	Below 248		Exhaust	degree	90	
Fuel consumption		g/hp-h	Below 185		Cylinder liner	Inside diameter	mm	100.00 to 100.03
Exhaust temperature		C-degree	Below 750	Outside diameter		mm	102.98 to 103.10	
Exhaust smoke	Bosch	Below 2.5	Piston	Projection	mm	0.025 to 0.090		
	Firing order	-		1 - 4 - 2 - 6 - 3 - 5 - 1	Outside diameter	mm	99.905 to 99.915	
Position of FO Pump (viewed from stern)	-	Right		Pin hole diameter	mm	37		
Direction of rotation (Viewed from stern)	Crank shaft	-		Counter clockwise	Pin outside diameter	mm	36.989 to 37.000	
	Propeller	-		Clockwise	Ring groove	Top ring	mm	2.025 to 2.040
Lubricant	Pump type	-		Trochoid	2nd ring	mm	2.025 to 2.040	
		Pump capacity		liter/h	5670	3rd ring	mm	-
	Pressure	Mpa		0.44 to 0.54	Oil ring	mm	3.020 to 3.035	
		kgf/cm ²		4.5 to 5.5		Journal O/Diameter	mm	74.952 to 74.964
	Capacity of oil pan	liter		20	Pin O/Diameter	mm	75.000 to 75.045	
	Effective of oil pan	liter	8	Pin O/Diameter	mm	84.952 to 84.964		
	Oil consumption	g/kW-h	0.14 to 0.68	Con-rod	Small end bearing I/D	mm	37.03 to 37.05	
		g/hp-h	0.1 to 0.5		Large end bearing I/D	mm	65.000 to 65.042	
Applicable oil (API/SAE)	-	CD Class 15W40	Cam shaft	Cam height	Suction	mm	6.5	
Lube oil filter	-	Paper		Exhaust	mm	6.5		
Top clearance	mm	0.71 to 0.89		Journal Outside D.	mm	56.91 to 56.94		
Compression ratio	-	15.02		Bearing Inside D.	mm			
Combustion maximum pressure	Mpa	15.2		Side clearance	mm	0.05 to 0.20		
	kgf/cm ²	155		Piston ring	Thickness	Top ring	mm	3.630 to 3.870
Idling speed	min ⁻¹	670 to 730	2nd ring		mm	4.08 to 4.32		
High Idling speed	min ⁻¹	3690 to 3750	3rd ring		mm	-		
Turbocharger	Model	-	RHC7W (IHI)		Oil ring	mm	2.2 to 2.6	
	Cooling system	-	Water cooled		Breadth	Top ring	mm	1.975 to 1.990
Air cooler	Lube system	-	Common		2nd ring	mm	1.980 to 1.990	
	Cooling area	-	Colgate fin		3rd ring	mm	-	
		mm ²	-		Oil ring	mm	2.97 to 2.99	
Marine gear	Model	-	KMH6A		End gap	Top ring	mm	
	Type	-	Hydraulic Angle 10			2nd ring	mm	
	Reduction ratio	Ahead	-	1.58, 1.92, 2.26		3rd ring	mm	-
		Astern	-	1.58, 1.92, 2.26	Oil ring	mm		
	Capacity of oil pan	liter	4	Ring groove clearance	Top ring	mm	0.090 to 0.125	
	Effective of oil pan	liter	0.3		2nd ring	mm	0.035 to 0.070	
	Hydraulic oil pressure	MPa	2.26 to 3.24		3rd ring	mm	-	
		kgf/cm ²	27.5 to 28.5		Oil ring	mm	0.030 to 0.065	
	Lube oil pressure	Mpa		Tightening torque	Cylinder head	Across flat	mm	(M14)
		kgf/cm ²				Torque	kgf-m	11 to 17 to 19.22
Lube oil filter	-		Main bearing		Across flat	mm	(M15)	
Lube oil filter	-				Torque	kgf-m	23 to 25	
Applicable oil (API/SAE)	-	CD Class SAE30	Con. rod		Across flat	mm	(M12)	
Dry weight	kgf	102			Torque	kgf-m	13.5 to 14.5	
Dimension	Length	mm	1316		FW bolt	Across flat	mm	(M16)
	Width	mm	721			Torque	kgf-m	29 to 31
	Height	mm	709		Injection V	Across flat	mm	(M6)
Drawing out hight of piston	mm	-	Torque			kgf-m	0.40 to 0.50	
Dry weight (with Marine gear)	kgf	610						

Engine model 6LYA-UTE				Cooling system	Type				
Type	Configuration	-	Vertical Diesel		Fresh water pump	Type	-	Water cooled	Centrifugal
	Stroke cycle	-	4	Displacement		liter/h	20000		
	Cooling system	-	Water cooled	Tank		liter	20		
	Combustion system	-	Direct injection	Sub tank		liter	1.5		
Number of cylinder	-	-	6	F/W cooler capacity	m ³	-	-	-	
Bore X Stroke	mm	-	100 X 110	L/O cooler capacity	m ³	-	-	-	
Displacement	liter	-	5.184	Sea water pump	Type	-	Jabsco	-	
Continuous duty	Output	kW	191.2	Fuel system	Displacement	liter/h	11000	-	
		hp	260		Water separator	-	-	-	
	Speed	min ⁻¹	3100		FO pump model	-	-	YPES-6AL	
	Mean effect pressure	Mpa	1.43		Injection timing (FID)	degree	12 to 14	-	-
		kgf/cm ²	14.56			Injection pressure	Mpa	25.48 to 26.46	-
	Piston speed	m/s	11.37			kgf/cm ²	260 to 270	-	-
		g/kW-h	Below 241		Injection nozzle	-	5 - 0.34 X 145	-	-
	Fuel consumption	g/hp-h	Below 180		Fuel filter	Type	-	Paper	-
	Exhaust temperature	C-degree	Below 620		Area	micron	35 (1400cm ²)	-	-
		Bosch	Below 2.5		Applicable fuel oil	-	Diesel fuel	-	-
Maximum duty	Output	kW	231.7	Starting system	Type	-	Electric	-	
		hp	315		Motor	V - kW	12V - 2.5kW	-	-
	Speed	min ⁻¹	3300		Battery	V - Ah	12V - 120Ah	-	-
	Mean effect pressure	Mpa	1.62		Alternator	V - A	12V - 80A	-	-
		kgf/cm ²	16.57	Suction	mm	0.07 to 0.13	-	-	
	Piston speed	m/s	12.1	Exhaust	mm	0.37 to 0.43	-	-	
		g/kW-h	Below 248	Valve seat angle	Suction	degree	120	-	-
	Fuel consumption	g/hp-h	Below 185	Exhaust	degree	90	-	-	
	Exhaust temperature	C-degree	Below 660	Cylinder liner	Inside diameter	mm	100.00 to 100.03	-	-
		Bosch	Below 2.5	Outside diameter	mm	102.98 to 103.10	-	-	
Firing order	-	-	1 - 4 - 2 - 6 - 3 - 5 - 1	Projection	mm	0.025 to 0.090	-	-	
Position of FO Pump (viewed from stern)	-	-	Right	Piston	Outside diameter	mm	99.905 to 99.915	-	
Direction of rotation (Viewed from stern)	Crank shaft	-	Counter clockwise	Pin hole diameter	mm	37	-	-	
	Propeller	-	Clockwise	Pin outside diameter	mm	36.989 to 37.000	-	-	
Lubricant	Pump type	-	Trochoid	Ring groove	Top ring	mm	2.025 to 2.040	-	
		Pump capacity	liter/h	5670	2nd ring	mm	2.025 to 2.040	-	-
	Pressure	Mpa	0.392 to 0.490	3rd ring	mm	-	-	-	
		kgf/cm ²	4.0 to 5.0	Oil ring	mm	3.020 to 3.035	-	-	
	Capacity of oil pan	liter	20	Crank shaft	Journal O/Diameter	mm	74.952 to 74.964	-	
	Effective of oil pan	liter	8	Pin O/Diameter	mm	75.000 to 75.045	-	-	
	Oil consumption	g/kW-h	0.14 to 0.54	Pin O/Diameter	mm	64.952 to 64.964	-	-	
		g/hp-h	0.1 to 0.4	Con-rod	Small end bearing I/D	mm	37.03 to 37.05	-	-
	Applicable oil (API/SAE)	-	-	CD Class 15W40	Large end bearing I/D	mm	65.000 to 65.042	-	-
	Lube oil filter	-	-	Paper	Cam shaft	Cam height	Suction	mm	6.5
					Exhaust	mm	6.5	-	
Top clearance	mm	-	0.71 to 0.89	Journal Outside D.	mm	56.91 to 56.94	-	-	
Compression ratio	-	-	15.2	Bearing Inside D.	mm	-	-	-	
Combustion maximum pressure	Mpa	-	14.7	Side clearance	mm	0.05 to 0.20	-	-	
	kgf/cm ²	-	150	Piston ring	Thickness	Top ring	mm	3.630 to 3.870	
Idling speed	min ⁻¹	-	675 to 725		2nd ring	mm	4.08 to 4.32	-	
High idling speed	min ⁻¹	-	3695 to 3705		3rd ring	mm	-	-	
Turbocharger	Model	-	RHC7W (IHI)		Oil ring	mm	2.2 to 2.6	-	
	Cooling system	-	Water cooled	Breadth	Top ring	mm	1.975 to 1.990	-	
	Lube system	-	Common		2nd ring	mm	1.980 to 1.990	-	
Air cooler	Type	-	Plate fin (SERCK)		3rd ring	mm	-	-	
	Cooling area	m ²	-		Oil ring	mm	2.97 to 2.99	-	
Marine gear	Model	-	-	End gap	Top ring	mm	-	-	
	Type	-	-		2nd ring	mm	-	-	
	Reduction ratio	Ahead	-	-		3rd ring	mm	-	-
		Astern	-	-		Oil ring	mm	-	-
	Capacity of oil pan	liter	-	-	Ring groove clearance	Top ring	mm	0.090 to 0.125	
	Effective of oil pan	-	-	-		2nd ring	mm	0.035 to 0.070	
	Hydraulic oil pressure	MPa	-	-		3rd ring	mm	-	-
		kgf/cm ²	-	-		Oil ring	mm	0.030 to 0.065	-
	Lube oil pressure	Mpa	-	-	Tightening torque	Cylinder head	Across flat	mm	(M14)
		kgf/cm ²	-	-		Torque	kgf-m	11 to 17 to 19,22	-
Lube oil filter	-	-	-		Across flat	mm	(M15)	-	
Applicable oil (API/SAE)	-	-	-		Torque	kgf-m	23 to 25	-	
Dry weight	kgf	-	-		Con. rod	Across flat	mm	(M12)	
Dimension	Length	mm	1274.9		Torque	kgf-m	13.5 to 14.5	-	
	Width	mm	708		FW bolt	Across flat	mm	(M16)	
	Height	mm	709		Torque	kgf-m	29 to 31	-	
Drawing out hight of piston	mm	-	-	Injection V	Across flat	mm	(M6)	-	
Dry weight (with Marine gear)	kgf	-	510		Torque	kgf-m	0.40 to 0.50	-	

Engine model 6LYA-S TE				Cooling system	Type	-	Water cooled		
Type	Configuration	-	Vertical Diesel		Fresh water pump	Type	-	Centrifugal	
	Stroke cycle	-	4	Displacement		liter/h	20000		
	Cooling system	-	Water cooled	Tank		liter	20		
	Combustion system	-	Direct injection	Sub tank		liter	1.5		
Number of cylinder				-	F/W cooler capacity	m ²			
Bore X Stroke				mm	L/O cooler capacity	m ²			
Displacement				liter	5.184	Sea water pump	Type	-	Jabsco
Continuous duty	Output	kW	213.3	Fuel system	Displacement	liter/h	11000		
		hp	290		Water separator	-	-		
	Speed	min ⁻¹	3100	FO pump model	-	YPES-6AL			
	Mean effect pressure	Mpa	1.59	Injection timing (FID)	degree	12 to 14			
		kgf/cm ²	16.24	Injection pressure	Mpa	25.48 to 26.46			
	Piston speed	m/s	11.37	Injection pressure	kgf/cm ²	260 to 270			
	Fuel consumption	g/kW-h	Below 241	Injection nozzle	-	5 - 0.35 X 140			
		g/hp-h	Below 180	Fuel filter	Type	-	Paper		
	Exhaust temperature	C-degree	Below 700	Fuel filter	Area	micron	35 (4000cm ²)		
	Exhaust smoke	Bosch	Below 2.5	Applicable fuel oil	-	Diesel fuel			
Maximum duty	Output	kW	257.4	Starting system	Type	-	Electric		
		hp	350		Motor	V - kW	12V - 3.0kW		
	Speed	min ⁻¹	3300		Battery	V - Ah	12V - 120Ah		
	Mean effect pressure	Mpa	1.81		Alternator	V - A	12V - 80A		
		kgf/cm ²	18.41	Valve clearance	Suction	mm	0.07 to 0.13		
	Piston speed	m/s	12.1	Exhaust	mm	0.47 to 0.53			
	Fuel consumption	g/kW-h	Below 248	Valve seat angle	Suction	degree	120		
		g/hp-h	Below 185	Exhaust	degree	90			
	Exhaust temperature	C-degree	Below 750	Cylinder liner	Inside diameter	mm	100.00 to 100.03		
	Exhaust smoke	Bosch	Below 2.5		Outside diameter	mm	102.98 to 103.10		
Firing order	-	1 - 4 - 2 - 6 - 3 - 5 - 1	Piston	Projection	mm	0.025 to 0.090			
Position of FO Pump (viewed from stern)	-	Right		Outside diameter	mm	99.905 to 99.915			
Direction of rotation	Crank shaft	-		Counter clockwise	Pin hole diameter	mm	37		
	Propeller	-		Clockwise	Pin outside diameter	mm	36.989 to 37.000		
Lubricant	Pump type	-	Trochoid	Ring groove	Top ring	mm	2.025 to 2.040		
		Pump capacity	liter/h	5670	2nd ring	mm	2.025 to 2.040		
	Pressure	Mpa	0.392 to 0.490	3rd ring	mm	-			
		kgf/cm ²	4.0 to 5.0	Oil ring	mm	3.020 to 3.035			
	Capacity of oil pan	liter	20	Crank shaft	Journal O/Diameter	mm	74.952 to 74.964		
	Effective of oil pan	liter	8		Pin O/Diameter	mm	75.900 to 75.045		
	Oil consumption	g/kW-h	0.14 to 0.54		Pin O/Diameter	mm	64.952 to 64.964		
	Applicable oil (API/SAE)	-	CD Class 15W40	Small end bearing I/D	mm	37.03 to 37.05			
		Lube oil filter	-	Paper	Large end bearing I/D	mm	65.000 to 65.042		
	Top clearance	mm	0.71 to 0.89	Cam shaft	Cam height	Suction	mm	6.5	
Compression ratio	-	15.2	Exhaust		mm	6.5			
Combustion maximum pressure	Mpa	15.2	Journal Outside D.		mm	56.91 to 56.94			
	kgf/cm ²	155	Bearing Inside D.		mm	-			
Idling speed	min ⁻¹	670 to 730	Piston ring	Side clearance	mm	0.05 to 0.20			
High idling speed	min ⁻¹	3690 to 3750		Thickness	Top ring	mm	3.630 to 3.870		
Turbocharger	Model	-			RHC7W (IH)	2nd ring	mm	4.08 to 4.32	
	Cooling system	-			Water cooled	3rd ring	mm	-	
Air cooler	Lube system	-			Common	Oil ring	mm	2.2 to 2.6	
	Cooling area	m ²		-	Breadth	Top ring	mm	1.975 to 1.990	
Marine gear	Model	-		-	2nd ring	mm	1.980 to 1.990		
		Type		-	-	3rd ring	mm	-	
	Reduction ratio	Ahead		-	-	Oil ring	mm	2.97 to 2.99	
		Astern		-	-	End gap	Top ring	mm	-
	Capacity of oil pan	liter	-	2nd ring	mm		-		
	Effective of oil pan	liter	-	3rd ring	mm		-		
	Hydraulic oil pressure	MPa	-	-	Oil ring		mm	-	
		kgf/cm ²	-	-	Ring groove clearance	Top ring	mm	0.090 to 0.125	
	Lube oil pressure	Mpa	-	2nd ring		mm	0.035 to 0.070		
	Lube oil filter	kgf/cm ²	-	-		3rd ring	mm	-	
kgf/cm ²		-	-	Oil ring		mm	0.030 to 0.065		
Applicable oil (API/SAE)	-	-	-	Tightening torque	Cylinder head	Across flat	mm	(M14)	
Dry weight	kgf	-	-		Torque	kgf-m	11 to 17 to 19,22		
Dimension	Length	mm	1274.9		Main bearing	Across flat	mm	(M15)	
	Width	mm	708		Torque	kgf-m	23 to 25		
Drawing out hight of piston	mm	-	-	Con. rod	Across flat	mm	(M12)		
	mm	-	-		Torque	kgf-m	13.5 to 14.5		
Dry weight (with Marine gear)	kgf	-	-	FW bolt	Across flat	mm	(M16)		
	kgf	510	-		Torque	kgf-m	29 to 31		
Injection V	Across flat	mm	(M6)	Injection V	Across flat	mm	(M6)		
	Torque	kgf-m	0.40 to 0.50		Torque	kgf-m	0.40 to 0.50		

Engine model				6LY2-STE					
Type	Configuration	-	Vertical Diesel	Cooling system	Fresh water	Type	-	Water cooled	
	Stroke cycle	-	4		pump	Displacement	liter/h	17000	Centrifugal
	Cooling system	-	Water cooled			Tank	liter	24	
	Combustion system	-	Direct injection			Sub tank	liter	1.5	
	Number of cylinder	-	6			F/W cooler capacity	m ³	20	
Bore X Stroke	mm	105.9 X 110	L/O cooler capacity	m ³					
Displacement	liter	58133.538	Sea water	Type	-	Jabaco			
Continuous duty	Output	kW	257.4	Fuel system	Water separator	FO pump model	-	YPES-6AL	
		hp	350			Injection timing (FID)	degree	14 to 16	
	Speed	min ⁻¹	3100		Injection pressure		Mpa	27.4	
		Mean effect pressure	Mpa			0	kgf/cm ²	280 to 290	
			kgf/cm ²		0	Injection nozzle	-	5 - 0.34 X 145	
	Piston speed	m/s	11.37		Fuel filter	Type	-	Paper	
	Fuel consumption	g/kW-h	Below 248			Area	micron	35 (4000cm ²)	
		g/hp-h	Below 185		Applicable fuel oil	-	-	Diesel fuel	
	Exhaust temperature	C-degree	Below 700			Starting system	Type	-	Electric
	Exhaust smoke	Bosch	Below 2.5		Motor		V - kW	12V - 2.5kW	
Output		kW	308.9	Battery			V - Ah	12V - 120Ah	
Maximum duty	Speed	min ⁻¹	3300	Alternator	V - A		12V - 80A		
		Mean effect pressure	Mpa		0		Suction	mm	0.05 to 0.15
			kgf/cm ²	0	Exhaust	mm		0.35 to 0.45	
	Piston speed	m/s	12.1	Valve seat angle	Suction	degree	120		
	Fuel consumption	g/kW-h	Below 255		Exhaust	degree	90		
		g/hp-h	Below 190	Cylinder liner	Inside diameter	mm	100.00 to 100.03		
	Exhaust temperature	C-degree	Below 760		Outside diameter	mm	102.98 to 103.10		
	Exhaust smoke	Bosch	Below 2.5	Projection	mm	0.025 to 0.090			
		Firing order	-	1 - 4 - 2 - 6 - 3 - 5 - 1	Piston	Outside diameter	mm	99.905 to 99.915	
	Position of FO Pumps (viewed from stern)	-	Right	Pin hole diameter		mm	37		
Direction of rotation (Viewed from stern)	Crank shaft	-	Counter clockwise	Pin outside diameter		mm	36.989 to 37.000		
	Propeller	-	Clockwise	Ring groove		Top ring	mm	2.025 to 2.046	
Lubricant	Pump type	-	Trochoid	2nd ring		mm	2.570 to 2.585		
		Pump capacity	liter/h	5670	3rd ring	mm	-		
	Pressure		Mpa	0.441 to 0.539	Oil ring	mm	4.010 to 4.025		
			kgf/cm ²	4.5 to 5.5	Crank shaft	Journal O/Diameter	mm	74.952 to 74.964	
	Capacity of oil pan	liter	16.4	Pin O/Diameter		mm	75.000 to 75.045		
	Effective of oil pan	liter	8	Pin O/Diameter	mm	64.952 to 64.964			
	Oil consumption	g/kW-h	0.14 to 0.54	Con-rod	Small end bearing I/D	mm	37.03 to 37.05		
		g/hp-h	0.1 to 0.4		Large end bearing I/D	mm	65.000 to 65.042		
	Applicable oil (API/SAE)	-	CD Class 15W40	Cam shaft	Cam height	Suction	mm	6.5	
	Lube oil filter	-	Paper		Exhaust	mm	6.5		
Top clearance	mm	0.70 to 0.90	Journal Outside D.		mm	56.91 to 56.94			
	Compression ratio	-			15.2	Bearing Inside D.	mm		
Combustion maximum pressure	Mpa	16.7	Side clearance		mm	0.05 to 0.20			
		kgf/cm ²		170	Piston ring	Thickness	Top ring	mm	3.630 to 3.870
Idling speed	min ⁻¹	675 to 725	2nd ring	mm		4.08 to 4.32			
	High idling speed	min ⁻¹		3645 to 3695		3rd ring	mm	-	
Turbocharger	Model	-	RHC7W (IHI)	Oil ring		mm	2.2 to 2.6		
		Cooling system	-	Water cooled		Breadth	Top ring	mm	1.975 to 1.990
	Lube system	-	Common	2nd ring	mm		1.980 to 1.990		
Air cooler	Type	-	Plate fin (SERCK)	3rd ring	mm	-			
	Cooling area	m ²	-	Oil ring	mm	2.97 to 2.99			
		Marine gear	Model	-	KMH6A1	End gap	Top ring	mm	
Type	-	Hydraulic Angle 10	2nd ring	mm					
Reduction ratio	Ahead	-	1.58, 1.92, 2.26	3rd ring	mm		-		
Marine gear	Capacity of oil pan	liter	4	Oil ring	mm				
		Effective of oil pan	liter	0.3	Ring groove clearance	Top ring	mm	0.090 to 0.125	
	Hydraulic oil pressure	MPa	3.05 to 3.15	2nd ring		mm	0.086 to 0.096		
			kgf/cm ²	31.5 to 32.5	3rd ring	mm	-		
	Lube oil pressure	Mpa	-	Oil ring	mm	0.035 to 0.040			
			kgf/cm ²	-	Tightening torque	Cylinder head	Across flat	mm	(M14)
	Lube oil filter	-	-	Torque		kgf-m	12 to 18 to 22,24		
	Applicable oil (API/SAE)	-	CD Class SAE30	Main bearing		Across flat	mm	(M15)	
	Dry weight	kgf	102			Torque	kgf-m	23 to 25	
		Dimension	Length	mm		1316	Con. rod	Across flat	mm
Width	mm		709	Torque	kgf-m	13.5 to 14.5			
Height	mm		724.3	FW bolt	Across flat	mm	(M16)		
Drawing out hight of piston	mm	-	Torque		kgf-m	29 to 31			
	Dry weight (with Marine gear)	kgf	637	Injection V	Across flat	mm	(M6)		
Torque		kgf-m	1.00 to 1.20						

Engine model 4LHA-HTE				Cooling system		Type	-	Water cooled
Type	Configuration	-	Vertical Diesel	Fresh water pump	Type	-	Centrifugal	
	Stroke cycle	-	4		Displacement	liter/h	9700	
	Cooling system	-	Water cooled		Tank	liter	14	
	Combustion system	-	Direct injection		Sub tank	liter	0.8	
Number of cylinder	-	4		F/W cooler capacity	m ²			
Bore X Stroke	mm	100 X 110		L/O cooler capacity	m ²			
Displacement	liter	3.456		Sea water pump	Type	-	Jabsco	
Continuous duty	Output	kW	91.2	Fuel system	Displacement	liter/h	5500	
		hp	124		Water separator	-		
	Speed	min ⁻¹	3100		FO pump model	-	VE-HDI (Zexel)	
	Mean effect pressure	Mpa	1.02		Injection timing (FID)	degree	5 to 7	
		kgf/cm ²	10.42		Injection pressure	Mpa	20.6 to 21.5	
	Piston speed	m/s	11.37		Injection pressure	kgf/cm ²	210 to 220	
	Fuel consumption	g/kW-h	Below 227		Injection nozzle	-	5 - 0.28 X 140	
		g/hp-h	Below 170		Fuel filter	Type	-	Paper
	Exhaust temperature	C-degree	Below 560		Applicable fuel oil	Area	micron	35 (1400cm ²)
	Exhaust smoke	Bosch	Below 2.0					Diesel fuel
Maximum duty	Output	kW	110.3	Starting system	Type	-	Electric	
		hp	150		Motor	V - kW	12V - 2.5kW	
	Speed	min ⁻¹	3300		Battery	V - Ah	12V - 120Ah	
	Mean effect pressure	Mpa	1.16	Alternator	V - A	12V - 55A		
		kgf/cm ²	11.84	Valve clearance	Suction	mm	0.05 to 0.15	
	Piston speed	m/s	12.1		Exhaust	mm	0.25 to 0.35	
	Fuel consumption	g/kW-h	Below 248		Valve seat angle	Suction	degree	120
		g/hp-h	Below 185	Exhaust		degree	90	
	Exhaust temperature	C-degree	Below 630	Cylinder liner	Inside diameter	mm	100.00 to 100.03	
	Exhaust smoke	Bosch	Below 2.5		Outside diameter	mm	103.00 to 103.03	
Firing order	-	1 - 3 - 4 - 2 - 1	Piston	Projection	mm	0.025 to 0.090		
Position of FO Pump (viewed from stern)	-	Right		Outside diameter	mm	99.895 to 99.925		
Direction of rotation	Crank shaft	-	Counter clockwise	Pin hole diameter	mm	34.000 to 34.011		
	Propeller	-	Clockwise	Pin outside diameter	mm	33.989 to 34.000		
Lubricant	Pump type	-	Trochoid	Ring groove	Top ring	mm	2.095 to 2.110	
	Pump capacity	liter/h	2600	2nd ring	mm	2.045 to 2.060		
		Pressure	Mpa	0.441 to 0.539	3rd ring	mm	-	
	Capacity of oil pan	liter	13	Oil ring	mm	3.020 to 3.035		
		Effective of oil pan	liter	5	Crank shaft	Journal O/Diameter	mm	69.952 to 69.964
	Oil consumption	g/kW-h	0.27 to 0.68	Pin O/Diameter		mm	70.000 to 70.045	
		g/hp-h	0.2 to 0.5	Pin O/Diameter		mm	59.952 to 59.964	
	Applicable oil (API/SAE)	-	CD Class 15W40	Con-rod	Small end bearing L/D	mm	34.04 to 34.04	
	Lube oil filter	-	Paper		Large end bearing L/D	mm	60.000 to 60.042	
	Top clearance	mm	0.81 to 0.99	Cam shaft	Cam height	Suction	mm	48.435 to 48.565
Compression ratio	-	16.2	Exhaust		mm	49.435 to 49.565		
Combustion maximum pressure	Mpa	11.6	Piston ring	Journal Outside D.	mm	56.91 to 56.94		
	kgf/cm ²	118		Bearing Inside D.	mm	56.98 to 57.05		
Idling speed	min ⁻¹	725 to 775		Thickness	Side clearance	mm	0.05 to 0.20	
High idling speed	min ⁻¹	2675 to 3725			Top ring	mm	1.47 to 1.49	
Turbocharger	Model	-	RHC61W (IH)	2nd ring	mm	1.97 to 1.99		
	Cooling system	-	Water cooled	3rd ring	mm	-		
Air cooler	Lube system	-	Common	Oil ring	mm	2.97 to 2.99		
	Type	-	Plate fin (SERCK)	Breadth	Top ring	mm	1.975 to 1.990	
Cooling area	m ²	-	2nd ring		mm	1.975 to 1.990		
Marine gear	Model	-	HSW450A2	3rd ring	mm	-		
	Type	-	Mecha. Angle 8	Oil ring	mm	2.92 to 2.99		
		Reduction ratio	Ahead	1.26, 1.51, 2.03, 2.43	End gap	Top ring	mm	0.25 to 0.40
	ratio	Astern	1.26, 1.51, 2.03, 2.43	2nd ring		mm	0.25 to 0.40	
	Capacity of oil pan	liter	2.1	3rd ring	mm	-		
		Effective of oil pan	liter	0.3	Oil ring	mm	0.30 to 0.50	
	Hydraulic oil pressure	Mpa	2.1 to 2.3	Ring groove clearance	Top ring	mm	0.105 to 0.135	
		kgf/cm ²	21 to 23		2nd ring	mm	0.055 to 0.085	
	Lube oil pressure	Mpa	(Splash)		3rd ring	mm	-	
		kgf/cm ²	-		Oil ring	mm	0.030 to 0.065	
Lube oil filter	-	Paper	Tightening torque	Cylinder head	Across flat	mm	17	
Applicable oil (API/SAE)	-	CD Class SAE30			Torque	kgf-m	15 to 17	
Dry weight	kgf	48		Main bearing	Across flat	mm	19	
	mm	1058 (1022)			Torque	kgf-m	19.5 to 20.5	
Dimension	Length	mm	1058 (1022)	Con. rod	Across flat	mm	17	
	Width	mm	681		Torque	kgf-m	11.5 to 12.5	
	Height	mm	741	FW bolt	Across flat	mm	22	
Drawing out hight of piston	mm			Torque	kgf-m	19 to 21		
Dry weight (with Marine gear)	kgf	388		Injection V	Across flat	mm	10	
	Torque	kgf-m	0.40 to 0.50					

Engine model 6LP-DTE				
Type	Configuration	-	Vertical Diesel	
	Stroke cycle	-	4	
	Cooling system	-	Water cooled	
	Combustion system	-	Direct Injection	
Number of cylinder		-	6	
Bore X Stroke		mm	94 X 100	
Displacement		liter	4.164	
Continuous duty	Output	kW	154.5	
		hp	210	
	Speed	min ⁻¹	3600	
	Mean effect pressure	Mpa	1.24	
		kgf/cm ²	12.61	
	Piston speed	m/s	12.00	
		g/kW-h	Below 245	
	Fuel consumption	g/hp-h	Below 183	
		C-degree	Below 580	
	Exhaust temperature	Bosch	Below 2.0	
Output		kW	183.9	
Maximum duty	Output	hp	250	
		min ⁻¹	3800	
	Mean effect pressure	Mpa	1.39	
		kgf/cm ²	14.22	
	Piston speed	m/s	12.67	
		g/kW-h	Below 259	
	Fuel consumption	g/hp-h	Below 193	
		C-degree	Below 650	
	Exhaust temperature	Bosch	Below 2.0	
		Firing order	-	1 - 4 - 2 - 6 - 3 - 5 - 1
Position of FO Pump (viewed from stern)		-	Left	
Direction of rotation (Viewed from stern)	Crank shaft	-	Counter clockwise	
	Propeller	-	Clockwise	
Lubricant	Pump type	-	Trochoid	
	Pump capacity	liter/h	2800	
	Pressure	Mpa	0.39 to 0.49	
		kgf/cm ²	4.0 to 5.0	
	Capacity of oil pan	liter	10	
	Effective of oil pan	liter	1.4	
	Oil consumption	g/kW-h	0.14 to 0.54	
		g/hp-h	0.1 to 0.4	
Applicable oil (API/SAE)	-	CD Class 15W40		
Lube oil filter	-	Paper		
Top clearance	mm	0.67 to 0.77		
Compression ratio	-	15.9		
Combustion maximum pressure	Mpa	14		
	kgf/cm ²	143		
Idling speed	min ⁻¹	725 to 775		
High idling speed	min ⁻¹	4175 to 4225		
Turbocharger	Model	-	RHE62W (IH)	
	Cooling system	-	Water cooled	
Air cooler	Lube system	-	Common	
	Type	-	Plate fin (SERCK)	
Cooling area	m ²	-	-	
	Marine gear	Model	-	
Type	-	-		
Reduction ratio	Ahead	-	-	
	Astern	-	-	
Capacity of oil pan	liter	-		
Effective of oil pan	-	-		
Hydraulic oil pressure	MPa	-		
	kgf/cm ²	-		
Lube oil pressure	Mpa	-		
	kgf/cm ²	-		
Lube oil filter	-	-		
Applicable oil (API/SAE)	-	-		
Dry weight	kgf	-		
Dimension	Length	mm	1065	
	Width	mm	671	
	Height	mm	739	
Drawing out height of piston	mm	-		
Dry weight (with Marine gear)	kgf	380		
Cooling system	Type	-	Water cooled	
	Fresh water pump	Type	-	Centrifugal
		Displacement	liter/h	11400
		Tank	liter	13.5
		Sub tank	liter	1.6
	F/W cooler capacity	m ²	-	
	L/O cooler capacity	m ²	-	
	Sea water pump	Type	-	Jabeco
		Displacement	liter/h	7500
	Water separator	-	-	
Fuel system	FO pump model	-	VE (Denso)	
	Injection timing (FID)	degree	12.5 to 14.5	
		Mpa	24.5 to 30.5	
	Injection pressure	kgf/cm ²	250 to 310	
		Type	-	5 - 0.32 X 141
	Fuel filter	Type	-	Paper
Area		micron	35 (3200 cm ²)	
Applicable fuel oil	-	-	Diesel fuel	
Starting system	Type	-	Electric	
	Motor	V - kW	12V - 2.5kW	
	Battery	V - Ah	12V - 120Ah	
Alternator	V - A	12V - 80		
	Valve clearance	Suction	mm	0.15 to 0.25
Exhaust		mm	0.35 to 0.45	
Valve seat angle	Suction	degree	90	
	Exhaust	degree	90	
Cylinder liner	Inside diameter	mm	94.000 to 94.030	
	Outside diameter	mm	-	
Piston	Projection	mm	-	
	Outside diameter	mm	93.95 to 93.98	
	Pin hole diameter	mm	-	
	Pin outside diameter	mm	33.000 to 33.012	
	Ring groove	Top ring	mm	2.04 to 2.06
		2nd ring	mm	2.05 to 2.07
		3rd ring	mm	-
Oil ring		mm	4.020 to 4.040	
Crank shaft	Journal O/Diameter	mm	66.982 to 67.000	
	Pin O/Diameter	mm	-	
Con-rod	Pin O/Diameter	mm	58.982 to 59.000	
	Small end bearing I/D	mm	33.008 to 33.020	
Large end bearing I/D	mm	62.014 to 62.032		
	Cam shaft	Cam height	Suction	mm
Cam shaft	Exhaust	mm	55.940 to 55.960	
	Journal Outside D.	mm	34.969 to 34.985	
	Bearing Inside D.	mm	-	
	Side clearance	mm	-	
	Piston ring	Thickness	Top ring	mm
2nd ring			mm	-
3rd ring			mm	-
Oil ring			mm	-
Breath		Top ring	mm	-
		2nd ring	mm	-
		3rd ring	mm	-
		Oil ring	mm	-
End gap		Top ring	mm	0.270 to 0.470
		2nd ring	mm	0.400 to 0.650
	3rd ring	mm	-	
	Oil ring	mm	0.200 to 0.500	
Ring groove clearance	Top ring	mm	0.050 to 0.095	
	2nd ring	mm	0.060 to 0.100	
	3rd ring	mm	-	
	Oil ring	mm	0.030 to 0.070	
Tightening torque	Cylinder head	Across flat	mm	-
		Torque	kgfm	7 & 90deg & 90deg
	Main bearing	Across flat	mm	-
		Torque	kgfm	10.5 & 90 deg
	Con. rod	Across flat	mm	-
		Torque	kgfm	3.75 & 90 deg
FW bolt	Across flat	mm	-	
	Torque	kgfm	13	
Injection V	Across flat	mm	-	
	Torque	kgfm	4	

Engine model 6LP-STE				Cooling system	Type	-	Water cooled		
Type	Configuration	-	Vertical Diesel		Fresh water pump	Type	-	Centrifugal	
	Stroke cycle	-	4		Displacement	liter/h	11400		
	Cooling system	-	Water cooled		Tank	liter	13.5		
	Combustion system	-	Direct injection		Sub tank	liter	1.6		
Number of cylinder	-	6		F/W cooler capacity	m ²	-			
Bore X Stroke	mm	94 X 100		L/O cooler capacity	m ²	-			
Displacement	liter	4,164		Sea water pump	Type	-	Jabsco		
Continuous duty	Output	kW	187.6	Fuel system	Displacement	liter/h	7500		
		hp	255		Water separator	-	-	-	
	Speed	min ⁻¹	3600	FO pump model	-	-	VE (Denso)		
	Mean effect pressure	Mpa	1.5	Injection timing (FID)	degree	12.5 to 14.5			
		kgf/cm ²	15.31	Injection pressure	Mpa	24.5 to 30.5			
	Piston speed	m/s	12		kgf/cm ²	250 to 310			
	Fuel consumption	g/kW-h	Below 241	Injection nozzle	-	6 - 0.30 X 140			
		g/hp-h	Below 180	Fuel filter	Type	-	Paper		
	Exhaust temperature	C-degree	Below 580		Area	micron	35 (3200 cm ²)		
	Exhaust smoke	Bosch	Below 2.0	Applicable fuel oil	-	-	Diesel fuel		
Maximum duty	Output	kW	220.7	Starting system	Type	-	Electric		
		hp	300		Motor	V - kW	12V - 2.5kW		
	Speed	min ⁻¹	3800		Battery	V - Ah	12V - 120Ah		
	Mean effect pressure	Mpa	1.67		Alternator	V - A	12V - 80		
		kgf/cm ²	17.06	Valve clearance	Suction	mm	0.17 to 0.23		
	Piston speed	m/s	12.67		Exhaust	mm	0.35 to 0.45		
	Fuel consumption	g/kW-h	Below 248		Valve seat angle	Suction	degree	90	
		g/hp-h	Below 185	Exhaust		degree	90		
Exhaust temperature	C-degree	Below 680	Cylinder liner	Inside diameter	mm	94.000 to 94.030			
Exhaust smoke	Bosch	Below 2.0		Outside diameter	mm	-			
				Projection	mm	-			
Firing order	-	1 - 4 - 2 - 6 - 3 - 5 - 1	Piston	Outside diameter	mm	93.95 to 93.98			
Position of FO Pump (viewed from stem)	-	Left		Pin hole diameter	mm	-			
Direction of rotation (Viewed from stem)	Crank shaft	-		Counter clockwise	Pin outside diameter	mm	33.000 to 33.012		
	Propeller	-		Clockwise	Ring groove	Top ring	mm	2.04 to 2.06	
Lubricant	Pump type	-	Trochoid	2nd ring	mm	2.05 to 2.07			
		Pump capacity	liter/h	2800	3rd ring	mm	-		
	Pressure	Mpa	0.343 to 0.441	Oil ring	mm	4.02 to 4.04			
		kgf/cm ²	3.5 to 4.5	Crank shaft	Journal O/Diameter	mm	66.982 to 67.000		
	Capacity of oil pan	liter	10.5		Pin O/Diameter	mm	58.982 to 59.000		
	Effective of oil pan	liter	1.4		Con-rod	Small end bearing I/D	mm	33.008 to 33.020	
	Oil consumption	g/kW-h	0.14 to 0.54		Large end bearing I/D	mm	62.014 to 62.032		
		g/hp-h	0.1 to 0.4	Cam shaft	Cam height	Suction	mm	48.498 to 48.598	
Applicable oil (API/SAE)	-	CD Class 15W40	Exhaust		mm	50.734 to 50.834			
Lube oil filter	-	Paper	Journal Outside D.		mm	34.869 to 34.985			
			Bearing Inside D.		mm	-			
Top clearance	mm	0.67 to 0.77		Side clearance	mm	-			
Compression ratio	-	15.1	Piston ring	Thickness	Top ring	mm	-		
Combustion maximum pressure	Mpa	13.7			2nd ring	mm	-		
	kgf/cm ²	140			3rd ring	mm	-		
Idling speed	min ⁻¹	725 to 775				Oil ring	mm	-	
High idling speed	min ⁻¹	4175 to 4225	Breadth	Top ring	mm	-			
Turbocharger	Model	-		RHE62W (IH)	2nd ring	mm	-		
	Cooling system	-		Water cooled	3rd ring	mm	-		
Air cooler	Lube system	-		Common	Oil ring	mm	-		
	Type	-	Plate fin (SERCK)	End gap	Top ring	mm	0.270 to 0.470		
Cooling area	m ²	-	2nd ring		mm	0.400 to 0.650			
Marine gear	Model	-	-		3rd ring	mm	-		
		Reduction ratio	Ahead		-	Oil ring	mm	0.200 to 0.500	
	Capacity of oil pan	liter	-	-	Ring groove clearance	Top ring	mm	0.050 to 0.095	
		Effective of oil pan	liter	-		2nd ring	mm	0.060 to 0.100	
	Hydraulic oil pressure	MPa	-	-		3rd ring	mm	-	
		kgf/cm ²	-	-		Oil ring	mm	0.030 to 0.070	
	Lube oil pressure	MPa	-	-	Tightening torque	Cylinder head	Across flat	mm	-
		kgf/cm ²	-	-		Torque	Nm/kgm	7 & 90deg & 90deg	
	Lube oil filter	-	-	-		Main bearing	Across flat	mm	-
	Applicable oil (API/SAE)	-	-	-			Torque	Nm/kgm	10.5 & 90 deg
	Dry weight	kgf	-	-	Con. rod	Across flat	mm	-	
						Torque	Nm/kgm	3.75 & 90 deg	
Dimension	Length	mm	1065	FW bolt	Across flat	mm	-		
	Width	mm	671		Torque	Nm/kgm	13		
	Height	mm	739	Injection V	Across flat	mm	-		
Drawing out hight of piston	mm	-	Torque		kgf-m	4			
Dry weight (with Marine gear)	kgf	408							

Engine model 6CX-E7E				Cooling system	Type	-	Water cooled	
Type	Configuration	-	Vertical Diesel		Fresh water pump	Type	-	Centrifugal
	Stroke cycle	-	4	Displacement		liter/h	13000	
	Cooling system	-	Water cooled	Tank		liter	36	
	Combustion system	-	Direct injection	Sub tank		liter	1.1	
Number of cylinder	-	6		F/W cooler capacity	m ²	1.86		
Bore X Stroke	mm	100 X 125		L/O cooler capacity	m ²			
Displacement	liter	5.891		Sea water pump	Type	-	Jabsco	
Continuous duty	Output	kW	275.8	Fuel system	Displacement	liter/h	9820	
		hp	375		Water separator	-		
	Speed	min ⁻¹	2600		FO pump model	-	YPES-PS	
	Mean effect pressure	Mpa	2.16		Injection timing (FID)	degree	11 to 13	
		kgf/cm ²	22.03		Injection pressure	Mpa	23 to 24	
						kgf/cm ²	235 to 245	
	Piston speed	m/s	10.83		Injection nozzle	-	5 - 0.34 X 150	
	Fuel consumption	g/kW-h	Below 225		Fuel filter	Type	-	Paper
		g/hp-h	Below 168		Area	micron	35 (3600X2 cm ²)	
	Exhaust temperature	C-degree	Below 550		Applicable fuel oil	-	Diesel fuel	
Exhaust smoke	Bosch	Below 1.5						
Maximum duty	Output	kW	308.9	Starting system	Type	-	Electric	
		hp	420		Motor	V - kW	12V - 4kW	
	Speed	min ⁻¹	2700		Battery	V - Ah	12V - 200Ah	
	Mean effect pressure	Mpa	2.33		Alternator	V - A	12V - 55A	
		kgf/cm ²	23.77	Valve clearance	Suction	mm	0.22 to 0.28	
					Exhaust	mm	0.37 to 0.43	
	Piston speed	m/s	11.25		Valve seat angle	Suction	degree	120
	Fuel consumption	g/kW-h	Below 232	Exhaust		degree	90	
		g/hp-h	Below 173					
	Exhaust temperature	C-degree	Below 580	Cylinder liner	Inside diameter	mm	110.00 to 110.03	
Exhaust smoke	Bosch	Below 1.8	Outside diameter		mm	113.98 to 114.01		
Firing order	-	1 - 4 - 2 - 6 - 3 - 5 - 1		Projection	mm	0.03 to 0.09		
Position of FO Pump (viewed from stern)	-	Left	Piston	Outside diameter	mm	110.00 to 110.03		
Direction of rotation (Viewed from stern)	Crank shaft	Counter clockwise		Pin hole diameter	mm	45.988 to 45.997		
Lubricant	Propeller	-		Clockwise	Pin outside diameter	mm	46.000 to 46.011	
	Pump type	-		Gear pump	Ring groove	Top ring	mm	3.095 to 3.105
Pump capacity	liter/h	6720		2nd ring	mm	2.565 to 2.580		
Pressure		Mpa		3rd ring	mm	2.540 to 2.555		
		kgf/cm ²	4.5 to 5.5	Oil ring	mm	5.020 to 5.035		
Capacity of oil pan	liter	23	Crank shaft	Journal O/Diameter	mm	85.94 to 85.96		
Effective of oil pan	liter	12		Pin O/Diameter	mm			
Oil consumption	g/kW-h	0.14 to 0.68	Con-rod	Pin O/Diameter	mm	71.94 to 71.96		
	g/hp-h	0.1 to 0.5		Small end bearing I/D	mm	46.025 to 46.040		
Applicable oil (API/SAE)	-	CD Class 15W40	Cam shaft	Large end bearing I/D	mm			
Lube oil filter	-	Paper		Cam height	Suction	mm	44.16 to 44.24	
Top clearance	mm	0.86 to 1.04		Exhaust	mm	44.16 to 44.24		
Compression ratio	-		Piston ring	Journal Outside D.	mm	51.95 to 51.975		
Combustion maximum pressure	Mpa	14.7		Bearing Inside D.	mm	52.02 to 52.09		
	kgf/cm ²	150		Side clearance	mm	0.10 to 0.25		
Idling speed	min ⁻¹	675 to 725		Thickness	Top ring	mm	3.830 to 4.070	
High idling speed	min ⁻¹	2975 to 3025		2nd ring	mm	4.480 to 4.720		
Turbocharger	Model	-	TW51-52-1-00	3rd ring	mm	4.480 to 4.720		
	Cooling system	-	Water cooled	Oil ring	mm	2.600 to 3.000		
Lube system	Lube system	-	Common	Breadth	Top ring	mm	2.975 to 2.990	
	Type	-	Fin tube	2nd ring	mm	2.475 to 2.490		
Air cooler	Cooling area	m ²	6.5	3rd ring	mm	2.475 to 2.490		
				Oil ring	mm	3.975 to 3.990		
Marine gear	Model	-	YX-70S	End gap	Top ring	mm	0.25 to 0.45	
	Type	-	Hydraulic		2nd ring	mm	0.25 to 0.45	
	Reduction ratio	Ahead	1.52, 1.96, 2.50		3rd ring	mm	0.25 to 0.45	
		Astern	1.52, 1.96, 2.50		Oil ring	mm	0.25 to 0.45	
	Capacity of oil pan	liter	5	Ring groove clearance	Top ring	mm	0.105 to 0.130	
	Effective of oil pan		0.7		2nd ring	mm	0.075 to 0.105	
	Hydraulic oil pressure	Mpa			3rd ring	mm	0.050 to 0.080	
		kgf/cm ²	21.5 to 22.5		Oil ring	mm	0.030 to 0.060	
	Lube oil pressure	Mpa	0.2 to 0.3	Tightening torque	Cylinder head	Across flat	mm	22
		kgf/cm ²	1.0 to 4.0			Torque	Nm/kgm	24.5 to 25.5
Lube oil filter	-	Paper	Main bearing		Across flat	mm	27	
	Applicable oil (API/SAE)	-			CD Class SAE30	Torque	Nm/kgm	27 to 29
Dry weight	kgf	165	Con. rod		Across flat	mm	22	
Dimension	Length	mm				Torque	Nm/kgm	22.5 to 23.5
	Width	mm			FW bolt	Across flat	mm	27
	Height	mm			Torque	Nm/kgm	27.28 to 30	
Drawing out hight of piston	mm		Injection V	Across flat	mm	12		
Dry weight (with Marine gear)	kgf			Torque	kgf-m	3.0 to 3.4		

Engine model				6CXM-GTE				
Type	Configuration	-	Vertical Diesel	Cooling system	Type	-	Water cooled	
	Stroke cycle	-	4		Fresh water pump	Type	-	Centrifugal
	Cooling system	-	Water cooled		Displacement	liter/h	-	22700
	Combustion system	-	Direct injection		Tank	liter	-	35
Number of cylinder	Output	kW	305.2		Sub tank	liter	-	1.1
		hp	415		F/W cooler capacity	m ²	-	1.86
	Speed	min ⁻¹	2750		L/O cooler capacity	m ²	-	-
	Mean effect pressure	Mpa	2.17		Sea water pump	Type	-	Jabaco
		kgf/cm ²	22.17		Displacement	liter/h	-	10300
	Piston speed	m/s	11.92		Water separator	-	-	-
	Fuel consumption	g/kW-h	Below 231	Fuel system	FO pump model	-	YPES-PS	
	Exhaust temperature	C-degree	Below 172	Injection timing (FID)	degree	-	12 to 14	
	Exhaust smoke	Bosch	Below 2.0	Injection pressure	Mpa	-	23 to 24	
	Maximum duty	Output	kW	342	Injection nozzle	kgf/cm ²	-	8 - 0.28 X 155
hp			465	Fuel filter	Type	-	Paper	
Speed		min ⁻¹	2850	Area	micron	-	35 (3600X2 cm ²)	
Mean effect pressure		Mpa	2.35	Applicable fuel oil	-	-	Diesel fuel	
		kgf/cm ²	23.97	Starting system	Type	-	Electric	
Piston speed		m/s	12.35	Motor	V - kW	-	12V - 4.8kW	
Fuel consumption		g/kW-h	Below 235	Battery	V - Ah	-	12V - 200Ah	
Exhaust temperature		C-degree	Below 620	Alternator	V - A	-	12V - 55A	
Exhaust smoke		Bosch	Below 2.0	Valve clearance	Suction	mm	0.22 to 0.28	
Firing order		Output	kW	342	Exhaust	mm	-	0.37 to 0.43
	hp		465	Valve seat angle	Suction	degree	-	120
	Speed	min ⁻¹	2850	Exhaust	degree	-	90	
	Mean effect pressure	Mpa	2.35	Cylinder liner	Inside diameter	mm	-	110.0 to 110.03
		kgf/cm ²	23.97	Outside diameter	mm	-	113.98 to 113.99	
	Piston speed	m/s	12.35	Projection	mm	-	0.03 to 0.09	
	Fuel consumption	g/kW-h	Below 235	Piston	Outside diameter	mm	-	109.94 to 109.91
	Exhaust temperature	C-degree	Below 650	Pin hole diameter	mm	-	46.000 to 46.011	
	Exhaust smoke	Bosch	Below 2.0	Pin outside diameter	mm	-	45.988 to 45.997	
	Position of FO Pump (viewed from stern)	Output	kW	342	Ring groove	Top ring	mm	3.095 to 3.105
hp			465	2nd ring	mm	-	2.565 to 2.580	
Speed		min ⁻¹	2850	3rd ring	mm	-	2.540 to 2.555	
Mean effect pressure		Mpa	2.35	Oil ring	mm	-	5.020 to 5.035	
		kgf/cm ²	23.97	Crank shaft	Journal O/Diameter	mm	-	85.94 to 85.96
Piston speed		m/s	12.35	Pin O/Diameter	mm	-	71.94 to 71.96	
Fuel consumption		g/kW-h	Below 235	Con-rod	Small end bearing L/D	mm	-	46.025 to 46.040
Exhaust temperature		C-degree	Below 650	Large end bearing L/D	mm	-	-	
Exhaust smoke		Bosch	Below 2.0	Cam shaft	Cam height	Suction	mm	44.16 to 44.24
Direction of rotation (Viewed from stern)		Output	kW	342	Exhaust	mm	-	44.16 to 44.24
	hp		465	Journal Outside D.	mm	-	51.95 to 51.975	
	Speed	min ⁻¹	2850	Bearing Inside D.	mm	-	52.02 to 52.09	
	Mean effect pressure	Mpa	2.35	Side clearance	mm	-	9.10 to 0.25	
		kgf/cm ²	23.97	Piston ring	Thickness	Top ring	mm	3.830 to 4.070
	Piston speed	m/s	12.35	2nd ring	mm	-	4.480 to 4.720	
	Fuel consumption	g/kW-h	Below 235	3rd ring	mm	-	4.480 to 4.720	
	Exhaust temperature	C-degree	Below 650	Oil ring	mm	-	2.600 to 3.000	
	Exhaust smoke	Bosch	Below 2.0	Breadth	Top ring	mm	-	2.475 to 2.490
	Lubricant	Output	kW	342	2nd ring	mm	-	1.975 to 1.990
hp			465	3rd ring	mm	-	1.975 to 1.990	
Speed		min ⁻¹	2850	Oil ring	mm	-	3.975 to 3.990	
Mean effect pressure		Mpa	2.35	End gap	Top ring	mm	-	0.25 to 0.45
		kgf/cm ²	23.97	2nd ring	mm	-	0.25 to 0.45	
Piston speed		m/s	12.35	3rd ring	mm	-	0.25 to 0.45	
Fuel consumption		g/kW-h	Below 235	Oil ring	mm	-	0.25 to 0.45	
Exhaust temperature		C-degree	Below 650	Ring groove clearance	Top ring	mm	-	0.105 to 0.130
Exhaust smoke		Bosch	Below 2.0	2nd ring	mm	-	0.075 to 0.105	
Top clearance		Output	kW	342	3rd ring	mm	-	0.050 to 0.080
	hp		465	Oil ring	mm	-	0.030 to 0.060	
	Speed	min ⁻¹	2850	Tightening torque	Cylinder head	Across flat	mm	22
	Mean effect pressure	Mpa	2.35	Torque	Nm/kgm	-	24.5 to 26.5	
		kgf/cm ²	23.97	Main bearing	Across flat	mm	-	27
	Piston speed	m/s	12.35	Torque	Nm/kgm	-	27 to 29	
	Fuel consumption	g/kW-h	Below 235	Con. rod	Across flat	mm	-	22
	Exhaust temperature	C-degree	Below 650	Torque	Nm/kgm	-	22.5 to 23.5	
	Exhaust smoke	Bosch	Below 2.0	FW bolt	Across flat	mm	-	27
	Compression ratio	Output	kW	342	Torque	Nm/kgm	-	28 to 30
hp			465	Injection V	Across flat	mm	-	12
Speed		min ⁻¹	2850	Torque	kgf-m	-	3.0 to 3.4	
Mean effect pressure		Mpa	2.35					
		kgf/cm ²	23.97					
Piston speed		m/s	12.35					
Fuel consumption		g/kW-h	Below 235					
Exhaust temperature		C-degree	Below 650					
Exhaust smoke		Bosch	Below 2.0					
Combustion maximum pressure		Output	kW	342				
	hp		465					
	Speed	min ⁻¹	2850					
	Mean effect pressure	Mpa	2.35					
		kgf/cm ²	23.97					
	Piston speed	m/s	12.35					
	Fuel consumption	g/kW-h	Below 235					
	Exhaust temperature	C-degree	Below 650					
	Exhaust smoke	Bosch	Below 2.0					
	Idling speed	Output	kW	342				
hp			465					
Speed		min ⁻¹	2850					
Mean effect pressure		Mpa	2.35					
		kgf/cm ²	23.97					
Piston speed		m/s	12.35					
Fuel consumption		g/kW-h	Below 235					
Exhaust temperature		C-degree	Below 650					
Exhaust smoke		Bosch	Below 2.0					
High idling speed		Output	kW	342				
	hp		465					
	Speed	min ⁻¹	2850					
	Mean effect pressure	Mpa	2.35					
		kgf/cm ²	23.97					
	Piston speed	m/s	12.35					
	Fuel consumption	g/kW-h	Below 235					
	Exhaust temperature	C-degree	Below 650					
	Exhaust smoke	Bosch	Below 2.0					
	Turbocharger	Output	kW	342				
hp			465					
Speed		min ⁻¹	2850					
Mean effect pressure		Mpa	2.35					
		kgf/cm ²	23.97					
Piston speed		m/s	12.35					
Fuel consumption		g/kW-h	Below 235					
Exhaust temperature		C-degree	Below 650					
Exhaust smoke		Bosch	Below 2.0					
Air cooler		Output	kW	342				
	hp		465					
	Speed	min ⁻¹	2850					
	Mean effect pressure	Mpa	2.35					
		kgf/cm ²	23.97					
	Piston speed	m/s	12.35					
	Fuel consumption	g/kW-h	Below 235					
	Exhaust temperature	C-degree	Below 650					
	Exhaust smoke	Bosch	Below 2.0					
	Marine gear	Output	kW	342				
hp			465					
Speed		min ⁻¹	2850					
Mean effect pressure		Mpa	2.35					
		kgf/cm ²	23.97					
Piston speed		m/s	12.35					
Fuel consumption		g/kW-h	Below 235					
Exhaust temperature		C-degree	Below 650					
Exhaust smoke		Bosch	Below 2.0					
Drawing out hight of piston		Output	kW	342				
	hp		465					
	Speed	min ⁻¹	2850					
	Mean effect pressure	Mpa	2.35					
		kgf/cm ²	23.97					
	Piston speed	m/s	12.35					
	Fuel consumption	g/kW-h	Below 235					
	Exhaust temperature	C-degree	Below 650					
	Exhaust smoke	Bosch	Below 2.0					
	Dry weight (with Marine gear)	Output	kW	342				
hp			465					
Speed		min ⁻¹	2850					
Mean effect pressure		Mpa	2.35					
		kgf/cm ²	23.97					
Piston speed		m/s	12.35					
Fuel consumption		g/kW-h	Below 235					
Exhaust temperature		C-degree	Below 650					
Exhaust smoke		Bosch	Below 2.0					