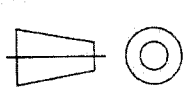



SHEET	INDEX OR MODIFICATION	ZONE	DATE	REVISION AND MODIFICATION	DRAWN BY	DESIGNED BY	CHECKED BY	APPROVED BY
				DESCRIPTION				

YEAR : 2019	PROJECT NAME KAPAL BANTU RUMAH SAKIT (KBR) 124M TNI - AL	PROJECT NO W000302
DRAW BY : 02/07 NIZAR	DRAWING/DOCUMENT NAME ANNEX TO ORDER MAIN DIESEL GENERATOR AND EMERGENCY DIESEL GENERATOR	OWNER : TNI AL
DESIGNED BY : 2/7 S. Helina		CLASS : LR
CHECKED BY : 02/07 [Signature]		DESIGNER : PT. PAL
APPROVED BY : 03/07 [Signature]		GROUP : M & D
ALL RIGHTS RESERVED ARE PROPERTY OF PT PAL INDONESIA		SCALE : -
PROJECTION SYMBOL 		SIZE : A4
		SHEET : 1 OF 21
		DRW/DOCUMENT NO : 5312101
		REV 0 1 2 3 4 5

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**ANNEX TO ORDER
MAIN DIESEL GENERATOR
AND
EMERGENCY DIESEL GENERATOR**

**KAPAL BANTU RUMAH
SAKIT (KBRS) 124M
TNI-AL**

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**ANNEX. I
GENERAL SPECIFICATION**

1. GENERAL

Country Of Origin of the equipment : USA
PT. PAL Project No. : W000302
Type of Vessel : Kapal Bantu Rumah Sakit (KBRS)
Number of Vessel : 1 (One).
Owner : Indonesia Navy.

2. RULE & REGULATION

Equipment shall comply with the requirement of the following rules and regulations of the latest issue and all necessary certificates and/or documents shall be obtained by the manufacturer.

- ❖ Lloyds Register (LR)
with notation: +100A1, +LMC, Kapal Bantu Rumah Sakit (KBRS)
- ❖ Marine Pollution Regulation
- ❖ ISO related to the subject
- ❖ International Maritime Organization (IMO)

3. DESIGN, MATERIAL, WORKMANSHIP AND ENVIRONMENTAL CONDITION

Design, material and workmanship shall be in accordance with the best marine practice. All equipment and machinery shall be seaworthy and of good design, performance, reliability and durability.

Environmental Design Condition:

- Ambient temperature in engine room: 45 ° C
- Atmospheric air temperature 35 ° C
- Sea water temperature 32 ° C
- Atmospheric pressure 1000 mbar
- Relative humidity 60 %


4. INSPECTION AND TEST

Necessary inspections and test shall be carried out at manufacturer's shop. Witness of the inspection and test shall be carried out by the representative of classification society. Necessary certificate and test report shall be submitted to shipbuilder PT.PAL INDONESIA free of charge within 4 (four) weeks after shipment.

5. GUARANTEE

- a. The configuration of the equipment shall be completely new (ex-work). No used configuration, either apart or complete will be acceptable.
- b. The manufacturer shall replace, at their expenses, any defects of the equipment caused by defective material, faulty design and/or poor workmanship.
- c. The manufacturer shall be shortly responsible for uncompleted accessories based on technical clarification, packing list and maker drawing.



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- d. The manufacturer shall be responsible if any component equipment and/or total system (refers to scope of supply) can't be operated on board and in environmental condition based on specification, instruction manual and related document.

6. SUPERVISION / COMMISSIONING ENGINEER.

The equipment shall be adjusted, tested and demonstrated for proper operation by supervision of manufacturer engineer or by maker adequately trained local representative. Commissioning for main diesel generator and emergency diesel generator with Three (3) time visits, Fifteen (15) working days.

7. SPARE PARTS AND TOOL.


- a. Spare parts for main diesel generator and emergency diesel generator shall be furnished in accordance:
- Manufacture standard / Class requirement for one (1) year or 2000 hours operation
 - Ninety (90) days sea trial (will be prepared by Caterpillar)
 - Available spare parts for 20 years (statement letter)
 - List spare part for maintenance schedule according to running hour
- b. Tools for main diesel generator and emergency diesel generator according to manufacturer standard.

8. DRAWINGS

- ◆ Two (2) weeks after signing contract, the manufacturer shall submit following data's and drawings for approval, each consist of three (3) copies and soft copy (PDF file) in English language.
 - Installation document which is clearly defined mechanical and electrical interface
 - Technical specification and detail of scope of supply
 - Dimensional drawing in detail
 - List Spare parts and tools
- ◆ Seven (7) sets necessary Working Drawing in English language to be submitted by manufacturer max. two (2) weeks after receiving ship yard approved drawings, consist of specifications, working drawing , spare part and tools list, shop test procedure, shop test record and instruction manual, Operation Maintenance Manual (periodically activity and spare part support), Illustrated Part Catalogue (drawing and identity of spare part)
- ◆ All above data's and drawings shall be submitted to :

**PT. PAL INDONESIA
DIVISION OF DESIGN
MANAGER OF MACHINERY OUTFITTING DESIGN
JL. UJUNG, SURABAYA 60155
I N D O N E S I A**



	<p style="text-align: center;">ANNEX TO ORDER MAIN DIESEL GENERATOR AND EMERGENCY DIESEL GENERATOR</p>	<p style="text-align: center;">KAPAL BANTU RUMAH SAKIT (KBRIS) 124M TNI-AL</p>
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9. STANDARD

◆ **Equipment and Material**

In general, all equipment and outfits of the vessel shall be in accordance with JIS / DIN or equivalent and the maker standard, except otherwise specified.

Screw threads shall be based on International Organization for Standardization (ISO) within the availability of manufacturer's facility.

◆ **Name Plate**


Name plate and caution plate to be in English and Indonesia

10. CERTIFICATES

Lloyds Register (LR) Certificate, Manufacture Certificate, NOx Compliance Certificate and Country of Origin Certificate to be completed by manufacture 1 (one) original, 7 (seven) copies to be submitted to PT.PAL INDONESIA within four (4) weeks after shipment per parcel post to be addressed as mentioned below:

**PT. PAL INDONESIA
DIVISION OF LOGISTIC
MANAGER OF PROCUREMENT
JL. UJUNG, SURABAYA 60155
INDONESIA**



	ANNEX TO ORDER MAIN DIESEL GENERATOR AND EMERGENCY DIESEL GENERATOR	KAPAL BANTU RUMAH SAKIT (KBRS) 124M TNI-AL
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**ANNEX. II
SPECIFICATION OF
MAIN DIESEL GENERATOR & EMERGENCY DIESEL GENERATOR**

1. GENERAL

1.1 Main Diesel Generator

Maker : CATERPILLAR, Marine Diesel Generator Sets
 Volt, phase & freq. : 445 Volt, 3 phase, 60 Hz
 Revolution : 1800 rpm
 Number : Five (5) sets / ship

1.2 Emergency Diesel Generator

Maker : CATERPILLAR, Marine Diesel Generator Sets
 Volt, phase & freq. : 445 Volt, 3 phase, 60 Hz
 Revolution : 1800 rpm
 Number : One (1) set / ship

2. PRINCIPAL PARTICULAR

2.1 Main Diesel Generator

2.1.1 Prime Mover

- Type : C18, Marine Diesel Engine, Vertical in-line, 4(four) stroke,
Compressed air starting, direct injection, Turbocharged.
 - Power Output : 803 BHP at 1800 rpm

2.1.2 Alternator

- Type : SR4B Random Wound
 - Output : 565 kWe
 - Voltage : AC 445 Volt.
 - Cos Phi : 0.8
 - No of Phase : 3 ph
 - Cycle : 60 Hz
 - Revolution : 1800 rpm
 - Protection : IP 23
 - Insulation : H Class
 - Ambient Temp : 45°C

2.2 Emergency Diesel Generator

2.2.1 Prime Mover

- Type : C18, Marine Diesel Engine, Vertical in-line, 4(four) stroke,
Electric starting, direct injection, Turbocharged.
 - Power Output : 624 BHP at 1800 rpm





**ANNEX TO ORDER
MAIN DIESEL GENERATOR
AND
EMERGENCY DIESEL GENERATOR**

**KAPAL BANTU RUMAH
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2.2.2 Alternator

- Type : SR4B Random Wound
- Output : 395 kWe
- Voltage : AC 445 Volt.
- Cos Phi : 0.8
- No of Phase : 3 ph
- Cycle : 60 Hz
- Revolution : 1800 rpm
- Protection : IP 23
- Insulation : H Class
- Ambient Temp : 45°C

3. FUEL OIL USED

The using fuel oil of genset is MGO / HSD oil / Pertamina Solar.

4. ACCESSORIES and SCOPE OF SUPPLY

The accessories & Scope of Supply for Main Diesel Generator and Emergency Diesel Generator shall be completed by manufacturers as enclosed.

5. SPARE PART AND TOOLS.

a. Spare parts for main diesel generator and emergency diesel generator shall be furnished in accordance:

- Manufacture standard / Class requirement for one (1) year or 2000 hours operation
- Ninety (90) days sea trial (will be prepared by Caterpillar)
- Available spare parts for 20 years (statement letter)
- List spare part for maintenance schedule according to running hour


b. Tools for main diesel generator and emergency diesel generator according to manufacturer standard.

6. FACTORY ACCEPTANCE TEST.

Shop test shall be carried out in accordance with the manufacturer's standard. Witness of the inspection and shop test shall be carried out by the representative of classification society, ship owner and shipbuilder. The shop test to be conducted at factory country and attended by seven (7) persons [one (1) from PT. PAL Indonesia and six (6) from owner]. The protocol test to be submitted to shipyard one (1) month before shop test schedule. FAT should be informed two (2) months before the date of FAT.

7. CONSTRUCTION AND MATERIALS

The equipment shall be of marine standard. parts of main diesel generator and emergency diesel generator shall be tested in accordance with the requirements of classification society and manufacturer standard. The tapped hole of suitable size and sufficient number for the attachment of jacking, lifting screw or lifting gear shall be provided as required.

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8. GUIDANCE BOOKS

Specification and final drawings for the delivered equipment in English 8 sets/ship + 1 (one) CD + USB stick incl. LR Class Certificate, NOx Compliance Certificate, instruction manual, shop test procedure and test record, scope of supply and spare parts list.


Final drawing to be completed with instruction maintenance schedule:

- Description of equipments include technical specification
- Procedure of how to operate the equipment for standing alone or with integration to other equipment
- Operation Maintenance Manual, periodically activity and spare part support
- Part catalogue for illustration / drawing and identity of spare part

9. OTHERS

1. If any items or requirements have not stated in this specification, should be subject to our technical clarification meeting.
2. One (1) day for Crew class training for main diesel generator and emergency diesel generator for ten (10) persons / ship of crew in PT. PAL Indonesia Shipyard.
3. Base Maintenance Training (BMT) for main diesel generator and emergency diesel generator for five (5) persons in PT. Trakindo Utama for Five (5) working days per ship.



	KAPAL BANTU RUMAH SAKIT 124 M TNI AL CATERPILLAR MAIN DIESEL GENERATOR	Doc No. : S427-A02-0001 Date: 16 Apr 2019 Page 1 of 8
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Standard Consist C18 565EKW / 706 KVA @ 1800 RPM

Caterpillar C18 DITA-HE (Direct Injection Turbocharged Aftercooled - Heat Exchanger)
Marine Package Genset arranged for 565 kW / 706 kVA @ 1800 RPM, 440V, "P" Prime Power Rating complete with standard accessories and following attachments:
Voltage : 445 Volt , 3 phase (Actual voltage is 445 V)
Genset nameplate voltage indication : 440 V
Frequency : 60 Hz

AIR INLET SYSTEM

- * Separate circuit after-cooled (SCAC)
- * Turbocharger, jacket water cooled
- * Turbocharger inlet, 152 mm (6 in) OD straight connection
- * CLOSED CRANKCASE VENTILATION SYSTEM
TECHNICAL: Installed at the factory. Engine mounted fumes disposal system (CCV).

CERTIFICATION

- * LR ENGINE CERTIFICATE
- * LR GENERATOR CERTIFICATE
- * IMO TIER II DNV-GL ENGINE CERTIFICATE


CHARGING AND STARTING SYSTEM

- * 24 VOLT BATTERY SET - DRY
TECHNICAL: 1300 CCA, 190 ampere hours. Includes 2 batteries.
For use between -30 to -12 C (-22 to 10 F).
Including supply of battery box.
- * CHARGING ALTERNATOR 24V 105AMP
TECHNICAL: 24V 105AMP, RH mounted. Alternator driven by single poly-v groove belt with auto-tensioning mounting group which allows for a fixed centerline alternator.
- * AMMETER 24V
- * BATTERY DISCONNECT SWITCH
- * 1 LOT OF FLEXIBLE CABLE FOR STARTING SYSTEM

CONTROL SYSTEM

- * Programmable low idle
- * Electronic diagnostics and fault logging
- * Electronic fuel/air ratio control
- * Programmable ECM Shutdowns for:
High Jacket Water Coolant Temp
Low Engine Oil Pressure
Engine Overspeed
- * CAT MGCP II A& P PANEL
Provides a hinged MGCP II A&P panel. Utilizes Auto-Maskin 200 series components.
- * CAT MGCP II A&P 10FT HARNESS
TECHNICAL: Shipped loose
Provides 10 ft extension harnesses for remote mounting of CAT MGCP II A& P PANEL.

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* LOAD SHARING MODULE AND SYNCHRONIZING PARTS SUPPLY BY PANEL MAKER/CUSTOMER

* CAT A&P AIR START PRESSURE SENSOR

TECHNICAL: Air pressure sensor for air starting motor for low pressure alarm.


* OIL LEVEL SENSOR

TECHNICAL: Installed at the factory.

* CAT A & P EXHAUST TEMP SENSOR

TECHNICAL: Shipped loose

1/4"-18 NPTF threaded sensor. Includes exhaust temperature sensors and wiring to connect to main engine harness. Provides sensor input to the Electronic Control Module (ECM) for monitoring of exhaust temperatures. Sensor to be installed post- turbocharger.

* The Engine Control Panel is mounted on left or right side of the set, seen from "engine-side" (D/G No. 1, 3 and E/DG on left side, D/G No. 2, 4, 5 on right side) and contain the following: 

Selector switch operation mode "OFF / LOCAL / REMOTE"

- Start push button
- Stop push button
- Alarm reset push button
- Buzzer for acoustic Alarm indication
- Interface to motor management and governor for external speed regulation with binary speed setting signals (push button Up / Down)
- Emergency stop push button
- Integrated with Alarm Monitoring System (AMS) by serial Interface RS-422/485 (Mod-Bus)

COOLING SYSTEM

* Separate Circuit After-Cooling (SCAC)

* Engine JW and SCAC Shell and Tube Heat Exchangers

* SCAC pump, gear driven

* Jacket water pump, gear driven

* Auxiliary water pump, bronze impeller, gear driven

* SCAC and JW shunt tanks for maintaining proper pump inlet pressures

* SEA WATER STRAINER

* FLEXIBLE CONNECTION (JIS STANDARD)

EXHAUST SYSTEM

* Water-cooled exhaust manifold & turbocharger

* 152 mm (6 in) round flanged outlet

* DRY ELBOW

TECHNICAL: 90 degree dry exhaust elbow for turbocharger outlet connection, 8-bolt flange, 203.2 mm (8 in) I.D., 1/2"-14 NPTF port located on elbow.

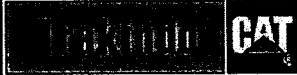
* FLEXIBLE FITTING 2 PCS

TECHNICAL: 8-bolt flanges at each end, 203.2 mm (8 in) x 305 mm (12 in) long.

* EXHAUST OUTLET FLANGE

TECHNICAL: 8-bolt flange, 203.2 mm (8 in).

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- * SPARK ARRESTER MUFFLER 8 INCH
TECHNICAL: Shipped loose. 8" spark arresting DNV type approved muffler with end inlet and end outlet muffler configuration for applications requiring sound attenuation from 18-25 dBA.

FLYWHEELS AND FLYWHEEL HOUSINGS

- * Flywheel Housing, SAE No. 0
- * Flywheel, SAE No. 18, 136 teeth
- * SAE standard rotation

FUEL SYSTEM

- * Part for fuel system compatible with Bio Diesel (B20), (provided with Statement Letter)
- * Fuel transfer pump, gear driven
- * Manual fuel priming pump
- * Hybrid fuel line design
- * DUPLEX FUEL FILTER-FRONT SERVICE
TECHNICAL: Replaces front service standard simplex fuel system with duplex fuel system.
- * FLEXIBLE FUEL LINES
TECHNICAL: Provides supply and return flexible fuel lines. Supply line length is 990 mm (39 in) with straight 3/4-16 (JIC 37 deg) connections and return line length is 1430 mm (56.3 in) with straight 9/16-18 (JIC 37 deg) connections.
- * MARINE PLATE TYPE FUEL COOLER
TECHNICAL: Plate-type fuel cooler installed on the lower left side of the engine, with 3/4-16 fuel return-to-tank connection.
- * RACOR FUEL/WATER SEPARATOR
- * ELECTRONIC FUEL SOLENOID
- * Built in Flow meter (shown in panel)

GENERATORS AND GENERATOR ATTACHMENTS

- * SR4B Random Wound
- * Permanent Magnet Excitation
- * 12 leads
- * Generator set package includes Caterpillar's Digital Voltage Regulator (CDVR).
- * CDVR includes reactive droop capability, 3-phase voltage sensing,
- * KVAR/PF modes, RFI suppression
- * Marine Class H insulation, Class F temperature rise
- * Surface mount platinum bearing and stator RTD's
- * Anti-condensation space heaters (120/240VAC, 300W, 2 elements)
- * Generator IP23 protection
- * Coastal insulation protection
- * CABLE GLAND FOR GENERATOR POWER CABLE CONNECTION
- * Cable Gland Position as follows:
(D/G No. 1, 4, 5 and E/DG on right side, D/G No. 2 and 3 on right side), opposite direction With Panel)

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LUBE SYSTEM

- * Center sump oil pan:
- * Deep, 500hr oil change interval
- * Front and top service oil filler locations
- * Front service dipstick
- * Oil pump, gear driven
- * DUPLEX OIL FILTER - FRONT SERVICE
TECHNICAL: Replaces front service standard simplex oil system with duplex oil system.
- * MANUAL SUMP PUMP
TECHNICAL: Provides shipped loose manual sump pump for draining engine lube oil.
Includes mounting bracket. To be installed by customer on right or left side of flywheel housing.

MOUNTING SYSTEM

- * Formed C-channel rails, 254mm (10.0in) height
- * Four (4) shipped loose isolators for installation below package base

POWER TAKE-OFFS

- * Poly-V groove for alternator drive
- * NOTE: There are no standard power take-offs available

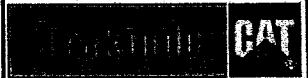
STARTING SYSTEM

- * AIR STARTING MOTOR LH
TECHNICAL: Mounted on left side (LH) of engine.
- * AIR PRESSURE REGULATOR
TECHNICAL: 1" std pipe thread on inlet/outlet with maximum inlet pressure of 450 psi.
- * AIR STARTING SILENCER
TECHNICAL: To be installed at air starter exhaust port location.
- * FILTER - AIR STARTING MOTOR
TECHNICAL: Provides serviceable 300 mesh screen with 1-1/2" NPTF threaded connections.
- * AIR RECEIVER TANK, CAPACITY (150-250) LITRES @ 30BAR
- * Air receiver tank completed with: (1 (one) set per ship)
 - Pressure switch low Alarm
 - Safety Valve
 - Stop Valve
 - Pressure gauge
 - Drain Valve (Automatic)
 - Class Type Approved LR

GENERAL

- * Front damper guard
- * Front service engine
- * Common electrical bonding point on HEX and KEEL cooled engines
- * Engine does not ship with zinc components
- * Engine is certified to D2/E2 emissions cycles
- * STANDARD TOOL SET

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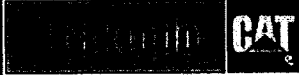
- * Included counter connection, bolt & nut
- * Commissioning Engineer Included
- * Commissioning for main diesel generator and emergency diesel generator with three (3) times visit, total Fifteen (15) working days.
- * FAT at Factory Country - 7 (seven) person per project
- * Training:
 - 10 person/ship of crew of BRS 124M in ship yard
 - BMT 5 (five) person/ship, 5 days, in PT PAL per shipset including E/DG
- * Final Painting: CAT Yellow
- * VOLTAGE ABLE TO SET AT 445V

DOCUMENTATION

- * 3 Approval Drawings
- * 5 Working Drawings
- * 8 Final Drawings

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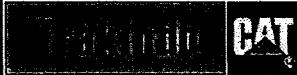
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SPARE PARTS KIT ACCORDING TO CLASS - ONE SET PER SHIP SET

No.	Description	Qty	Units	Part Number
1	INSERT-SEAT VALVE (EXHAUST)	2	EA	226-5561
2	LOCK-RETAINER (HEAD GP)	2	EA	2A-4429
3	RING-PISTON-INTERMEDIATE	2	EA	238-2707
4	BOLT-BEARING CAP	2	EA	3P-1323
5	INSERT-SEAT (INLET)	2	EA	224-3983
6	SLEEVE-CYLINDER (HEAD AS)	2	EA	263-4920
7	SPRING-VALVE (INNER)	2	EA	211-3122
8	SPRING-VALVE (OUTER)	2	EA	247-9908
9	ROTOCOIL AS (HEAD GP)	2	EA	186-2001
10	BOLT-CONNECTING ROD	2	EA	213-3217
11	RETAINER-IN	2	EA	250-2940
12	RING-PISTON OIL	2	EA	246-5659
13	RETAINER	2	EA	2A-4429
14	PIN-PISTON	2	EA	180-7350
15	BAND-FILLER	2	EA	9L-5854
16	BEARING-CONNECTING ROD	2	EA	261-3450
17	PUMP GP-FUEL INJECTOR	1	EA	235-1403
18	VALVE - EXHAUST	2	EA	490-7200
19	VALVE-INLET	2	EA	490-7199
20	GUIDE-ALVE	2	EA	122-7375
21	RING-PISTON TOP	2	EA	223-9159
22	SEAL-LINER-COOL	2	EA	155-0809
23	SEAL-LINER-COOL	2	EA	155-2793
24	CRANKSHAFT BEARING - MAIN	2	EA	317-8766
25	CRANKSHAFT PLATE-THRUST	2	EA	253-1752
26	SEAL-LINER-MID	2	EA	155-2793

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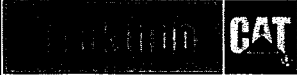
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SPARE PARTS KIT FOR 90 DAYS SEA TRIAL - ONE SET PER SHIP SET

No.	Description	Qty	Units	Part Number
1	SEAL	2	EA	242-9537
2	GROMMET	12	EA	149-7378
3	SEAL	4	EA	242-9537
4	GROMMET	12	EA	149-7378
5	LUBRICATION GREASE	5	EA	454-0291
6	SOS COOLANT ANALYSIS (BOTTLE)	5	EA	169-7372
7	SEAL	3	EA	061-9458
8	FILTER AS-LUBRICANT	12	EA	1R-1808
9	ELEMENT - WATER SEPARATOR	6	EA	NON-CAT
10	FILTER AS FUEL	12	EA	1R-0749
11	SOS COOLANT ANALYSIS (BOTTLE)	2	EA	169-7372
12	HEAVY DUTY CLEANER (1 GAL)	2	EA	NON-CAT
13	SEAL-O-RING	16	EA	330-4110
14	SEAL-O-RING	16	EA	330-4110
15	LUBRICATION GREASE	2	EA	454-0291
16	SEAL O RING	2	EA	7J-0204
17	FILTER ELEMENT AS - AIR (PRIMARY)	2	EA	290-1935
18	ELEMENT - FUMES DISPOSAL	2	EA	275-2276
19	LUBRICATION GREASE	1	EA	454-0291

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MAINTENANCE PARTS FOR ONE YEAR / 2000 HOURS - ONE SET PER SHIP SET

No.	Description	Qty	Units	Part Number
1	SEAL	50	UNIT	242-9537
2	GROMMET	200	UNIT	149-7378
3	SEAL	100	UNIT	242-9537
4	LUBRICATION GREASE	75	UNIT	454-0291(TU3-397C)
LUBE OIL SYSTEM PARTS				
5	SEAL	50	UNIT	061-9458
6	FILTER AS-LUBRICANT	96	UNIT	1R-1808
7	DEO15W40-20 LITERS	72	UNIT	3E-9848
8	DEO15W40-5 LITERS	48	UNIT	3E-9901
FUEL SYSTEM PARTS				
9	ELEMENT - WATER SEPARATOR	50	UNIT	NON-CAT
10	FILTER AS FUEL	96	UNIT	1R-0749
COOLING SYSTEM PARTS				
11	SOS COOLANT ANALYSIS	24	UNIT	169-7372 (HP428)
12	HEAVY DUTY CLEANER (1 GAL)	24	UNIT	NON-CAT(1U-5490)
13	SEAL-O-RING	100	UNIT	330-4110
14	EXTENDER (Coolant)	2	UNIT	119-5152
15	IMPELLER PUMP - SEA WATER	8	UNIT	397-2685
16	SEAL O RING	12	UNIT	7J-0204
17	FILTER ELEMENT AS - AIR (PRIMARY)	12	UNIT	290-1935
18	ELEMENT - FUMES DISPOSAL	12	UNIT	275-2276

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Standard Consist C18 395EKW / 494KVA @ 1800 RPM

Caterpillar C18 DITA-RAD (Direct Injection Turbocharged Aftercooled - Radiator)
Marine Package Genset arranged for 395 ekW / 494 kVA @ 1800 RPM, 440V, "P" Prime Power Rating complete with standard accessories and following attachments:

Voltage : 445 Volt , 3 phase (Actual voltage is 445 V)
Genset nameplate voltage indication : 440 V
Frequency : 60 Hz

AIR INLET SYSTEM

- * Separate circuit after-cooled (SCAC)
- * Turbocharger, jacket water cooled
- * Turbocharger inlet, 152 mm (6 in) OD straight connection
- * CLOSED CRANKCASE VENTILATION SYSTEM
TECHNICAL: Installed at the factory. Engine mounted fumes disposal system (CCV).

CERTIFICATION

- * LR ENGINE CERTIFICATE
- * LR GENERATOR CERTIFICATE
- * IMO TIER II DNV-GL ENGINE CERTIFICATE

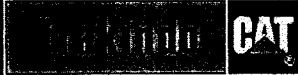
CHARGING AND STARTING SYSTEM

- * 2 SETS 24 VOLT BATTERY SET - DRY
TECHNICAL: 1300 CCA, 190 ampere hours. Includes 2 batteries.
For use between -30 to -12 C (-22 to 10 F).
Including supply of battery box.
- * 2 SETS BATTERY CHARGER 10 AMP
- * 3 SETS OF BATTERY DISCONNECT SWITCH
- * 1 LOT OF FLEXIBLE CABLE FOR STARTING SYSTEM

CONTROL SYSTEM

- * Programmable low idle
- * Electronic diagnostics and fault logging
- * Electronic fuel/air ratio control
- * Programmable ECM Shutdowns for:
 - High Jacket Water Coolant Temp
 - Low Engine Oil Pressure
 - Engine Overspeed
- * CAT MGCP II A& P PANEL
Provides a hinged MGCP II A&P panel. Utilizes Auto-Maskin 200 series components.
- * CAT MGCP II A&P 10FT HARNESS
TECHNICAL: Shipped loose
Provides 10 ft extension harnesses for remote mounting of CAT MGCP II A& P PANEL.
- * LOAD SHARING MODULE AND SYNCHRONIZING PARTS SUPPLY BY PANEL MAKER/CUSTOMER
- * CAT A&P AIR START PRESSURE SENSOR
TECHNICAL: Air pressure sensor for air starting motor for low pressure alarm.

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*** OIL LEVEL SENSOR**

TECHNICAL: Installed at the factory.

*** CAT A& P EXHAUST TEMP SENSOR**

TECHNICAL: Shipped loose

1/4"-18 NPTF threaded sensor. Includes exhaust temperature sensors and wiring to connect to main engine harness. Provides sensor input to the Electronic Control Module (ECM) for monitoring of exhaust temperatures. Sensor to be installed post-turbocharger.

* The Engine Control Panel is mounted on left or right side of the set, seen from "engine-side" (D/G No. 1, 3 and E/DG on left side, D/G No. 2, 4, 5 on right side) and contain the following: *A fine*

Selector switch operation mode "OFF / LOCAL / REMOTE"

- Start push button
- Stop push button
- Alarm reset push button
- Buzzer for acoustic Alarm indication
- Interface to motor management and governor for external speed regulation with binary speed setting signals (push button Up / Down)
- Emergency stop push button
- Integrated with Alarm Monitoring System (AMS) by serial Interface RS-422/485 (Mod-Bus)

COOLING SYSTEM

- * Separate Circuit After-Cooling (SCAC)
- * SCAC pump, gear driven
- * Jacket water pump, gear driven
- * SCAC and JW shunt tanks for maintaining proper pump inlet pressures
- * RADIATOR COOLING SYSTEMS

EXHAUST SYSTEM

- * Water-cooled exhaust manifold and turbocharger
- * 152 mm (6 in) round flanged outlet
- * DRY ELBOW
TECHNICAL: 90 degree dry exhaust elbow for turbocharger outlet connection, 8-bolt flange, 203.2 mm (8 in) I.D., 1/2"-14 NPTF port located on elbow.
- * FLEXIBLE FITTING 2 PCS
TECHNICAL: 8-bolt flanges at each end, 203.2 mm (8 in) x 305 mm (12 in) long.
- * EXHAUST OUTLET FLANGE
TECHNICAL: 8-bolt flange, 203.2 mm (8 in).
- * SPARK ARRESTER MUFFLER 8 INCH
TECHNICAL: Shipped loose. 8" spark arresting DNV type approved muffler with end inlet and end outlet muffler configuration for applications requiring sound attenuation from 18-25 dBA.

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FLYWHEELS AND FLYWHEEL HOUSINGS

- * Flywheel Housing, SAE No. 0
- * Flywheel, SAE No. 18, 136 teeth
- * SAE standard rotation

FUEL SYSTEM

- * Part for fuel system compatible with Bio Diesel (B20), (provided with Statement Letter)
- * Fuel transfer pump, gear driven
- * Manual fuel priming pump
- * Hybrid fuel line design
- * DUPLEX FUEL FILTER-FRONT SERVICE
TECHNICAL: Replaces front service standard simplex fuel system with duplex fuel system.
- * FLEXIBLE FUEL LINES
TECHNICAL: Provides supply and return flexible fuel lines. Supply line length is 990 mm (39 in) with straight 3/4-16 (JIC 37 deg) connections and return line length is 1430 mm (56.3 in) with straight 9/16-18 (JIC 37 deg) connections.
- * MARINE PLATE TYPE FUEL COOLER
TECHNICAL: Plate-type fuel cooler installed on the lower left side of the engine, with 3/4-16 fuel return-to-tank connection.
- * RACOR FUEL/WATER SEPARATOR
- * ENGINE MAKER SUPPLIED SOLENOID VALVE FOR FUEL TANK

GENERATORS AND GENERATOR ATTACHMENTS

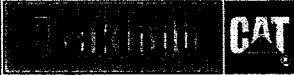
- * SR4B Random Wound
- * Permanent Magnet Excitation
- * 12 leads
- * Generator set package includes Caterpillar's Digital Voltage Regulator (CDVR).
- * CDVR includes reactive droop capability, 3-phase voltage sensing,
- * KVAR/PF modes, RFI suppression
- * Marine Class H insulation, Class F temperature rise
- * Surface mount platinum bearing and stator RTD's
- * Anti-condensation space heaters (120/240VAC, 300W, 2 elements)
- * Generator IP23 protection
- * Coastal insulation protection
- * CABLE GLAND FOR GENERATOR POWER CABLE CONNECTION
- * The cable glands are mounted on right side of the Generator, seen from "engine-side" (similar to gensets 1, 4 and 5)
- * Suitable for parallel operation with Main Generators

LUBE SYSTEM

- * Center sump oil pan:
- * Deep, 500hr oil change interval
- * Front and top service oil filler locations
- * Front service dipstick
- * Oil pump, gear driven

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*** DUPLEX OIL FILTER - FRONT SERVICE**

TECHNICAL: Replaces front service standard simplex oil system with duplex oil system.

*** MANUAL SUMP PUMP**

TECHNICAL: Provides shipped loose manual sump pump for draining engine lube oil.

Includes mounting bracket. To be installed by customer on right or left side of flywheel housing.

MOUNTING SYSTEM

* Formed C-channel rails, 254mm (10.0in) height

* Six (6) shipped loose isolators for installation below package base

POWER TAKE-OFFS

* Poly-V groove for alternator drive

* NOTE: There are no standard power take-offs available

STARTING SYSTEM

* ELECTRIC STARTING MOTOR-RH & LH 24V (DUAL ELECTRIC STARTING SYSTEMS)

ELECTRIC STARTING MOTOR 24V

TECHNICAL: Mounted on right side (RH) and left side (LH) of engine.

GENERAL

* Front damper guard

* Front service engine

* Engine is certified to D2/E2 emissions cycles

* STANDARD TOOL SET

* Included counter connection, bolt & nut

* Commissioning Engineer Included

* Final Painting : CAT yellow

* VOLTAGE ABLE TO SET AT 445V

DOCUMENTATION

* 3 Approval Drawings

* 5 Working Drawings

* 8 Final Drawings

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MAINTENANCE PARTS FOR ONE YEAR / 2000 HOURS - ONE SET PER SHIPSET

No.	Description	Qty.	Units	Part Number
1	SEAL	6	UNIT	242-9537
2	GROMMET	24	UNIT	149-7378
3	SOS COOLANT ANALYSIS	11	UNIT	169-7372
4	LUBRICATION GREASE	13	UNIT	454-0291
5	SEAL-O-RING	64	UNIT	330-4110
6	SEAL	5	UNIT	061-9458
7	FILTER AS-LUBRICANT	12	UNIT	1R-1808
8	FILTER AS FUEL	12	UNIT	1R-0749
9	SEAL O RING	2	UNIT	7J-0204
10	FILTER ELEMENT AS - AIR (PRIMARY)	12	UNIT	290-1935
11	BELT	2	UNIT	190-6560
12	TENSIONER - BELT	2	UNIT	329-8797
13	ELEMENT - FUMES DISPOSAL	2	UNIT	275-2276
14	SEAL	2	UNIT	3S-9643
15	REGULATOR	2	UNIT	6I-4955
16	SEAL	2	UNIT	4J-5573
17	SEAL	2	UNIT	6V-6707
18	ELEMENT - WATER SEPARATOR	6	UNIT	NON-CAT
19	EXTENDER	2	UNIT	119-5152
20	DEO15W40-20 LITERS	15	UNIT	3E-9848
21	DEO15W40-5 LITERS	10	UNIT	3E-9901
22	HEAVY DUTY CLEANER (1 GAL)	4	UNIT	NON-CAT

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