

# CONTENTS

## **PART I --CAT 3516C MG**

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## Chapter 1 Scope of supply

## 1. Caterpillar 3516C Marine Generator Sets Scope of Supply

卡特彼勒 3516C 船用主发电机组供货范围

*Each unit includes the following consist unless specified*

每船套包含 3 台 3516C 船用柴油发电机组,除特别指明外每台应包含如下配置:

### AIR INLET SYSTEM

#### /进气系统

- Separate circuit aftercooler core, corrosion resistant coated (air side)/中冷器, 空气侧防腐
- Air cleaner, regular duty /空气滤器, 常规型
- Dual turbochargers, 152 mm (6 in) OD straight connection /双增压器进气口,152mm 口径

### BASE ARRANGEMENT

#### /基座布置

- Engine and generator mounted on common base /发动机和发电机组装在基座上
- vibration isolators(ship loose) /减振器(散供)
- Engine and generator packaged in Lei Shing Hong factory in China / 机组在利星行工厂成套

### CONTROL SYSTEM

#### /控制系统

- Dual Caterpillar A3 electronic engine control, LH, with electronic unit injector fuel system, /卡特彼勒 A3 型电子控制单元, 左侧
- Motorized potentiometer for speed adjustment/shiploose /调速电动电位器(散供)  
*the potentiometer supplied with the governor must be built into the E7800, and via this unit the frequency and load of the governor are controlled. It is important in this situation that the governor can operate with droop.*
- Main and Back-up 24V DC to be supplied by yard /主备用 24V 电源由船厂提供

### COOLING SYSTEM

#### /冷却系统

- SCAC circuit /独立后冷却系统
- Oil cooler /润滑油冷却器
- HT&LT plate heat exchanger,shiploose /高低温板式冷却器, 散供
- HT thermostats and housing, full open temperature 92°C (198 F) /高温水节温阀
- LT thermostats and housing /低温水节温阀
- Jacket water pump, gear driven, centrifugal (HT) /机带缸套淡水泵, 离心式
- Auxiliary fresh water pump for aftercooler (LT) /机带空冷器淡水泵
- JW Expansion tank mounted for Jacket water /机带缸套水膨胀水箱
- Expansion tank for LT fresh water system supplied by yard,the capacity to be confirmed in approval drawing. /低温水膨胀水箱由船厂提供
- Jacket water heater, 2x 6kw,440V /2x 6kw, 440V 缸套水加热器
- Fuel cooler, shiploose /燃油冷却器, 散供
- Sea water pump /机带海水泵
- Flexible water conections for HT/LT system, shipped loose/高低温弹性水管, 散供
- Jacket water temp gauge /缸套水温度表

### EXHAUST SYSTEM

#### /排气系统

- Dry gas-tight exhaust manifolds with heat shield /干式排气歧管,带绝热层
- Dual turbochargers with watercooled bearings with heat shields/水冷双增压器, 带绝热层
- Exhaust outlet, vertical, 12" round flanged outlet /排气出口, 垂直,12 寸圆形法兰出口

- Flexible fitting, 12", shipped loose /不锈钢膨胀接头, 12 寸(散供)
- Flange and exhaust expander to be supplied by yard, 12" to 16",  
/异径接口, 12 寸到 16 寸,船厂提供
- Muffler with spark arrester, 35DB, DN400, shipped loose, made in China  
/火星熄灭消音器,国内配套,散装

### **FUEL SYSTEM /燃油系统**

- Electronically controlled unit injectors /电控燃油喷油单元
- Duplex fuel filter /双联燃油精滤器
- Fuel priming pump, manual /手动预供燃油泵
- Fuel transfer pump /燃油输送泵
- Water separator, shiploose /油水分离器, 散供
- Fuel oil solenoid valve in FO supply line,shiploose /燃油电磁阀,散供
- Flexible fuel lines for Inlet&Outlet, shipped loose /进回油燃油软管,散供

### **LUBE SYSTEM /滑油系统**

- Crankcase breather, top mounted /曲柄箱透气阀
- Duplex lube oil filter /双联滑油滤器
- Lube oil pump, gear driven /滑油泵
- Lube oil cooler /滑油冷却器
- Oil Sump /油底壳
- Oil filler and dipstick,LH /加油口和油尺
- Manual sump pump /手动污油泵
- Electric pre lube pump /电动预润滑泵
- (Start and stop supplied by LSH)
- Lub oil pressure gauge /滑油压力表

### **STARTING SYSTEM /起动系统**

- Air starting motor with connection hose /空气启动马达,带空气软管
- Air strainer /空气滤器
- Reducing pressure valve (3000kPa to 690~1034kPa)/启动空气减压阀
- Safe valve and low-pressure alarm switch are included/包含安全阀、低压报警开关

### **GENERATOR AND GENERATOR ATTACHMENTS /发电机及其附件**

Double Anti-friction bearings,Brush-less.self-exciation generators

/双轴承, 无刷自励发电机

Digital automatic voltage regulator

/数字式自动电压调节器

Space heater,500W/230V

/防冷凝加热器,500W/230V

Embedded winding temperature detectors,2X3 PT100

/绕组温度传感器,2X3 PT100

Bearing temperature detector, 1x2 PT100

/轴承温度传感器,1x2 PT100

6xDiff.CT

/差动 6xCT

Voltage adjust switch, shipped loose

/调压开关 (散供)

MCT module connection

/MCT 进线模块

### **PROTECTION SYSTEM /保护系统**

- A3 Electronic Engine Control (ECM) monitoring system to provide customer programmable engine deration strategies to protect against adverse operating conditions,LH,  
卡特彼勒 A3 电子控制系统(ECM)提供可编程的发动机保护, 左侧

- Emergency stop push button (located on electronic instrument panel) 机旁应急停车按钮
- Emergency start push button (located on electronic instrument panel) 机旁应急起动按钮
- Safety shutoff protection /安全停车保护
- Oil pressure and water temperature /滑油低压和高水温停车保护
- Overspeed shutoff /超速停车保护
- Explosion relief valve, for crankcase protection /曲轴箱防爆阀

**INSTRUMENTATION /显示仪表**

- Engine Local Instrument Panel /机旁仪表板  
(Same service side /同服务侧)
- Engine 4-position switch (Off/On/Auto/Start) /发动机 4 位控制开关:
  - Local Start /机旁起动
  - Local Stop /机旁停车
  - Cool down /柴油机慢转停车
  - Remote/Local control /机旁与遥控转换
- Alarm Horn /报警蜂鸣器
- Overspeed shutdown notification light /超速停车指示灯
- Emergency stop notification light /应急停车指示灯
- Cable between engine and this panel supplied.

**Marine Power Display /显示报警模块(通过 RS485 延伸)**

- Digital display of data for: /包括如下数字显示:
- Engine oil pressure /滑油压力
  - Engine water temperature /冷却水温
  - Fuel pressure /燃油压力
  - System DC voltage /系统电压
  - Air inlet restriction /进气总管阻力
  - RH & LH exhaust temperature /左右侧涡轮前排温
  - Fuel filter differential /燃油滤器压差
  - Oil filter differential /滑油滤器压差
  - Service meter /累计运行时间
  - Engine speed /发动机转速
  - Instantaneous fuel consumption /瞬时燃油消耗率
  - Total fuel consumed /燃油消耗总量
  - Engine oil temperature /滑油温度
  - Air intake manifold temperature /进气温度

**Alarm and Shutdwon Indication /报警指示**

- Battery voltage warning /系统电压异常报警
- Engine Jacket Water Temp High warning /高温冷却水高温报警
- Engine oil pressure low warning /滑油低压报警
- Air filter diff. pressure warning /进气压差报警
- Exhaust temperature warning /排温高报警
- Oil filter differential pressure warning /滑油滤器压差报警
- Fuel filter differential pressure warning /燃油滤器压差报警
- Aftercooler Water Temp High warning /低温冷却水高温报警

Safety & Control box, shipped loose, /安全控制箱，散供，减震安装

Shutdown alarm(with hard wire extension)停机警报（硬线延伸）：

Engine oil pressure too low	/滑油压力过低
Engine water temperature too high	/缸套水温度过高
Engine overspeed	/柴油机超速
Common shutdown alarm	/通用停机警报

Alarm(with hard wire extension)

警报（硬线延伸报警）：

Engine water pressure low	/柴油机缸套水压力低
Engine water level low	/柴油机水位低
Common alarm	/通用报警

Control (local) 控制（机旁）：

Lamp test button	/报警灯测试
Acknowledge button	/应答按钮
Reset button	/复位按钮
Power on/off switch	/电源通/断开开关

Control connection for external use/控制延伸

Remote start	/遥控启动
Remote stop	/遥控停车
Remote emergency stop	/遥控紧急停车
Remote speed adjustment	/遥控速度调节
Running status	/运转信号
Engine ready to start	/备车

All system alarms to be satisfied the latest requirement of rules

所有报警点满足最新的规范要求

Module RS485 port

/用户通讯模块 RS485（Modbus 接口实现柴油机组和船舶监控系统的通讯）

Remark: two sets genset of three will drive FiFi pump, ability to receive idle/rated speed mode signal. /三台机组中的两台前端驱动消防泵，接收怠速/额定转速的转换信号。

### **FLYWHEELS & FLYWHEEL HOUSINGS /飞轮及飞轮罩**

- Flywheel, SAE No. 00, 183 teeth /飞轮
- Flywheel housing, SAE No. 00 /飞轮罩壳
- SAE standard rotation: CCW /标准转向逆时针（面向飞轮）

### **Flexiable coupling between the Genset and FiFi pump**

- Flexible Coupling(two sets of three, type will be confirmed by TVA, TVA supplied by LSH,)

/弹性联轴节（三台机组中的两台包含此项，具体型号由扭振计算确定）

### **GENERAL**

/一般条款

- Vibration damper and guard /扭振阻尼器和罩网

- Paint, Caterpillar yellow /颜色,卡特黄
  - Lifting eyes /起吊孔
  - Manual engine barring group /手动盘车工具
  - All flexible hoses and counter flanges to meet class connected to engine to be supplied /提供所有与发动机相连的软管及配对法兰
  - 3 Way test chock for the sensors /三通测试阀
- Plate heatexchanger loose supply,flexible fitting, flexible hoses meet the Class requirement  
散供板式冷却器，软管，膨胀节满足船检要求。

#### **PACKING**

#### **/包装**

- Plastic shrink wrap protection /热缩膜保护

#### **CLASS AND CERTIFICATION**

#### **/检验资料**

- CCS engine certificate /发动机 CCS 证书
- CCS generator certification /发电机 CCS 船级社证书
- CCS genset certificate if necessary /CCS 机组证书，如船检需要
- IMO EIAPP certificate(Tier II) /满足 IMO 要求的排放证书 (Tier II)
- TVA report /TVA 报告

## Chapter 2 Technical Data

1. Performance Data
2. System Data
3. Generator data



<b>SALES MODEL:</b>	3516C	<b>COMBUSTION:</b>	DI
<b>ENGINE POWER (BKW):</b>	2,095.0	<b>ENGINE SPEED (RPM):</b>	1,800
<b>GEN POWER W/O FAN (EKW):</b>	2,000.0	<b>HERTZ:</b>	60
<b>COMPRESSION RATIO:</b>	14.7	<b>ASPIRATION:</b>	TA
<b>RATING LEVEL:</b>	ELECTRIC PROP - A RATING	<b>AFTERCOOLER TYPE:</b>	SCAC
<b>PUMP QUANTITY:</b>	2	<b>AFTERCOOLER CIRCUIT TYPE:</b>	JW+OC, AC
<b>FUEL TYPE:</b>	DIESEL	<b>AFTERCOOLER TEMP (C):</b>	40
<b>MANIFOLD TYPE:</b>	DRY	<b>JACKET WATER TEMP (C):</b>	99
<b>GOVERNOR TYPE:</b>	ADEM3	<b>TURBO CONFIGURATION:</b>	PARALLEL
<b>ELECTRONICS TYPE:</b>	ADEM3	<b>TURBO QUANTITY:</b>	2
<b>CAMSHAFT TYPE:</b>	STANDARD	<b>TURBOCHARGER MODEL:</b>	GTB7083BLN-5 2T-1.91
<b>IGNITION TYPE:</b>	CI	<b>CERTIFICATION YEAR:</b>	2007
<b>INJECTOR TYPE:</b>	EUI	<b>CRANKCASE BLOWBY RATE (M3/HR):</b>	89.2
<b>FUEL INJECTOR:</b>	2501368	<b>FUEL RATE (RATED RPM) NO LOAD (L/HR):</b>	61.4
<b>REF EXH STACK DIAMETER (MM):</b>	305	<b>PISTON SPD @ RATED ENG SPD (M/SEC):</b>	12.9
<b>MAX OPERATING ALTITUDE (M):</b>	700		

INDUSTRY	SUB INDUSTRY	APPLICATION
MARINE	DREDGE	MARINE AUXILIARY
MARINE	OFFSHORE	MARINE AUXILIARY
MARINE	GENERAL CARGO	MARINE AUXILIARY
MARINE	FISHING	MARINE AUXILIARY
MARINE	GOVERNMENT	MARINE AUXILIARY

## General Performance Data [Top](#)

GENSET POWER WITHOUT FAN	PERCENT LOAD	ENGINE POWER	BRAKE MEAN EFF PRES (BMEP)	BRAKE SPEC FUEL CONSUMPTION (BSFC)	VOL FUEL CONSUMPTION (VFC)	INLET MFLD PRES	INLET MFLD TEMP	EXH MFLD TEMP	ENGINE OUTLET TEMP
EKW	%	BKW	KPA	G/BKW-HR	L/HR	KPA	DEG C	DEG C	DEG C
2,000.0	100	2,090	1,784	200.5	499.5	239.2	46.4	561.3	380.0
1,800.0	90	1,881	1,606	202.0	452.9	212.4	46.8	549.7	386.5
1,600.0	80	1,672	1,427	204.4	407.4	185.2	46.5	538.8	385.3
1,500.0	75	1,567	1,338	205.7	384.3	170.8	46.1	533.2	382.7
1,400.0	70	1,463	1,249	207.1	361.1	156.0	45.7	527.5	380.5
1,200.0	60	1,254	1,071	210.1	314.0	125.6	45.6	512.3	382.1
1,000.0	50	1,045	892	214.3	266.9	95.2	45.7	492.3	383.6
800.0	40	836	714	221.8	221.0	70.2	45.8	462.6	372.3
600.0	30	627	535	235.5	176.0	49.5	45.9	420.8	347.7
500.0	25	522	446	246.9	153.7	40.4	45.8	394.2	330.4
400.0	20	418	357	264.3	131.7	32.2	45.7	363.6	309.2
200.0	10	209	178	354.1	88.2	19.1	44.9	287.0	252.6

GENSET POWER WITHOUT FAN	PERCENT LOAD	ENGINE POWER	COMPRESSOR OUTLET PRES	COMPRESSOR OUTLET TEMP	WET INLET AIR VOL FLOW RATE	ENGINE OUTLET WET EXH GAS VOL FLOW RATE	WET INLET AIR MASS FLOW RATE	WET EXH GAS MASS FLOW RATE	ENGINE OUTLET WET EXH VOL FLOW RATE (O DEG C AND 101 KPA)	ENGINE OUTLET DRY EXH VOL FLOW RATE (O DEG C AND 101 KPA)
EKW	%	BKW	KPA	DEG C	M3/M	M3/MIN	KG/HR	KG/HR	M3/MIN	M3/MI



2,000.0	100	2,090	766	125	1,712	766	249	589	2,090	4,957	5,281
1,800.0	90	1,881	723	121	1,590	727	226	481	1,881	4,502	4,796
1,600.0	80	1,672	680	119	1,446	660	203	395	1,672	4,047	4,311
1,500.0	75	1,567	658	118	1,365	622	192	359	1,567	3,818	4,067
1,400.0	70	1,463	636	116	1,282	579	180	324	1,463	3,587	3,821
1,200.0	60	1,254	587	113	1,129	513	157	243	1,254	3,121	3,325
1,000.0	50	1,045	534	108	975	446	133	162	1,045	2,651	2,824
800.0	40	836	479	102	815	340	110	105	836	2,195	2,338
600.0	30	627	420	96.0	655	275	88.0	64.0	627	1,748	1,862
500.0	25	522	388	92.0	576	223	77.0	48.0	522	1,527	1,627
400.0	20	418	355	88.0	498	185	66.0	35.0	418	1,309	1,394
200.0	10	209	282	80.0	346	93.0	44.0	17.0	209	878	935

## Emissions Data [Top](#)

Units Filter

All Units 

### RATED SPEED POTENTIAL SITE VARIATION: 1800 RPM

TOTAL NOX (AS NO2)	G/HR	14,524	9,913	8,228	5,651	3,097
TOTAL CO	G/HR	1,906	2,358	3,784	2,430	1,901
TOTAL HC	G/HR	481	440	359	305	394
PART MATTER	G/HR	206.9	176.4	251.3	170.0	86.8
TOTAL NOX (AS NO2)	(CORR 5% O2) MG/NM3	2,526.7	2,243.6	2,686.3	3,204.6	3,058.1
TOTAL CO	(CORR 5% O2) MG/NM3	331.7	533.7	1,235.5	1,378.3	1,876.3
TOTAL HC	(CORR 5% O2) MG/NM3	83.7	99.6	117.3	173.2	389.0
PART MATTER	(CORR 5% O2) MG/NM3	36.0	39.9	82.0	96.3	85.8
TOTAL NOX (AS NO2)	(CORR 5% O2) PPM	1,231	1,093	1,308	1,561	1,489

TOTAL CO	(CORR 5% O2) PPM	265	428	988	1,103	1,501
TOTAL HC	(CORR 5% O2) PPM	136	161	189	279	628
TOTAL NOX (AS NO2)	G/HP-H R	5.18	4.72	5.87	8.06	11.05
TOTAL CO	G/HP-H R	0.68	1.12	2.70	3.47	6.78
TOTAL HC	G/HP-H R	0.17	0.21	0.26	0.43	1.40
PART MATTER	G/HP-H R	0.07	0.08	0.18	0.24	0.31
TOTAL NOX (AS NO2)	LB/HR	32.02	21.85	18.14	12.46	6.83
TOTAL CO	LB/HR	4.20	5.20	8.34	5.36	4.19
TOTAL HC	LB/HR	1.06	0.97	0.79	0.67	0.87
PART MATTER	LB/HR	0.46	0.39	0.55	0.37	0.19
<b>GENSET POWER WITHOUT FAN</b>	<b>EKW</b>	<b>2,000.0</b>	<b>1,500.0</b>	<b>1,000.0</b>	<b>500.0</b>	<b>200.0</b>
<b>ENGINE POWER</b>	<b>BKW</b>	<b>2,090</b>	<b>1,567</b>	<b>1,045</b>	<b>522</b>	<b>209</b>
<b>PERCENT LOAD</b>	<b>%</b>	<b>100</b>	<b>75</b>	<b>50</b>	<b>25</b>	<b>10</b>

### **RATED SPEED NOMINAL DATA: 1800 RPM**

TOTAL NOX (AS NO2)	G/HR	12,104	8,261	6,857	4,709	2,581
TOTAL CO	G/HR	1,059	1,310	2,102	1,350	1,056
TOTAL HC	G/HR	362	331	270	229	296
TOTAL CO2	KG/HR	1,276	977	674	384	213
PART MATTER	G/HR	147.8	126.0	179.5	121.4	62.0
TOTAL NOX (AS NO2)	(CORR 5% O2) MG/NM3	2,105.6	1,869.7	2,238.6	2,670.5	2,548.4
TOTAL CO	(CORR 5% O2) MG/NM3	184.3	296.5	686.4	765.7	1,042.4
TOTAL HC	(CORR 5% O2) MG/NM3	62.9	74.9	88.2	130.2	292.5
PART MATTER	(CORR 5% O2) MG/NM3	25.7	28.5	58.6	68.8	61.3
TOTAL NOX (AS NO2)	(CORR 5% O2) PPM	1,026	911	1,090	1,301	1,241

TOTAL CO	(CORR 5% O2) PPM	147	238	549	613	834
TOTAL HC	(CORR 5% O2) PPM	102	121	142	210	472
TOTAL NOX (AS NO2)	G/HP-H R	4.32	3.93	4.89	6.72	9.21
TOTAL CO	G/HP-H R	0.38	0.62	1.50	1.93	3.77
TOTAL HC	G/HP-H R	0.13	0.16	0.19	0.33	1.06
PART MATTER	G/HP-H R	0.05	0.06	0.13	0.17	0.22
TOTAL NOX (AS NO2)	LB/HR	26.68	18.21	15.12	10.38	5.69
TOTAL CO	LB/HR	2.33	2.89	4.63	2.98	2.33
TOTAL HC	LB/HR	0.80	0.73	0.60	0.50	0.65
TOTAL CO2	LB/HR	2,814	2,153	1,487	846	470
PART MATTER	LB/HR	0.33	0.28	0.40	0.27	0.14
OXYGEN IN EXH	%	11.3	11.7	12.0	13.7	16.1
DRY SMOKE OPACITY	%	0.2	0.6	1.8	1.2	0.2
BOSCH SMOKE NUMBER		0.13	0.25	0.60	0.42	0.13
<b>GENSET POWER WITHOUT FAN</b>	<b>EKW</b>	<b>2,000.0</b>	<b>1,500.0</b>	<b>1,000.0</b>	<b>500.0</b>	<b>200.0</b>
<b>ENGINE POWER</b>	<b>BKW</b>	<b>2,090</b>	<b>1,567</b>	<b>1,045</b>	<b>522</b>	<b>209</b>
<b>PERCENT LOAD</b>	<b>%</b>	<b>100</b>	<b>75</b>	<b>50</b>	<b>25</b>	<b>10</b>

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EPA TIER 2	2007 - 2013
<p>GASEOUS EMISSIONS DATA MEASUREMENTS PROVIDED TO THE EPA ARE CONSISTENT WITH THOSE DESCRIBED IN EPA 40 CFR PART 94.103 AND ISO 8178 FOR MEASURING HC, CO, PM, AND NOX. THIS ENGINE CONFORMS TO US EPA MARINE COMMERCIAL COMPRESSION-IGNITION EMISSION REGULATIONS. THE "MAX LIMITS" SHOWN BELOW ARE WEIGHTED CYCLE AVERAGES AND ARE IN COMPLIANCE WITH THE MARINE REGULATIONS.</p>	

EPA TIER 2			2007 - 2013	
<b>Locality</b>	<b>Agency</b>	<b>Regulation</b>	<b>Tier/Stage</b>	<b>Max Limits - G/BKW - HR</b>
U.S. (INCL CALIF)	EPA	MARINE COMMERCIAL	TIER 2	CO: 5.0 NOx + HC: 7.2 PM: 0.20
IMO		2000 - 2010		
<p>GASEOUS EMISSIONS DATA MEASUREMENTS ARE CONSISTENT WITH THOSE DESCRIBED IN REGULATION 13 OF ANNEX VI OF MARPOL 73/78 AND ISO 8178 FOR MEASURING HC, CO, PM, AND NOX. THIS ENGINE CONFORMS TO INTERNATIONAL MARINE ORGANIZATION'S (IMO) MARINE COMPRESSION-IGNITION EMISSION REGULATIONS.</p>				
IMO II		2011 - ----		
<p>GASEOUS EMISSIONS DATA MEASUREMENTS ARE CONSISTENT WITH THOSE DESCRIBED IN REGULATION 13 OF REVISED ANNEX VI OF MARPOL 73/78 AND ISO 8178 FOR MEASURING HC, CO, PM, AND NOX. THIS ENGINE CONFORMS TO INTERNATIONAL MARINE ORGANIZATION'S (IMO) MARINE COMPRESSION-IGNITION EMISSION REGULATIONS.</p>				

## Altitude Derate Data [Top](#)

ALTITUDE CORRECTED POWER CAPABILITY (BKW)														□
AMBIENT OPERATING TEMP (C)	0	5	10	15	20	25	30	35	40	45	50	55	60	NORMAL
ALTITUDE (M)														
0	2,09	2,09	2,09	2,09	2,09	2,09	2,09	2,09	2,09	2,09	2,09	2,07	2,04	2,095
	5	5	5	5	5	5	5	5	5	5	5	6	5	
250	2,09	2,09	2,09	2,09	2,09	2,09	2,09	2,09	2,09	2,07	2,04	2,01	1,98	2,095
	5	5	5	5	5	5	5	5	5	8	6	5	5	





<b>AIR INTAKE SYSTEM</b>		
<i>THE INSTALLED SYSTEM MUST COMPLY WITH THE SYSTEM LIMITS BELOW FOR ALL EMISSIONS CERTIFIED ENGINES TO ASSURE REGULATORY COMPLIANCE.</i>		
MAXIMUM ALLOWABLE INTAKE RESTRICTION WITH CLEAN ELEMENT	3.7	KPA
MAXIMUM ALLOWABLE INTAKE RESTRICTION WITH DIRTY ELEMENT	6.2	KPA
<b>COOLING SYSTEM</b>		
ENGINE ONLY COOLANT CAPACITY	233	L
MAXIMUM ALLOWABLE JACKET WATER OUTLET TEMPERATURE	99	DEG C
MAXIMUM AFTERCOOLER INLET TEMPERATURE WITH 50/50 GLYCOL MIX	40	DEG C
MAXIMUM ALLOWABLE AFTERCOOLER COOLANT FLOW	870	L/MIN
REGULATOR LOCATION FOR JW CIRCUIT	OUTLET	
MAXIMUM UNINTERRUPTED FILL RATE	19	L/MIN
<b>ENGINE SPEC SYSTEM</b>		
CYLINDER ARRANGEMENT	VEE	
NUMBER OF CYLINDERS	16	
CYLINDER BORE DIAMETER	170	MM
PISTON STROKE	215	MM
TOTAL CYLINDER DISPLACEMENT	78.1	L
CRANKSHAFT ROTATION FROM	STD	

FLYWHEEL END		
CYLINDER FIRING ORDER	1-2-5-6-3-4-9-10-15-16-11-12-13-14-7-8	
NUMBER 1 CYLINDER LOCATION	RIGHT FRONT	
STROKES/COMBUSTION CYCLE	4	
<b>EXHAUST SYSTEM</b>		
<i>THE INSTALLED SYSTEM MUST COMPLY WITH THE SYSTEM LIMITS BELOW FOR ALL EMISSIONS CERTIFIED ENGINES TO ASSURE REGULATORY COMPLIANCE.</i>		
MAXIMUM ALLOWABLE SYSTEM BACK PRESSURE	6.7	KPA
MANIFOLD TYPE	DRY	
MAXIMUM ALLOWABLE STATIC WEIGHT ON EXHAUST CONNECTION	33	KG
MAXIMUM ALLOWABLE STATIC BENDING MOMENT ON EXHAUST CONNECTION	48	NM
<b>FUEL SYSTEM</b>		
MAXIMUM FUEL FLOW FROM TRANSFER PUMP TO ENGINE	1680	L/HR
MAXIMUM ALLOWABLE FUEL SUPPLY LINE RESTRICTION	30	KPA
MAXIMUM ALLOWABLE FUEL TEMPERATURE AT TRANSFER PUMP INLET	66	DEG C
MAXIMUM FUEL FLOW TO RETURN LINE FROM ENGINE	1627	L/HR
MAXIMUM ALLOWABLE FUEL RETURN LINE RESTRICTION	27	KPA
NORMAL FUEL PRESSURE IN A CLEAN SYSTEM	415	KPA

FUEL SYSTEM TYPE	EUI	
MAXIMUM TRANSFER PUMP PRIMING LIFT WITHOUT PRIMING PUMP	3.7	M
MAXIMUM HEAT REJECTION TO FUEL	12.7	KW
<b>LUBE SYSTEM</b>		
CRANKCASE VENTILATION TYPE	TO ATM	
<b>STARTING SYSTEM</b>		
MINIMUM CRANKING SPEED REQUIRED FOR START-RPM	120	

# 1 PERFORMANCE DATA (Calculated values)

## TYPE

Type designation: AMG 0500LL04 DAA

## RATINGS

Output:	2500	kVA			
Effective Power	2000	eKW	Direction of rotation		
Duty:	S1		(Facing generator drive	CW	
			end):		
Voltage:	690	V	Weight:	6850	kg
Current:	2092	A	Inertia:	80	kgm <sup>2</sup>
Power factor:	0.80		Protection by enclosure:	IP23	
Frequency:	60	Hz	Cooling method:	IC0A1	
Speed:	1800	rpm	Mounting arrangement:	IM1101	
Overspeed:	2160	rpm	Winding Method	Random	

## STANDARDS

Applicable standard:	IEC
Marine classification:	CCS
Hazardous area classification:	None
Temperature rise stator / rotor:	F/F
Insulation class:	H

## ENVIRONMENTAL CONDITIONS (max. values)

Ambient temperature min/max:	-15 / 45	°C	Altitude:	1000	masl
Coolant temperature max/min:		°C			

## ASSUMED DATA

Driving equipment:	CAT 3516C
Approx. mech. power:	2075 KW

## EFFICIENCY in %


	load:	110 %	100 %	75 %	50 %	25 %
Efficiency @ power factor 0.80		96.24	96.30	96.29	95.77	93.37
Efficiency @ power factor 1.00		97.18	97.21	97.18	96.75	94.78

## REACTANCES in %

XD (U):	278.0	XD' (S):	16.5	XQ'' (S):	15.5	X0 (U):	7.5
XQ (U):	117.5	XD'' (S):	12.2	X2 (S):	13.8	XP (S):	13.6
X1 (U):	8.4	(S) = Saturated value, (U) = Unsaturated value					

## TIME CONSTANTS (SEC.) AT 75 °C

TD0':	2.901	TD':	0.190	TQ0'':	0.1762	TA:	0.041
TD0'':	0.01431	TD'':	0.01104	TQ'':	0.0255		

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## RESISTANCES AT 20 °C

Stator winding:	0.0015	Ω	Field winding:	1.2882	Ω
Excitation winding:	13.1	Ω			

## SHORT CIRCUIT

Short circuit ratio:	0.41	
Sustained short circuit current:	1.4	p.u. (rated excitation)
	> 3.0	p.u. (voltage regulator)
Sudden short circuit current:	17150	A (symmetric RMS)
	43650	A (peak value)

## VOLTAGE VARIATION

Voltage drop at sudden increase of rated load:	< 15	%
Voltage rise at sudden drop of rated load:	< 20	%

## REACTIVE LOADING

Steady state reactive loading at rated excitation:	2150	KVAR (lagging)
Steady state reactive loading at zero excitation:	600	KVAR (leading)

## TORQUE

Rated load torque (Calculated of rated output in kVA):	13300	Nm
The peak values of sudden short circuit air gap torques:		
2-phase short circuit:	990	%
3-phase short circuit:	720	%

## BEARINGS


D-end:	Rolling, w/ grease, locked	N.D-end:	Rolling, w/ grease, free		
Lubrication system:					
<u>Inclination</u>					
Fore-Aft static:	5	Degrees	Fore-Aft dynamic:	7.5	degrees
Athwards static:	15	Degrees	Athwards dynamic:	22.5	degrees

## TERMINAL CONNECTIONS (Defined facing drive end)

Direction of main connection:	TBA
Direction of zero connection:	None

## OTHER

Stored energy constant (rotational energy divided by rated effect):	0.56	s
Earth capacitance (1-phase):	0.05	μF

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