



mitsubishi S16R-(Z3)MPTAW

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[Elastic drawing](#)
[Flywheel & housing drawing](#)
[Connection details](#)
[Performance curves](#)



MITSUBISHI
DIESEL ENGINE

Item no.	M0208-0009E
Date	April 2013

Specification sheet of S16R-(Z3)MPTAW marine diesel engine

Specification sheet of:

- S16R-MPTAW (in compliance with IMO MARPOL 73/78, Annex VI, Regulation 13, Tier 2)
- S16R-Z3MPTAW (in compliance with EU NRMM Stage IIIA Inland Waterway Vessel engines, category V1:4)

Revision	0	First edition: February 2011	Technology Department Engine Division		
	1	September 2011			
	2	October 2011	Approved by	Checked by	Drawn by
	3	April 2013			

GENERAL ENGINE DATA

Type	-----	4-Cycle, Water Cooled	
Aspiration	-----	Turbo-Charged, Inter Cooler (Fresh water to Cooler)	
Cylinder Arrangement	-----	60°V	
No. of Cylinders	-----	16	
Bore mm(in.)	-----	170	(6.69)
Stroke mm(in.)	-----	180	(7.09)
Displacement Liter(in. ³)	-----	65.37	(3989)
Compression Ratio	-----	14.5 : 1	
Dry Weight - Engine only - kg(lb)	-----	6780	(14950)
Wet Weight - Engine only - kg(lb)	-----	7195	(15865)

PERFORMANCE DATA

Idling Speed -rpm	-----	600~650	
Maximum Overspeed Capacity - rpm	-----	2100	
Moment of Inertia of Rotating Components J- kg · m ² (lbf · ft ²)	-----	24.5	(2326)
(Includes 21 inch Flywheel)			
Cyclic Speed Variation with Flywheel at			
	1200rpm	-----	1/150
	1500rpm	-----	1/219
	1800rpm	-----	1/336

ENGINE MOUNTING

Maximum Bending Moment at Rear Face of Flywheel Housing - N · m(lbf · ft)	-----	4413	(3256)
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AIR INLET SYSTEM

Maximum Intake Air Restriction (Includes piping)- kPa (in.H ₂ O)	-----	3.92	(15.7)
Maximum Allowable Intake Air Temperature- °C (°F)	-----	45	(113)

EXHAUST SYSTEM

Maximum Allowable Back Pressure - kPa (in.H ₂ O)	-----	4.41	(17.7)
---	-------	------	--------

LUBRICATION SYSTEM

Oil Pressure at Idle - MPa (psi)	-----	0.2~0.3	(29~43)
at Rated Speed - MPa (psi)	-----	0.5~0.6	(71~86)
Maximum Oil Temperature- °C (°F)	-----	110	(230)
Oil Capacity of Marine Pan High - liter (U.S.gal)	-----	260	(68.7)
Low - liter (U.S.gal)	-----	194	(51.2)
Total System Capacity (Includes Oil Filter) - liter (U.S.gal)	-----	290	(76.6)
Maximum Installation Angle			
	Front Up	-----	9.5°
	Front Down	-----	10.5°
Maximum Instantaneous Operating Angle			
(Engine Level)	Front Up	-----	30°
	Front Down	-----	30°
	Side to Side	-----	22.5°

COOLING SYSTEM

Jacket water system

Cooling system: Closed fresh water type High Temperature (HT) system with treated water/glycol mixture

Coolant Capacity of Jacket Water System (Engine only) - liter (U.S.gal)	-----	156	(41.2)
Maximum External Friction Head at Engine Outlet-MPa(psi)	-----	0.034	(5.0)
Jacket Water Standard Thermostat (Modulating) Range- °C (°F)	-----	71~85	(160~185)
Maximum Allowable Coolant Temperature at Engine Outlet- °C (°F)	-----	95	(203)
Recommended Coolant Temperature at Engine outlet- °C (°F)	-----	80	(176)

Charge air cooler cooling system

Cooling system: Closed fresh water type Low Temperature (LT) system with treated water/glycol mixture

Coolant Capacity of Charge Air Cooler (Engine only) - liter (U.S.gal)	-----	14	(3.7)
Maximum External Friction Head at Intercooler Outlet-MPa(psi)	-----	0.035	(5.1)
Charge Air Cooler Standard Thermostat (Modulating) Range- °C (°F)	-----	35~50	(95~122)
Maximum Coolant Temperature at Intercooler Inlet, MPTAW type- °C (°F)	-----	38	(100)
Minimum Coolant Expansion Space -% of System Capacity	-----	10	
Recommended Static Head of Coolant above Crankshaft Center - m(ft)			
	MAX.	-----	10 (32.8)
	MIN.	-----	7 (23.0)

The specifications are subject to change without prior notice.

FUEL SYSTEM

Fuel Injection Pump	----- Mitsubishi PS8 Type x 2
Maximum Suction Head of Feed Pump - kPa (in. Hg)	----- 14.7 (4.3)
Maximum Level of Fuel Tank - m	Continuous Use ----- 5.0
	Stand-by Use ----- 2.0
Minimum Fuel Oil Supply Pipe Inner Diameter - mm(in.)	----- 20 (0.79)
Minimum Fuel Oil Leak Pipe Inner Diameter - mm(in.)	----- 20 (0.79)

STARTING SYSTEM

Battery Charging Alternator - V-Ah	----- 24-35
Starting Motor Capacity - V -kW	----- 24-7.5x2
Maximum Allowable Resistance of Cranking Circuit - m Ω	----- 1.5
Recommended Minimum Battery Capacity	
At 5°C (41°F) and above - Ah	----- 300
Below 5°C (41°F) through -5°C (23°F)	----- 600
Cranking Ampere of Starter at 5°C (41°F) / -5°C (23°F)	
Static Ampere -A	410 × 2 / 540 × 2
Momentary Ampere -A	780 × 2 / 1040 × 2

ACCESSORY EQUIPMENT

Air Cleaner	Silencer Type
Exhaust Manifold	Air Cooled
Turbocharger	Air Cooled
Air Cooler	Fresh Water Cooled
Breather	Conduction Type
Governor	Hydraulic PSG Type or electronic (optional)
Fuel Injection Pump	
Fuel Feed Pump	
Fuel Injection Pipe	Double walled Type
Fuel Injection Nozzle	
Fuel Filter	Paper Element Type
Lubricating Oil Pump	
Lubricating Oil Cooler	
Lubricating Oil Filter(Full-Flow)	Paper Element Type
Lubricating Oil Filter(By-Pass Flow)	Paper Element Type
Oil Pan	Large Capacity,steel
Cooling Water Pumps (HT, LT)	
Cooling Water Thermostats (HT, LT)	
Starter	Earth Float Type
Alternator	Earth Float Type
Stop Solenoid	DC24V-15A
Engine Support	Marine Type
Accessory Drive	Front Drive Pulley

The specifications are subject to change without prior notice.

ENGINE RATING¹

All data represent net performance according to ISO 3046 with standard accessories such as fuel injection pump, water pump, L.O. pump and charging alternator under the condition of 100 kPa (750 mmHg) barometric pressure, 298 °K (25 °C) ambient temperature and 30% relative humidity.

ITEM Engine model	UNIT	Propulsion use			Auxiliary generator		
		-Z3MPTAW-3	-MPTAW-3	-MPTAW-2	-MPTAW-9	-MPTAW-5	-MPTAW-4
Rating		Heavy Duty		Medium Duty	60Hz	50Hz	60Hz
Rated engine speed		1600		1650	1200	1500	1800
Emission Regulation (Test cycle)	EU Stage IIIA category	E2 (CPP) E3(FPP)	-	-	-	-	-
	IMO Tier 2	E2 (CPP) E3(FPP)	E2 (CPP) E3(FPP)	E2 (CPP) E3(FPP)	D2	D2	D2
Number of cylinders		16					
Bore	mm (in.)	170 (6.69)					
Stroke	mm (in.)	180 (7.09)					
Displacement	liter (in. ³)	65.37 (3989)					
Rated output ¹	kW HP	1250 (1676)		1380 (1850)	1120 (1502)	1500 (2011)	1690 (2256)
Brake Mean Effective Pressure	MPa (psi)	1.43 (207)		1.54 (223)	1.71 (248)	1.84 (267)	1.72 (249)
Mean Piston Speed	m/s (ft/min)	9.6 (1890)		9.9 (1949)	7.2 (1417)	9.0 (1772)	10.8 (2126)
Maximum Regenerative Power Absorption Capacity	kW (HP)	161 (216)		160 (215)	131 (175)	163 (218)	162 (217)
Intake Air Flow	m ³ /min (CFM)	112 (3955)		126 (4449)	112 (3955)	134 (4732)	157 (5544)
Exhaust Gas Flow	m ³ /min (CFM)	295 (10416)		334 (11794)	295 (10416)	355 (12535)	416 (14689)
Coolant Flow	liter/min (U.S. GPM)	1720 (454)		1750 (462)	1300 (343)	1650 (436)	1850 (489)
Coolant(Jacket water) Pressure (water pump outlet)	MPa (psi)	0.15 (22)		0.15 (22)	0.09 (13)	0.14 (20)	0.17 (25)
Coolant Flow to Inter Cooler (Max. Flow: 320L/min)	liter/min (U.S. GPM)	300 (80)		300 (80)	300 (80)	300 (80)	300 (80)
Oil Flow	liter/min (U.S. GPM)	510 (135)		530 (140)	380 (100)	480 (127)	580 (153)
Radiated Heat to Ambient	kJ/hr (BTU/min)	352078 (5563)		398109 (6290)	351682 (5557)	422451 (6675)	496118 (7839)
Heat Rejection to Coolant	kJ/hr (BTU/min)	1760388 (27814)		1990543 (31451)	1758410 (27783)	2112256 (33374)	2480590 (39193)
Heat Rejection to Inter Cooler	kJ/hr (BTU/min)	1408311 (22251)		1592435 (25160)	1406728 (22226)	1689805 (26699)	1984472 (31355)
Heat Rejection to Exhaust	kJ/hr (BTU/min)	3715016 (58697)		4321875 (68285)	4173134 (65935)	4457576 (70430)	5494466 (86812)
Cooling system	Direct Sea Water Cooling Max. sea water temp. at intercooler inlet	°C	N/A				
	Intermediate Fresh Water Cooling Max. fresh water temp. at intercooler inlet	°C	Max. 38°C (When sea water temp. 32°C)				
	Radiator Cooling Max. coolant temp. at intercooler inlet	°C	N/A			Max. 45°C (When Air Temp. 25°C)	
Noise Level (1 m height & distance) (excludes, Intake,Exhaust)	dB(A)	-		-	-	-	-
Maximum No Load Governed Speed	rpm	1720		1774	1290	1575	1890

¹ the rated output is available up to IACS ambient reference conditions without derating

The specifications are subject to change without prior notice.



**MITSUBISHI DIESEL ENGINE
TECHNICAL INFORMATION**

ITEM NO.

T0307-0029E Rev.1 (1/2)

DATE

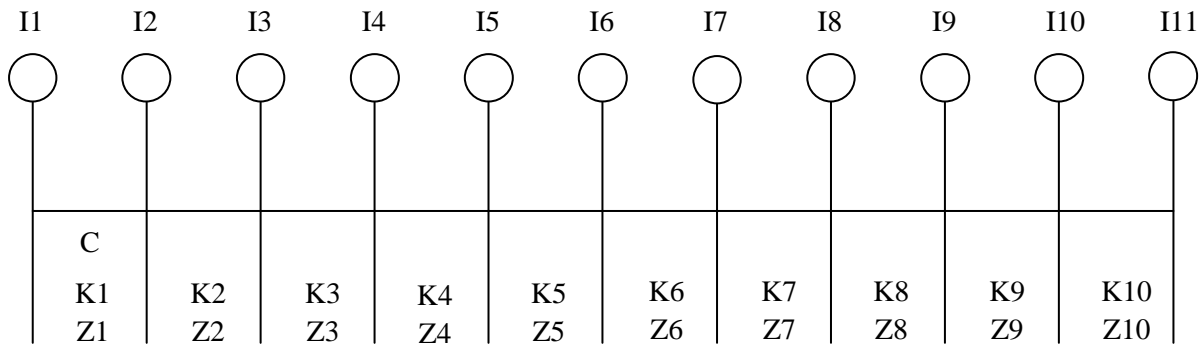
April, 2007

Elastic data of S16R-M Engine

Elastic data of S16R-M Engine are enclosed herein.

Revision	First Edition : April, 2007 (Refer to MTD98-0228B)	Engine Engineering Department Large Engine Design Section		
	Rev.1 : April, 2007 (Refer to MTD04-0106)			
		Approved by	Checked by	Drawn by



S16R-M ELASTIC DATA

(USE:45R89-19502 CONNECTING ROD)

	Moment of inertia J kg.m ²	Damping coefficient Nm/rad/s	Spring const. x10 ⁷ Nm/rad	Tensile strength N/mm ²	Section modulus cm ³
I1	DAMPER	2.02	C=1049.3	K1=0.0	Z1 =0.0
I2	PULLEY	2.924	—	K2=1.089	Z2 =373.7
I3	No.1 CRANK	1.045	—	K3=0.735	Z3 =373.7
I4	No.2 CRANK	1.045	—	K4=0.735	Z4 =373.7
I5	No.3 CRANK	1.045	—	K5=0.735	Z5 =373.7
I6	No.4 CRANK	1.045	—	K6=0.735	Z6 =373.7
I7	No.5 CRANK	1.045	—	K7=0.735	Z7 =373.7
I8	No.6 CRANK	1.045	—	K8=0.735	Z8 =373.7
I9	No.7 CRANK	1.045	—	K9=0.735	Z9 =373.7
I10	No.8 CRANK	1.044	—	K10=1.304	Z10=373.7
I11	FLYWHEEL	11.21	—		

Hysteresis constant:130 No. of Cylinder: 16 Bore:170mm Stroke:180mm

Length of Con-Rod: 340mm Mass of Reciprocating Parts: 12.630 kg

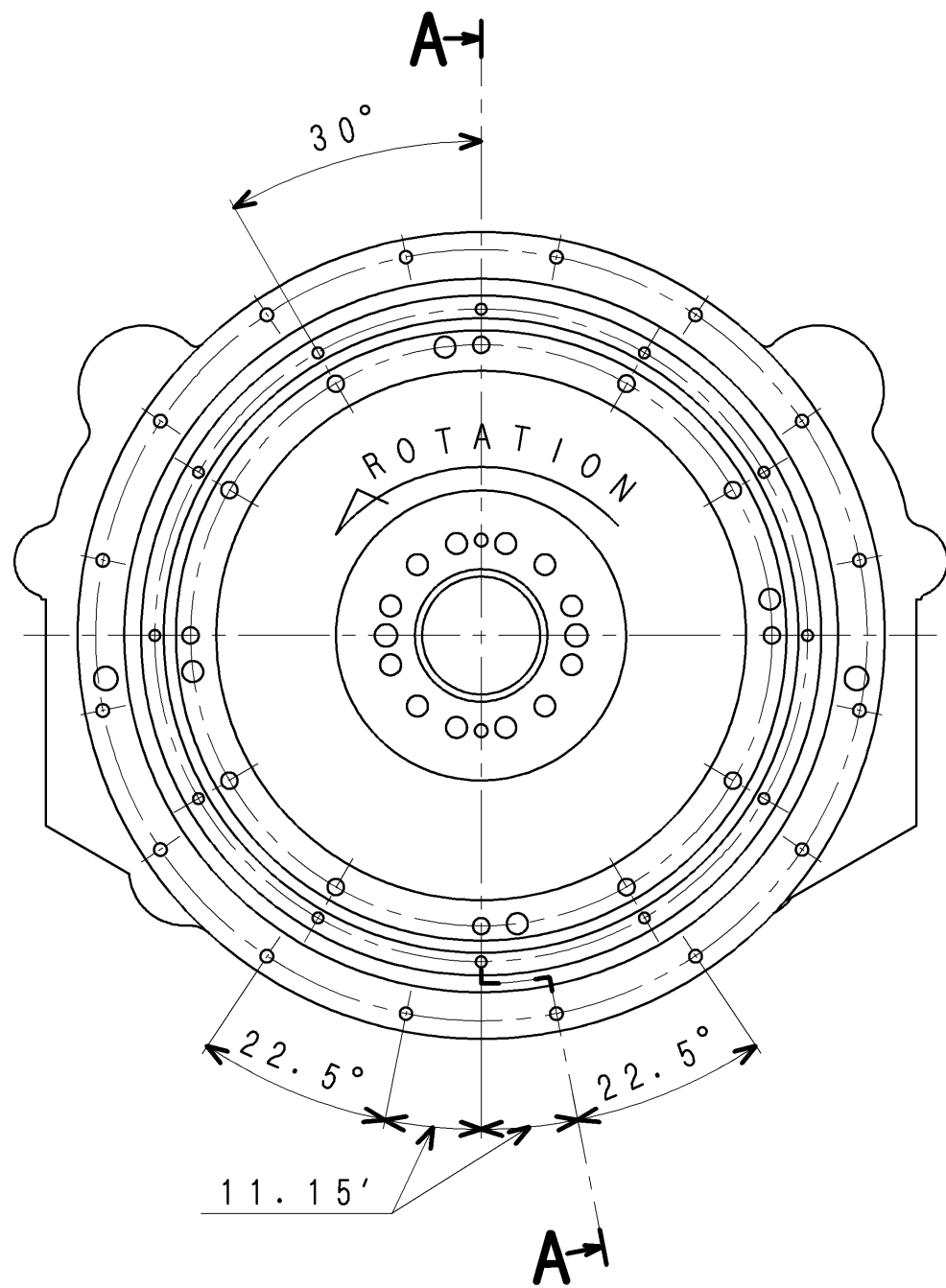
Firing order:1-9-6-14-2-10-4-12-8-16-3-11-7-15-5-13

Firing interval:0-60-90-150-180-240-270-330-360-420-450-510-540-600-630-690

APPLICATION : MARINE USE

The data is subject to change without notice.

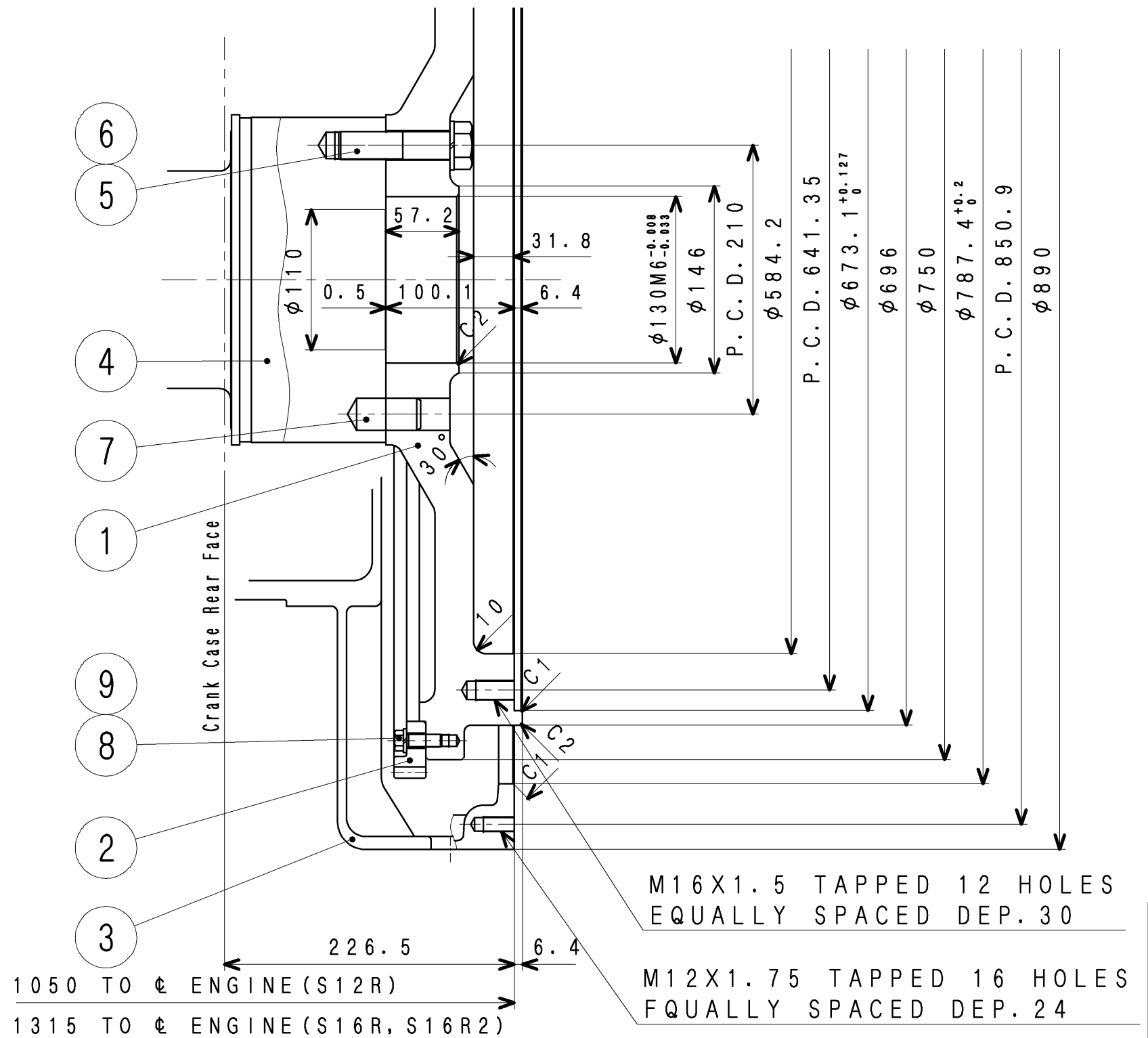




(2) Flywheel SAE (J620d) Standard No. 21

Note: (1) Flywheel Housing SAE (J617c) Standard No. 00

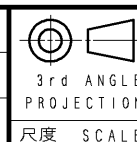
9	SPRING WASHER	12
8	RING GEAR BOLT	12
7	DOWEL PIN	2
6	WASHER	12
5	FLYWHEEL BOLT	12
4	CRANK SHAFT	1
3	FLYWHEEL HOUSING	1
2	RING GEAR	1
1	FLYWHEEL	1
No.	PARTS NAME	Q'TY



SECTION A-A

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MODEL	CHG	ED-NO	DATE	CHK
S12R				
S16R				
S16R2				



3rd ANGLE PROJECTION
尺度 SCALE

FLYWHEEL & HOUSING FOR SR-V

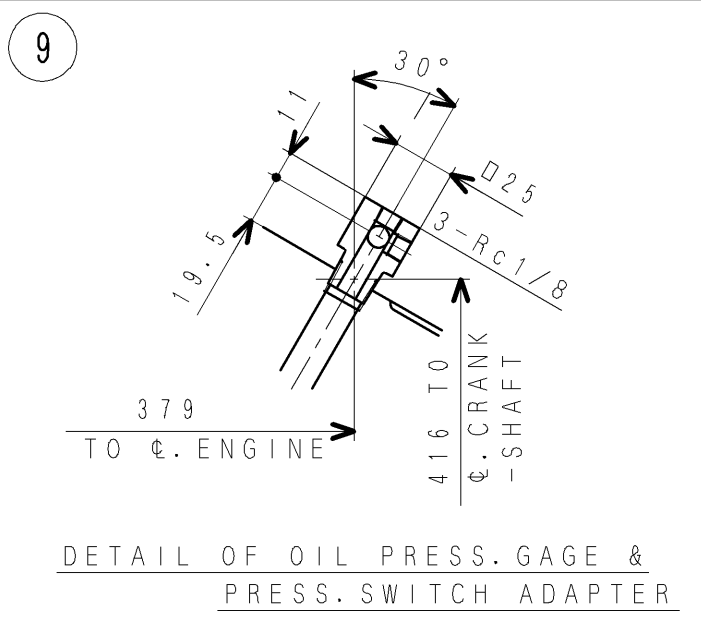
三菱重工業株式会社 汎用機・特車事業本部
GENERAL MACHINERY & SPECIAL VEHICLE HEADQUARTERS, MITSUBISHI HEAVY INDUSTRIES, LTD.

図面番号 45R96-21051
DRAWING No.

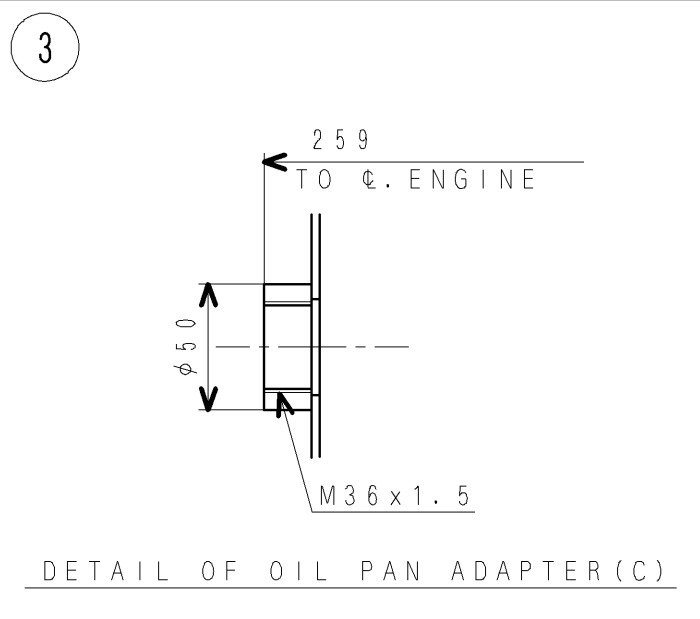
③ 新図 ④ 旧引図 サイズ A 3 ① 組立図 2 鋳鍛歯車品 3 板金溶接品 4 組立品 5 切削品 6 その他(購入品)

出図
汎特
2013
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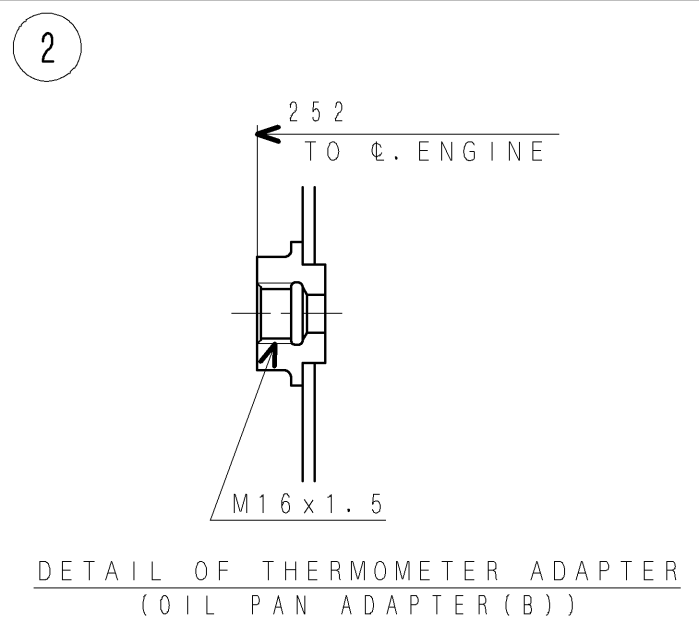
M/C



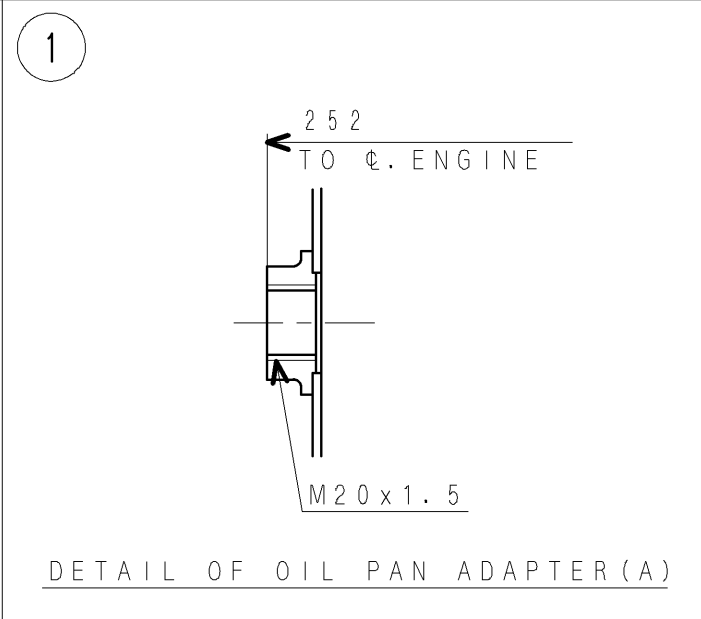
DETAIL OF OIL PRESS. GAGE & PRESS. SWITCH ADAPTER



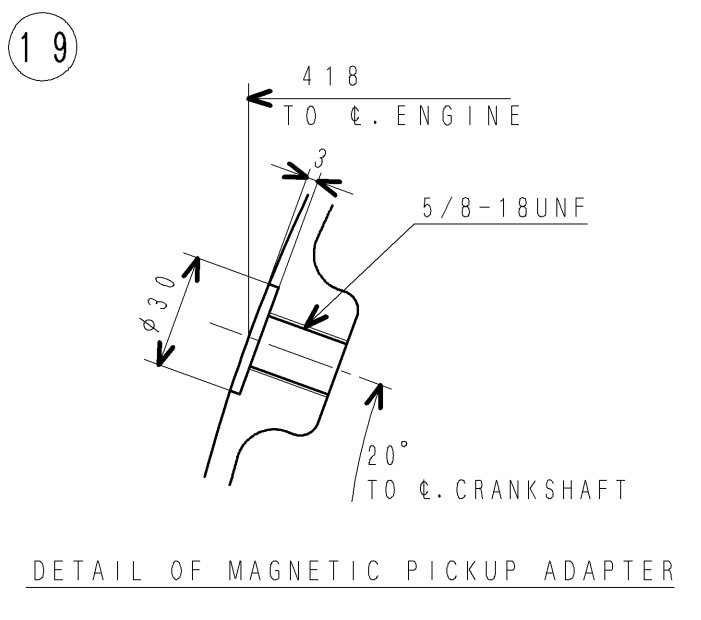
DETAIL OF OIL PAN ADAPTER (C)



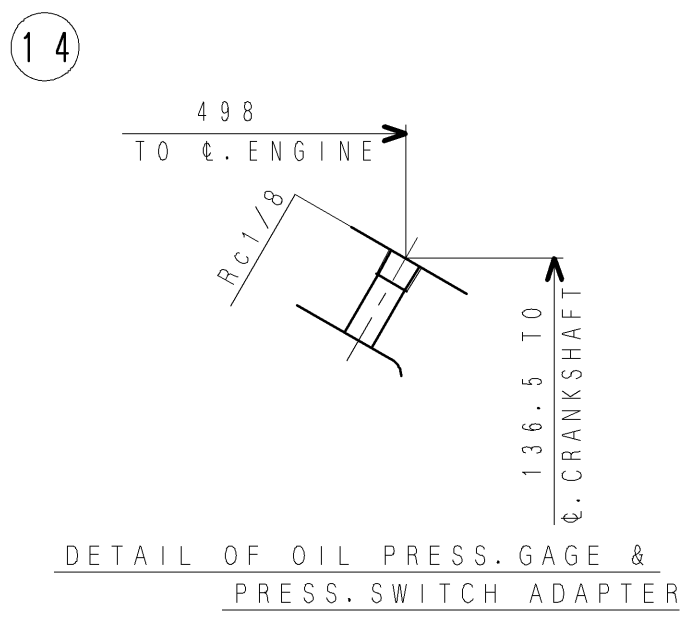
DETAIL OF THERMOMETER ADAPTER (OIL PAN ADAPTER (B))



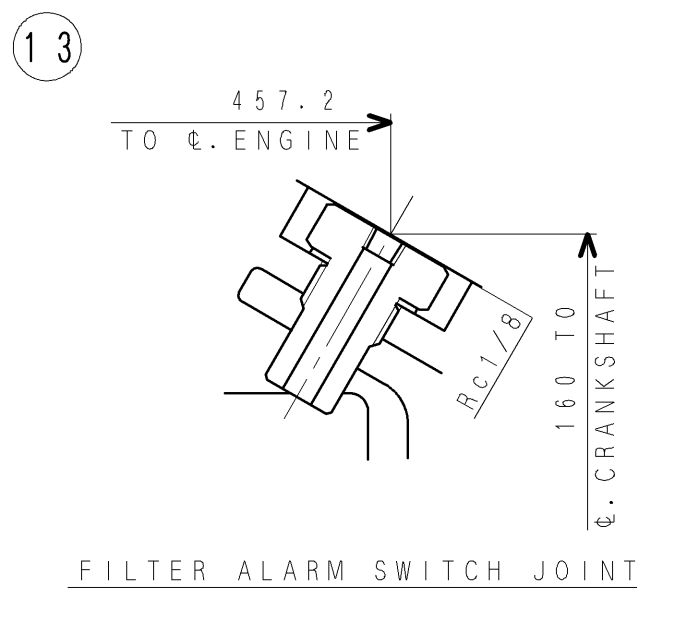
DETAIL OF OIL PAN ADAPTER (A)



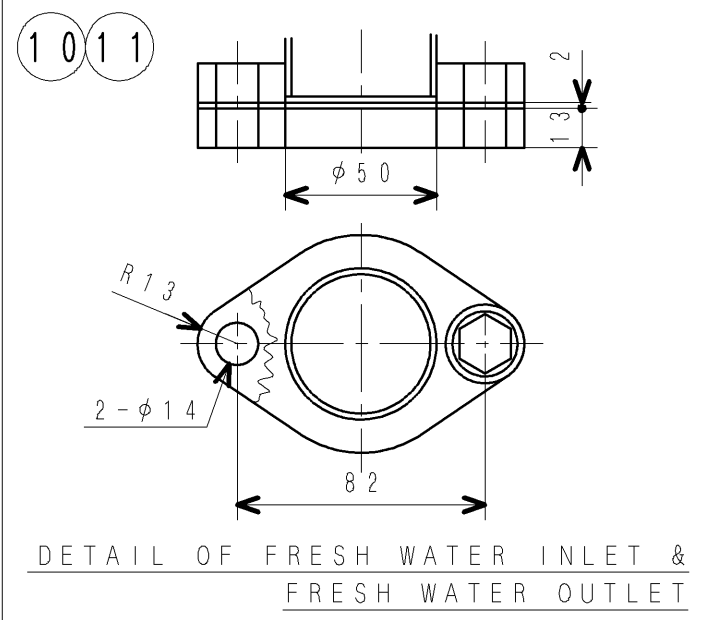
DETAIL OF MAGNETIC PICKUP ADAPTER



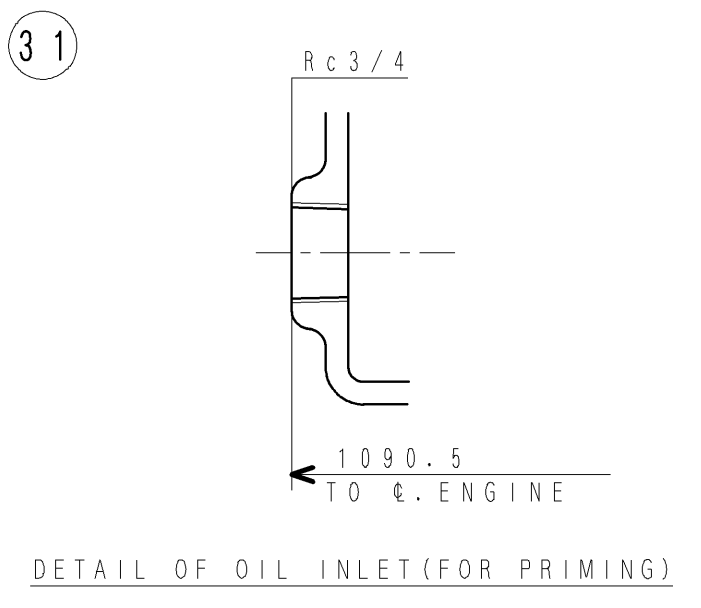
DETAIL OF OIL PRESS. GAGE & PRESS. SWITCH ADAPTER



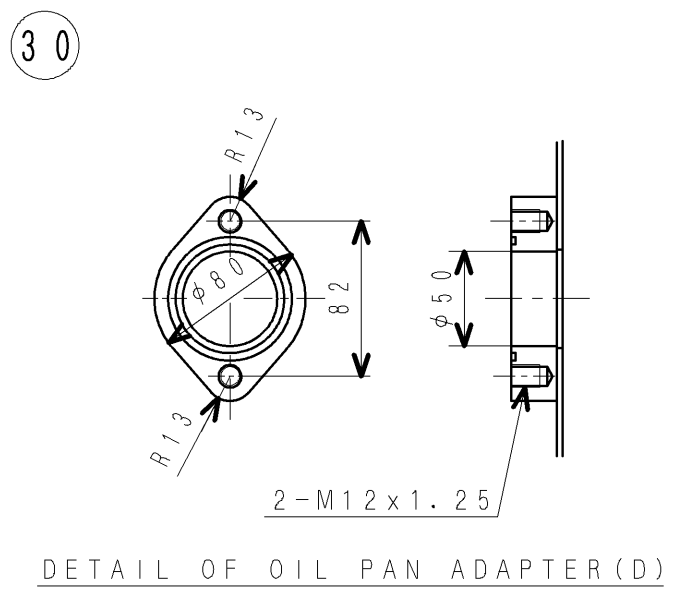
FILTER ALARM SWITCH JOINT



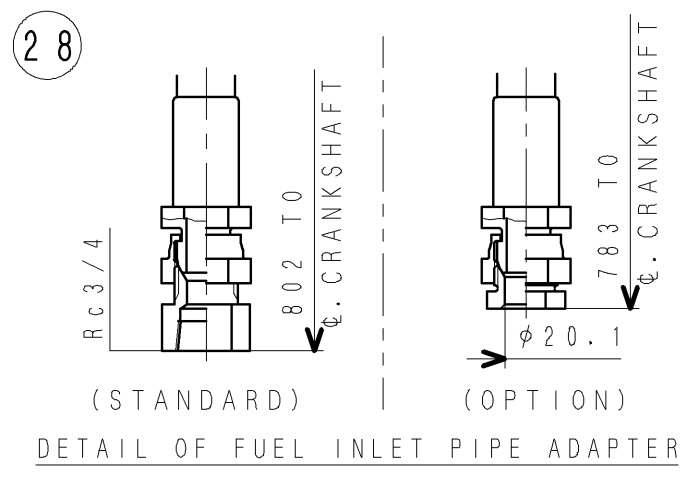
DETAIL OF FRESH WATER INLET & FRESH WATER OUTLET



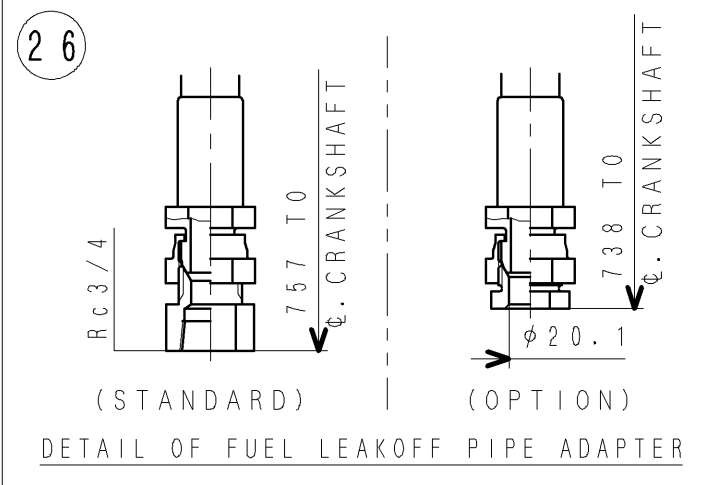
DETAIL OF OIL INLET (FOR PRIMING)



DETAIL OF OIL PAN ADAPTER (D)



DETAIL OF FUEL INLET PIPE ADAPTER



DETAIL OF FUEL LEAKOFF PIPE ADAPTER

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MODEL
S16R-C2MPTK
S16R-(Z3)MPTAW
S16R-Y3MPTAW

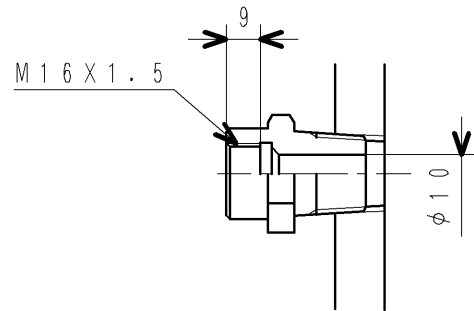
S16R
JOINT DETAIL
 三菱重工業株式会社 汎用機・特車事業本部
 MITSUBISHI HEAVY INDUSTRIES, LTD. GENERAL MACHINERY & SPECIAL VEHICLES.
 図面番号 45R96-01063 4
 DRAWING No. 1/2

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 2013
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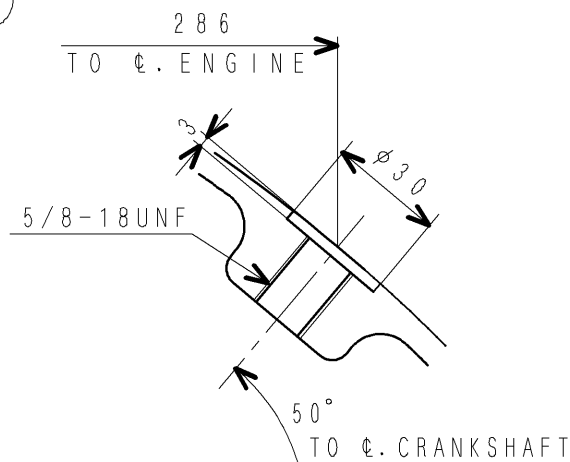
3 新図 サイズ ① 組立図 2 鋳鍛歯車品 3 板金溶接品 4 組立品
 ④ 旧引図 A 3 5 切削品 6 その他(購入品)

39



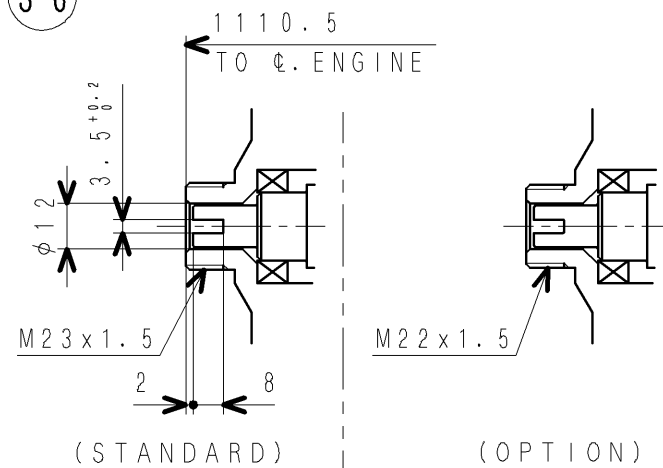
DETAIL OF THERMOMETER & THERMOSWITCH ADAPTER

37



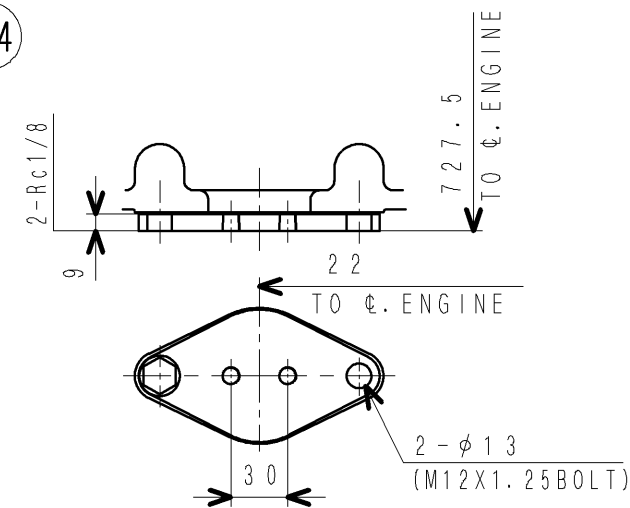
DETAIL OF MAGNETIC PICKUP ADAPTER

36



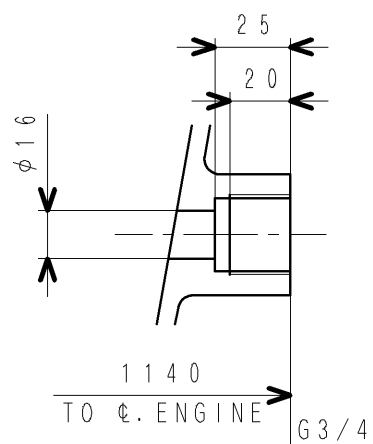
DETAIL OF TACHOMETER ADAPTER

34



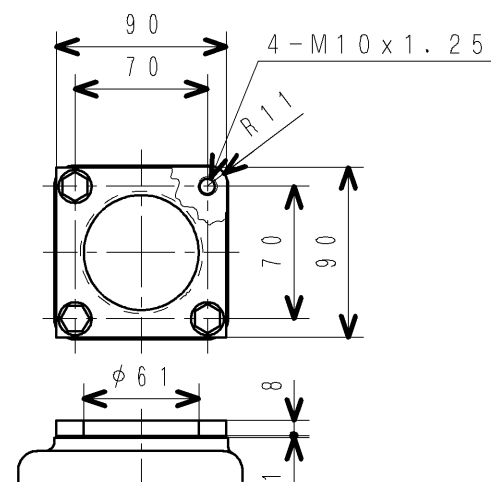
DETAIL OF AIR PRESS. GAGE ADAPTER

48



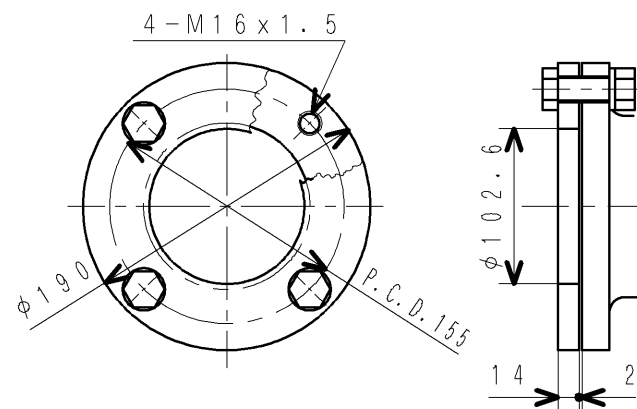
DETAIL OF THERMOMETER, ex. ADAPTER

47



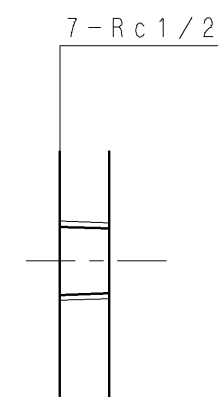
DETAIL OF FRESH WATER OUTLET

42



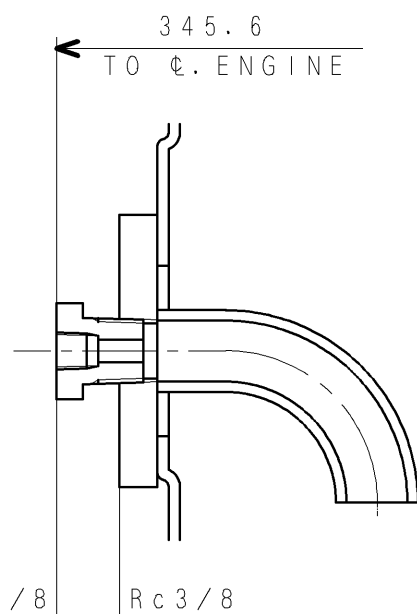
DETAIL OF FRESH WATER INLET

40



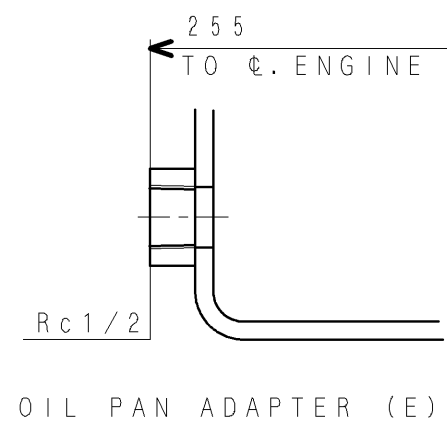
DETAIL OF THERMOMETER & THERMOSWITCH ADAPTER

50



C/C INTERNAL PRESS. ADAPTER

49



OIL PAN ADAPTER (E)

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S16R

JOINT DETAIL

三菱重工業株式会社 汎用機・特車事業本部

MITSUBISHI HEAVY INDUSTRIES, LTD. GENERAL MACHINERY & SPECIAL VEHICLES.

図面番号 45R96-01063

3

2/2

3 新図	サイズ A 3	① 組立図	2 鋳鍛歯車品	3 板金溶接品	4 組立品
④ 旧引図			5 切削品	6 その他(購入品)	

旧引

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 2013
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MITSUBISHI DIESEL ENGINE TECHNICAL INFORMATION	ITEM NO.	T0406-0007E Rev.2 (1/6)
	DATE	January, 2015

Performance Curves of S16R-(Z3)MPTAW

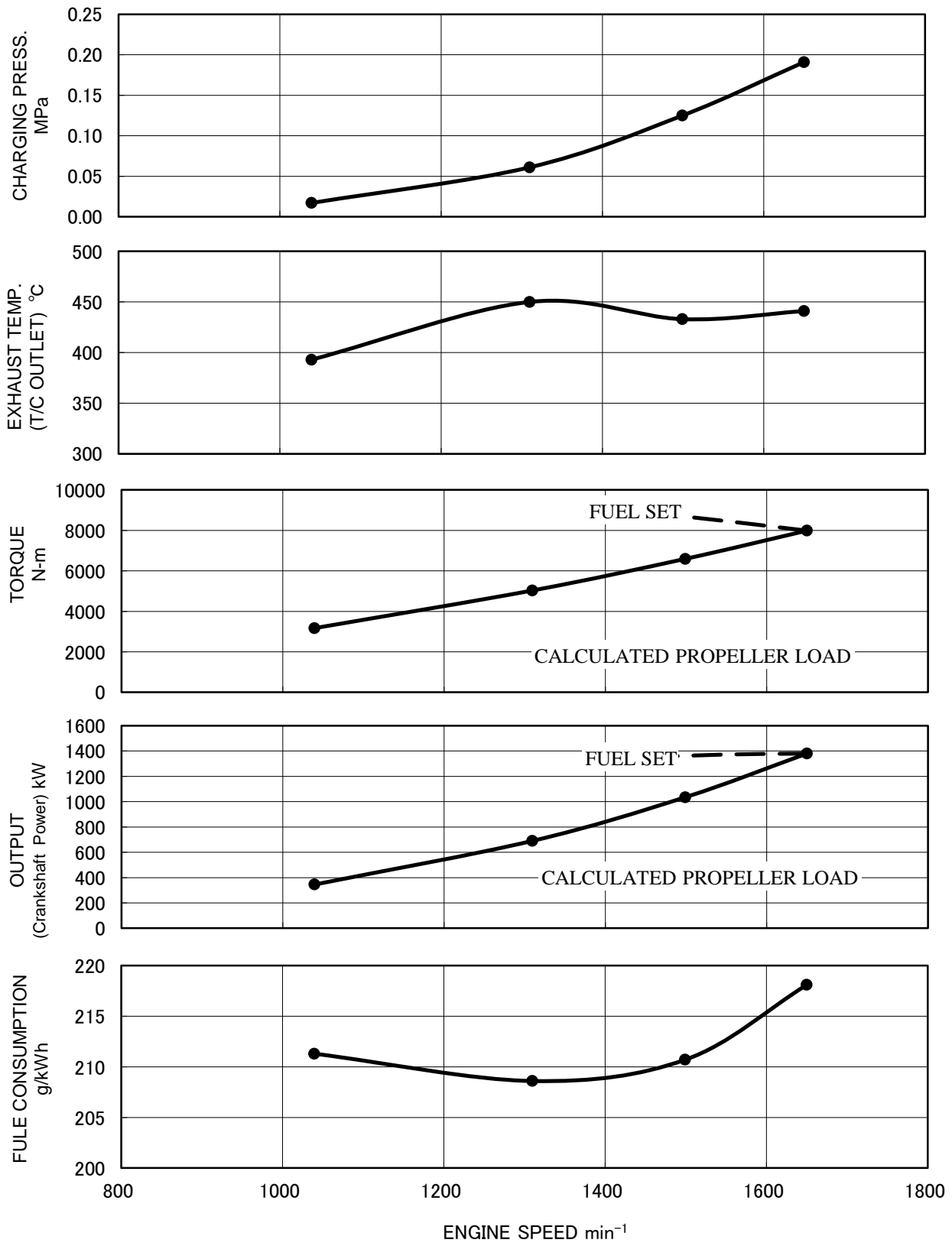
Performance Curves of S16R-(Z3)MPTAW Engine that is satisfied with EU stage IIIA & IMO-Tier2 are enclosed herein. The data are test bench data and not a guaranteed performance.

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Revision	First Edition : August, 2010	Engine Engineering Department High Speed Engine Designing Section		
	Rev.1 : August, 2013			
	Rev.2 : January, 2015	Approved by	Checked by	Drawn by

Rating: MD

RATED OUTPUT : 1380kW/1650min⁻¹ (at FLYWHEEL)



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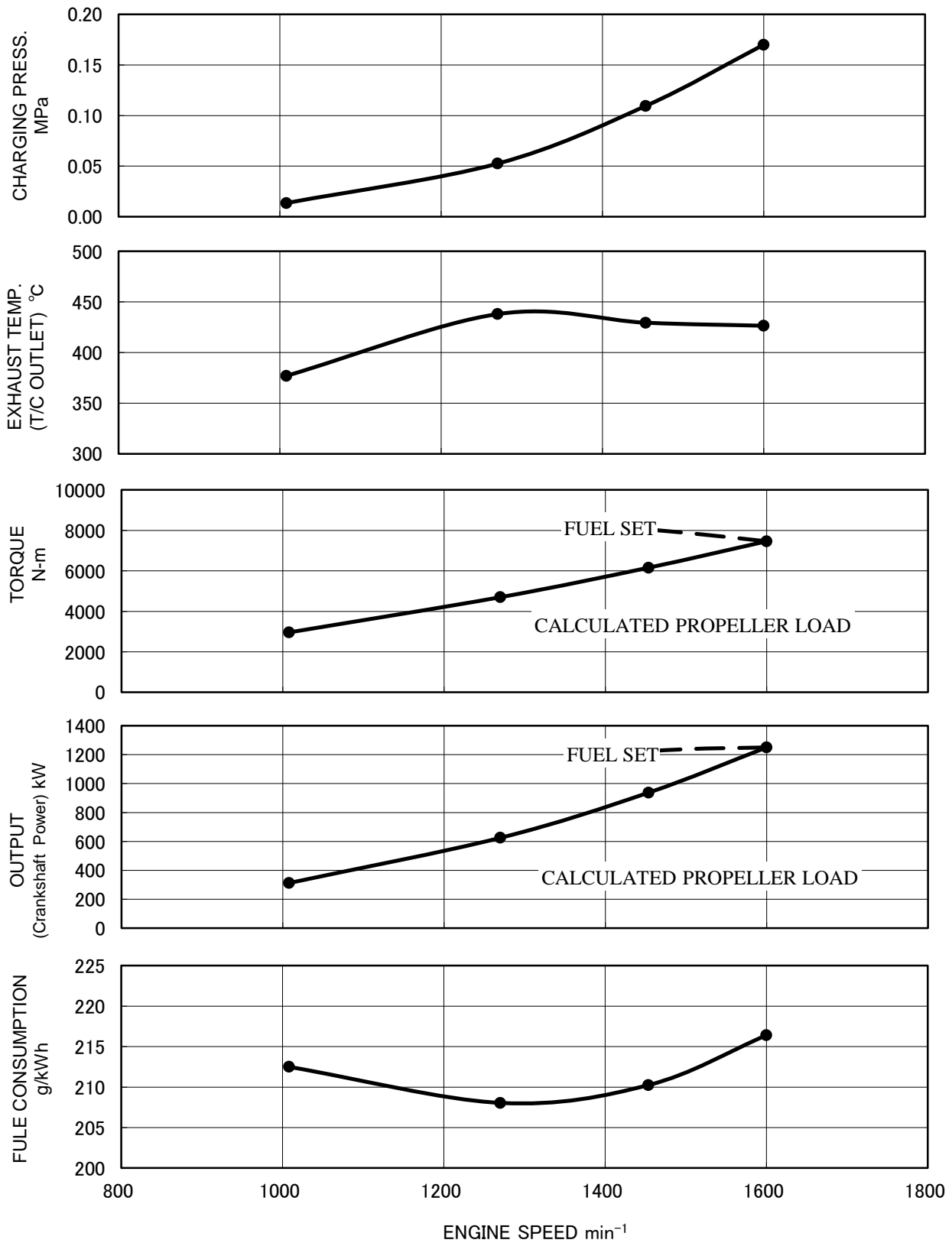
Fuel Consumption is based on ISO3046/1 with +5% tolerance at rated power.
The specifications are subject to change without notice.

APPLICATION : MARINE PROPULSION

Pub. No.T0406-0007E Rev.2 2/6

Rating: HD

RATED OUTPUT : 1250kW/1600min⁻¹ (at FLYWHEEL)



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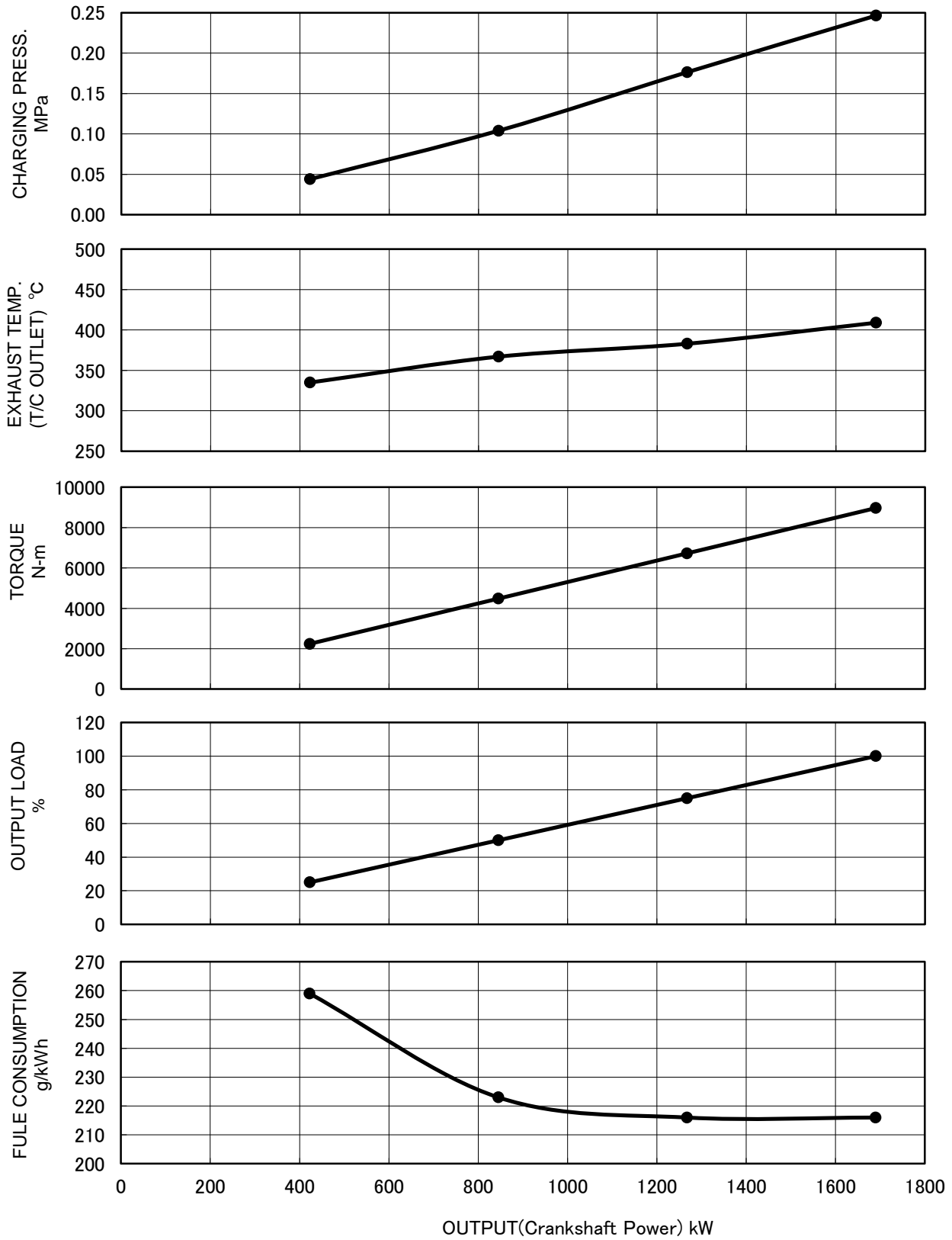
Fuel Consumption is based on ISO3046/1 with +5% tolerance at rated power.
The specifications are subject to change without notice.

APPLICATION : MARINE PROPULSION

Pub. No.T0406-0007E Rev.2 3/6

Rating: Prime

RATED OUTPUT : 1690kW/1800min⁻¹ (at FLYWHEEL)



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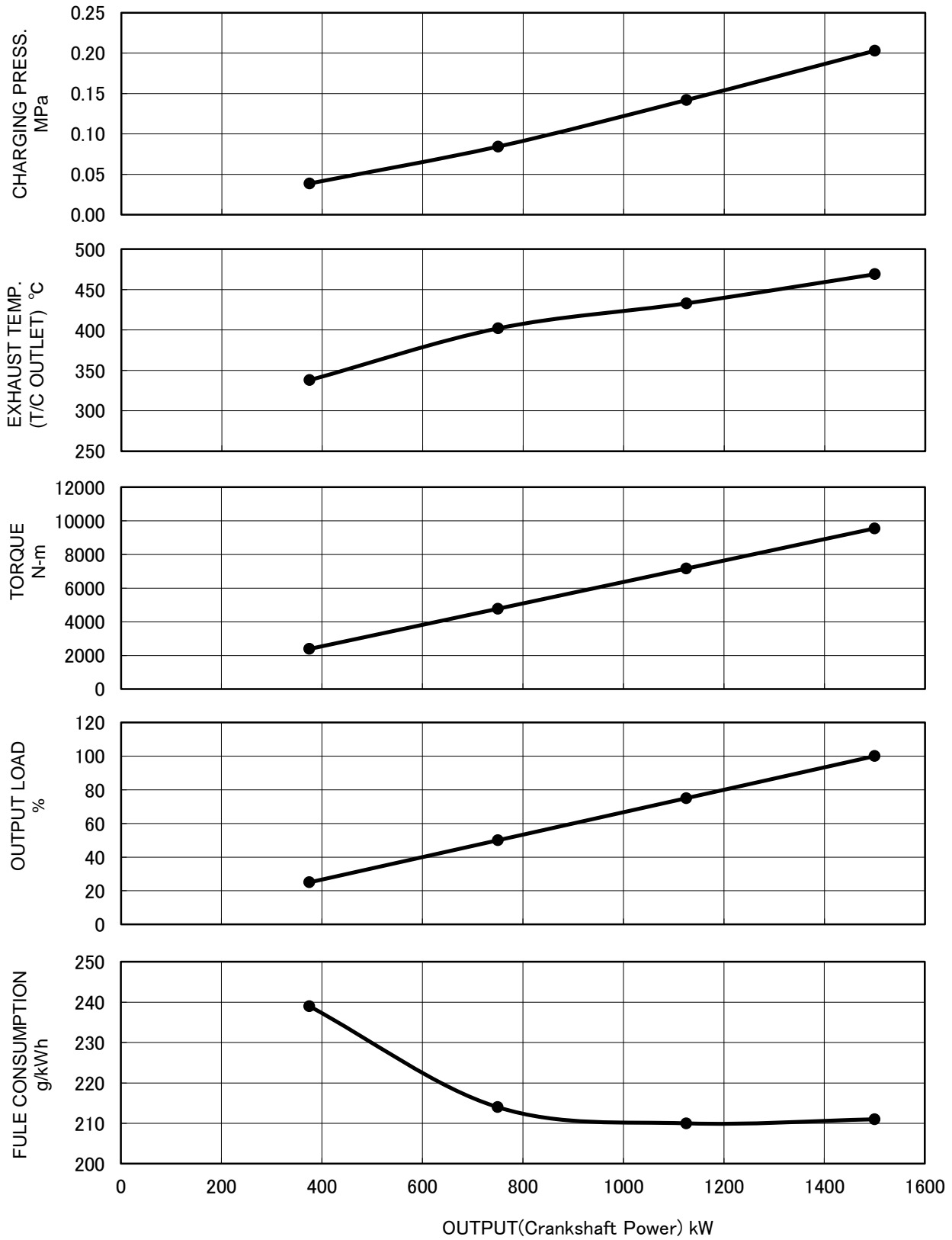
Fuel Consumption is based on ISO3046/1 with +5% tolerance at rated power.
The specifications are subject to change without notice.

APPLICATION : GENERATOR

Pub. No.T0406-0007E Rev.2 4/6

Rating: Prime

RATED OUTPUT : 1500kW/1500min⁻¹ (at FLYWHEEL)



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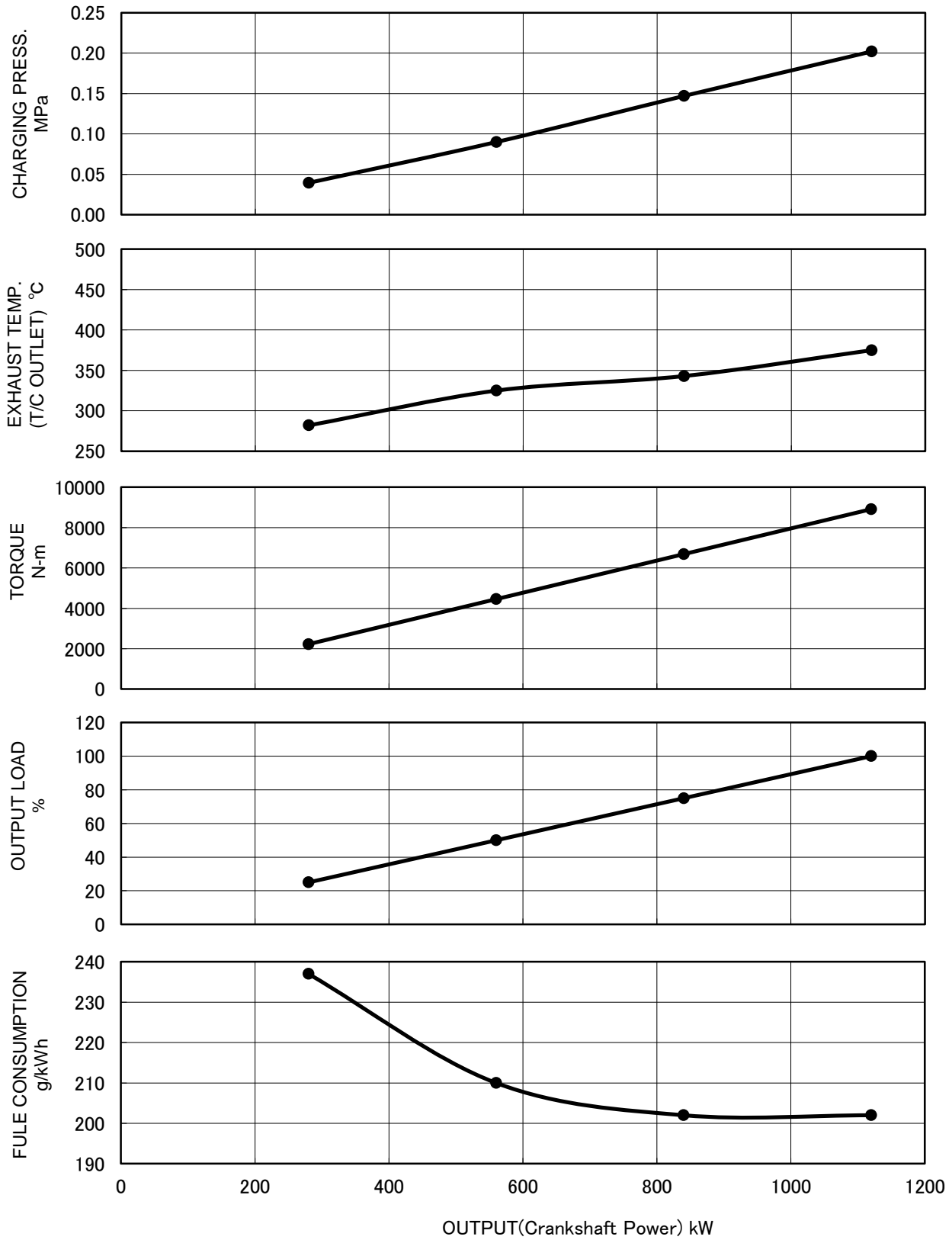
Fuel Consumption is based on ISO3046/1 with +5% tolerance at rated power.
The specifications are subject to change without notice.

APPLICATION : GENERATOR

Pub. No.T0406-0007E Rev.2 5/6

Rating: Prime

RATED OUTPUT : 1120kW/1200min⁻¹ (at FLYWHEEL)



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Fuel Consumption is based on ISO3046/1 with +5% tolerance at rated power.
The specifications are subject to change without notice.

APPLICATION : GENERATOR

Pub. No.T0406-0007E Rev.2 6/6