



mitsubishi S12R-(Z3)MPTAW-2-3

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



MITSUBISHI
DIESEL ENGINE

Item no.

M0207-0010E

Date

April 2013

Specification sheet of S12R-(Z3)MPTAW marine diesel engine

Specification sheet of:

- S12R-MPTAW (in compliance with IMO MARPOL 73/78, Annex VI, Regulation 13, Tier 2)
- S12R-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	-----	12	
Bore mm(in.)	-----	170	(6.69)
Stroke mm(in.)	-----	180	(7.09)
Displacement Liter(in. ³)	-----	49.03	(2992)
Compression Ratio	-----	14.5 : 1	
Dry Weight - Engine only - kg(lb)	-----	5320	(11731)
Wet Weight - Engine only - kg(lb)	-----	5600	(12348)

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)	-----	20.22	(1920)
(Includes 21 inch Flywheel)			
Cyclic Speed Variation with Flywheel at	1800rpm	-----	1/683
	1500rpm	-----	1/448
	1200 rpm	-----	1/77

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)
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LUBRICATION SYSTEM

Oil Pressure	at Idle - MPa (psi)	-----	0.2~0.3	(29~43)
	at Rate 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)	-----	200	(52.8)
	Low - liter (U.S.gal)	-----	158	(41.7)
Total System Capacity (Includes Oil Filter) - liter (U.S.gal)	-----	230	(60.8)	
Maximum Installation Angle	Front Up	-----	12.5°	
	Front Down	-----	15°	
	Maximum Instantaneous Operating Angle	Front Up	-----	30°
(Engine Level)	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)	-----	111	(29.3)
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)	-----	see page 4/4		
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 PS6 Type x 2
Maximum Suction Head of Feed Pump - kPa (in. Hg)	-----	14.7 (4.3)
Maximum Level of Fuel Tank - m	-----	5.0
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		380 × 2 / 480 × 2
Momentary Ampere -A		720 × 2 / 920 × 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 100kPa(750 mm Hg) barometric pressure, 298K (25degC) 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 V1:4	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		12					
Bore	mm (in.)	170 (6.69)					
Stroke	mm (in.)	180 (7.09)					
Displacement	liter (in. ³)	49.03 (2992)					
Rated output ¹	kW	940		1040	840	1120	1270
	HP	(1260)		(1394)	(1126)	(1501)	(1702)
Brake Mean Effective Pressure	MPa (psi)	1.44 (209)		1.54 (223)	1.71 (248)	1.83 (265)	1.73 (251)
Mean Piston Speed	m/s	9.6		9.9	7.2	9	10.8
	(ft/min)	(1890)		(1949)	(1417)	(1772)	(2126)
Maximum Regenerative Power Absorption Capacity	kW	128		140	69	109	178
	(HP)	(172)		(187)	(93)	(146)	(239)
Intake Air Flow	m ³ /min	86		97	70	100	119
	(CFM)	(3037)		(3425)	(2472)	(3531)	(4202)
Exhaust Gas Flow	m ³ /min	228		258	185	265	315
	(CFM)	(8051)		(9110)	(6532)	(9357)	(11123)
Coolant Flow	liter/min	1720		1750	1300	1650	1850
	(U.S. GPM)	(454)		(462)	(343)	(436)	(489)
Coolant(Jacket water) Pressure (water pump outlet)	MPa	0.15		0.15	0.09	0.14	0.17
	(psi)	(22)		(22)	(13)	(20)	(25)
Coolant Flow to Inter Cooler (Max. Flow: 320L/min)	liter/min	300		300	300	300	300
	(U.S. GPM)	(80)		(80)	(80)	(80)	(80)
Oil Flow	liter/min	510		530	380	480	580
	(U.S. GPM)	(135)		(140)	(100)	(127)	(153)
Radiated Heat to Ambient	kJ/hr	271144		307123	220574	315315	374980
	(BTU/min)	(4284)		(4853)	(3485)	(4982)	(5925)
Heat Rejection to Coolant	kJ/hr	1355721		1535613	1102869	1576577	1874902
	(BTU/min)	(21420)		(24263)	(17425)	(24910)	(29623)
Heat Rejection to Inter Cooler	kJ/hr	1084577		1228491	882295	1261262	1499922
	(BTU/min)	(17136)		(19410)	(13940)	(19928)	(23699)
Heat Rejection to Exhaust	kJ/hr	2943547		3423247	2123349	3327111	4179603
	(BTU/min)	(46508)		(54087)	(33549)	(52568)	(66038)
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	1260	1575	1890

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



**MITSUBISHI DIESEL ENGINE
TECHNICAL INFORMATION**

ITEM NO.

T0307-0028E Rev.1 (1/2)

DATE

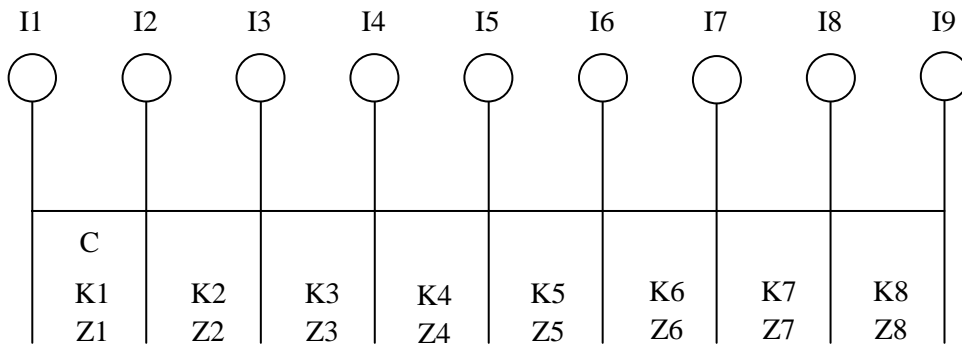
April, 2007

Elastic data of S12R-M Engine

Elastic data of S12R-M Engine are enclosed herein.

Revision	First Edition : April, 2007 (Refer to MTD98-0227B)	Engine Engineering Department Large Engine Design Section		
	Rev.1 : April, 2007 (Refer to MTD04-0105)			
		Approved by	Checked by	Drawn by



S12R-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	1049.3	K1=0	Z1 =0.0
I2	PULLEY	2.924	—	K2=1.089	Z2 =373.7
I3	No.1 CRANK	0.999	—	K3=0.735	Z3 =373.7
I4	No.2 CRANK	0.610	—	K4=0.735	Z4 =373.7
I5	No.3 CRANK	0.999	—	K5=0.735	Z5 =373.7
I6	No.4 CRANK	0.999	—	K6=0.735	Z6 =373.7
I7	No.5 CRANK	0.610	—	K7=0.735	Z7 =373.7
I8	No.6 CRANK	0.998	—	K8=1.304	Z8 =373.7
I9	FLYWHEEL	11.21	—		

Hysteresis constant: 92 No. of Cylinder: 12 Bore:170mm Stroke:180mm

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

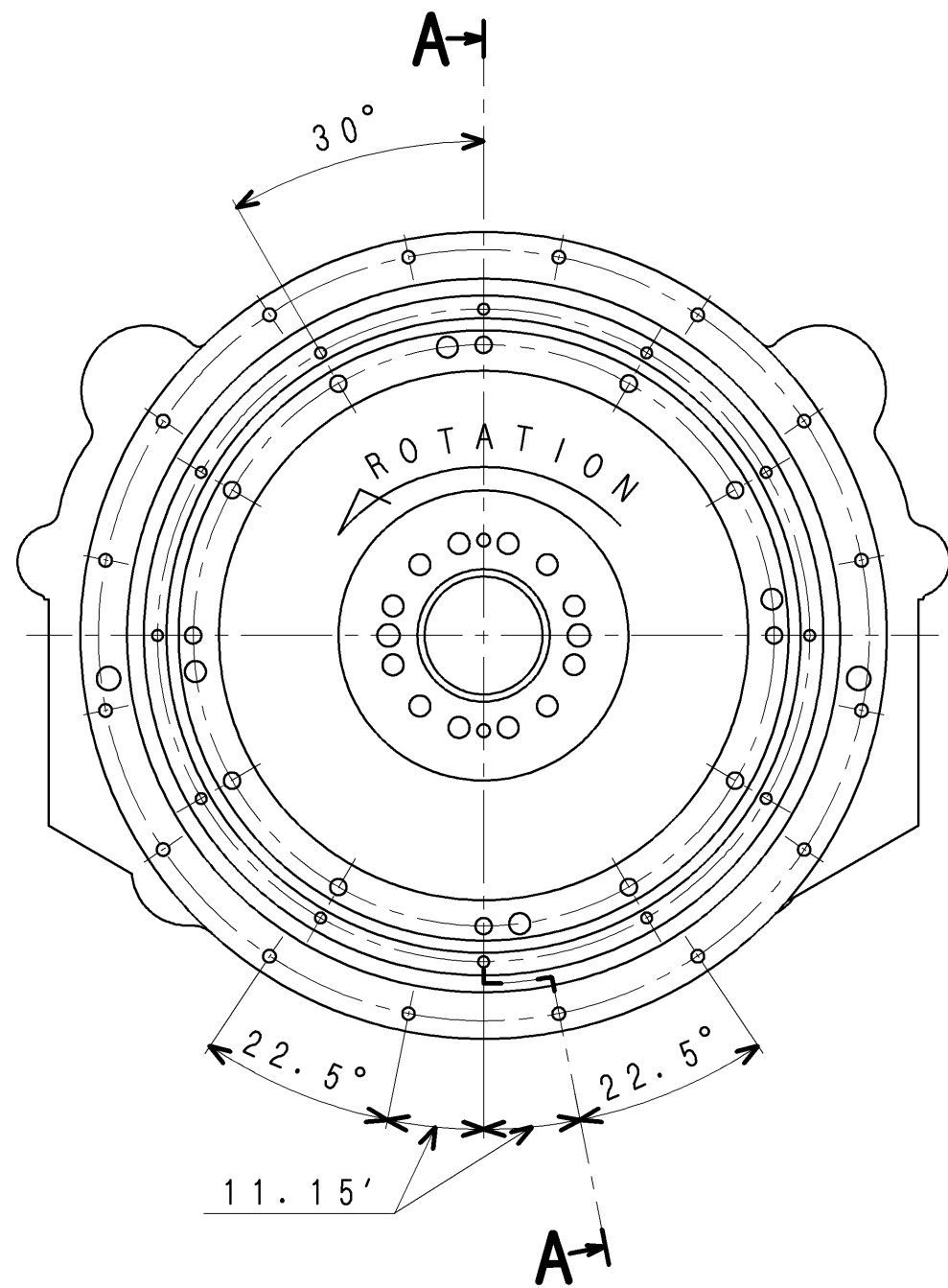
Firing order:1-12-5-8-3-10-6-7-2-11-4-9

Firing interval:0-60-120-180-240-300-360-420-480-540-600-660

APPLICATION : MARINE USE

The data is subject to change without notice.

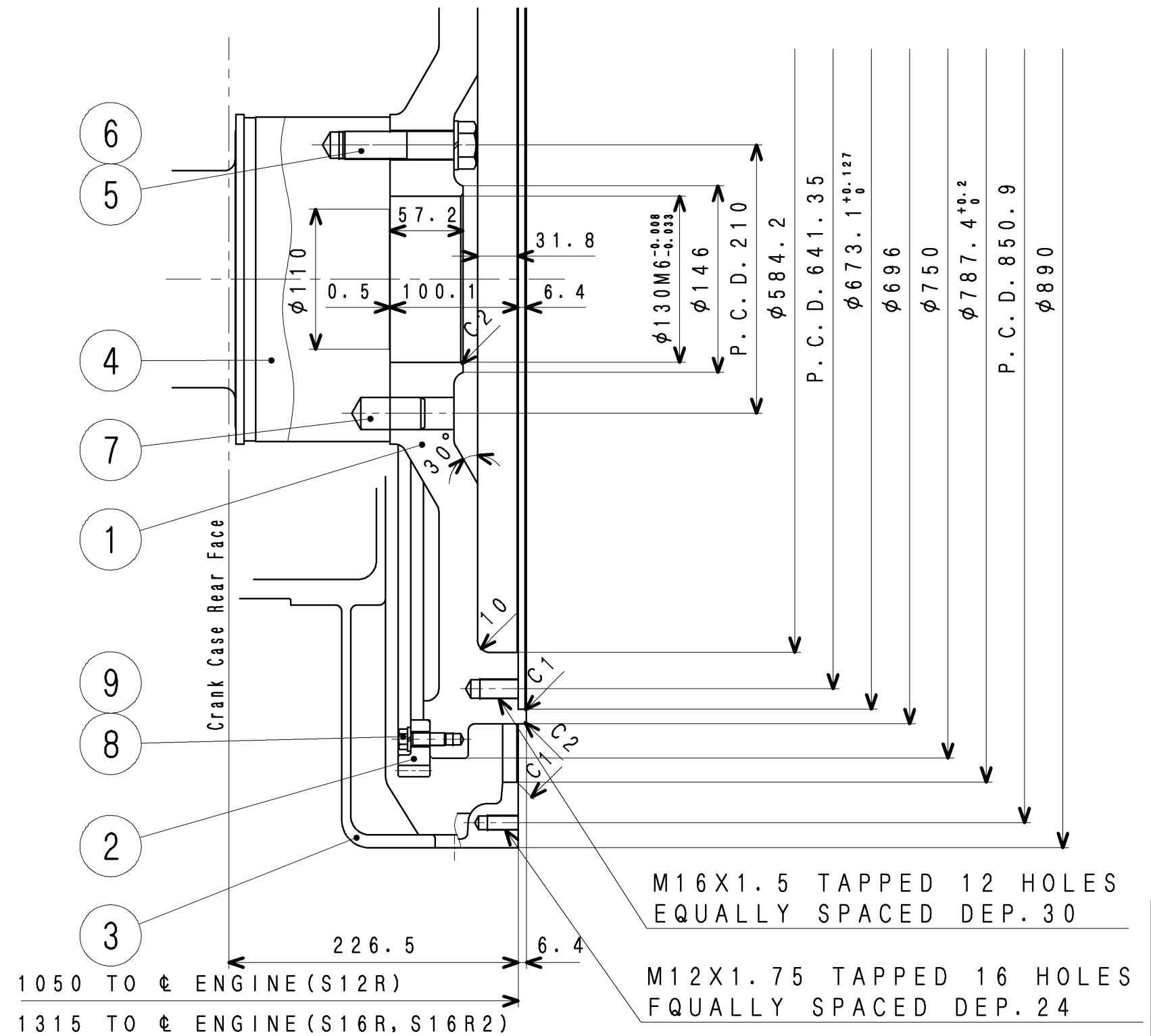

MITSUBISHI HEAVY INDUSTRIES, LTD.
 GENERAL MACHINERY & SPECIAL VEHICLE



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

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

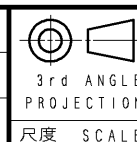
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8	RING GEAR BOLT	12
7	DOWEL PIN	2
6	WASHER	12
5	FLYWHEEL BOLT	12
4	CRANK SHAFT	1
3	FLYWHEEL HOUSING	1
2	RING GEAR	1
1	FLYWHEEL	1
No.	PARTS NAME	Q'TY



SECTION A-A

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MODEL	CHG	ED-NO	DATE	CHK
S12R				
S16R				
S16R2				



FLYWHEEL & HOUSING
FOR SR-V

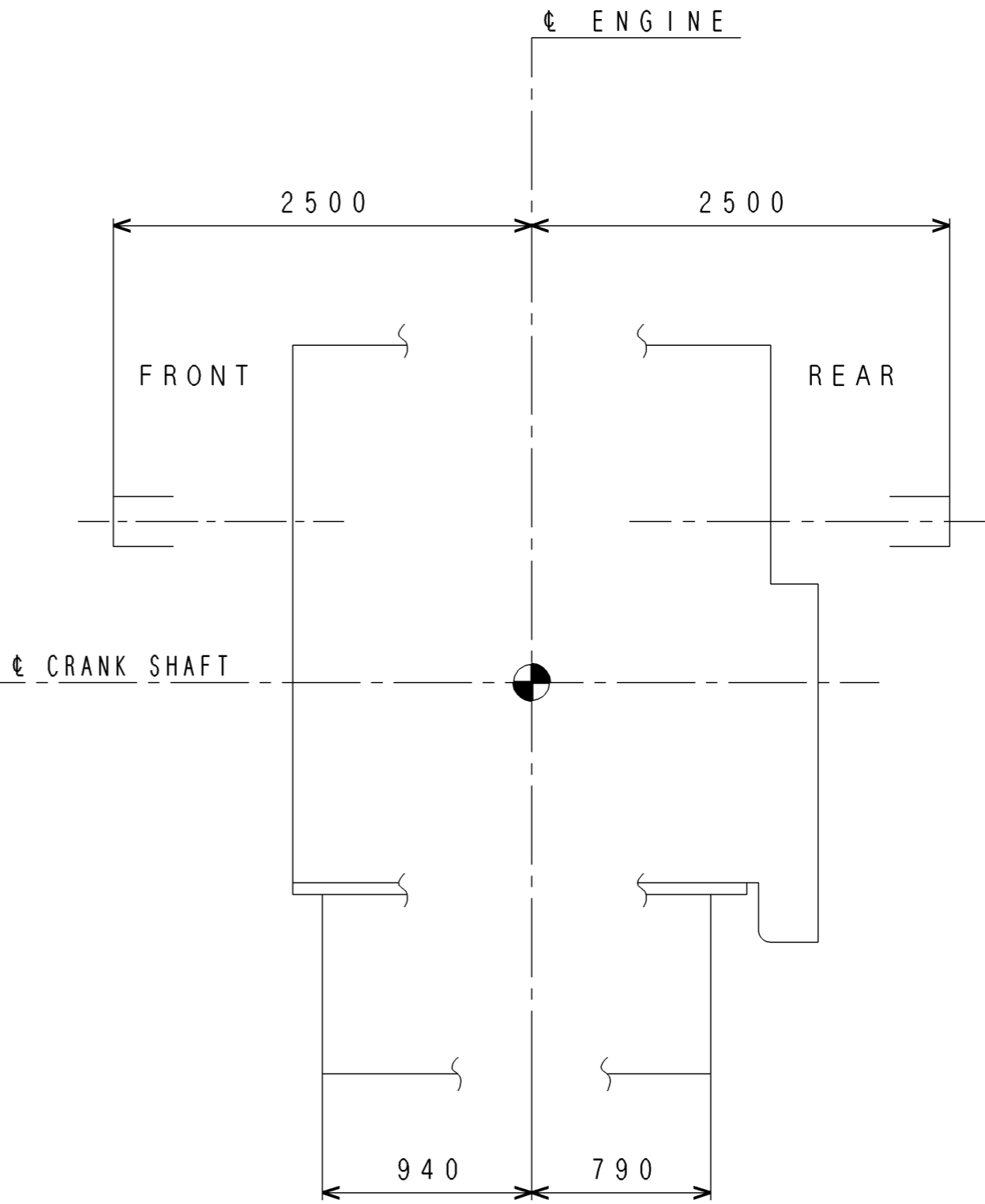
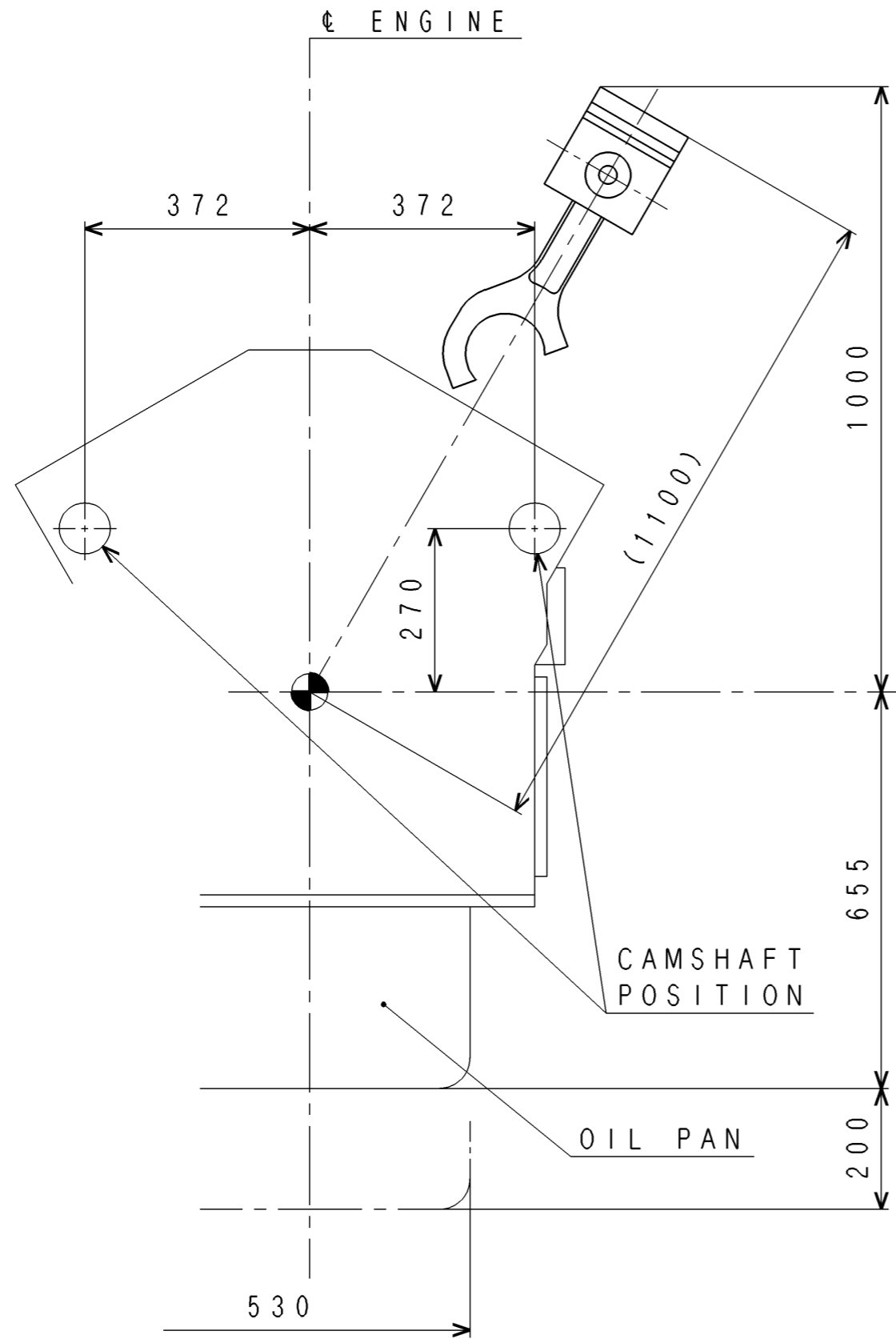
三菱重工業株式会社 汎用機・特車事業本部
GENERAL MACHINERY & SPECIAL VEHICLE HEADQUARTERS, MITSUBISHI HEAVY INDUSTRIES, LTD.

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
5.23

M/C



CHG	EO-NO	DATE	CHK

3rd ANGLE
PROJECTION
尺度 SCALE

MEASURE OF OVERHAUL FOR S12R

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.

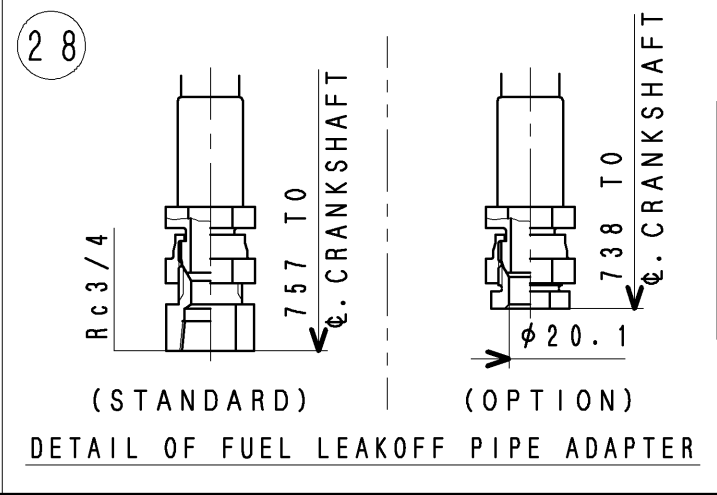
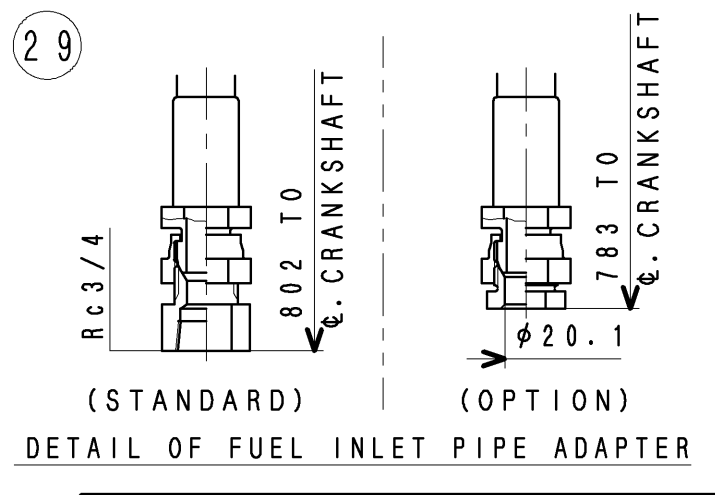
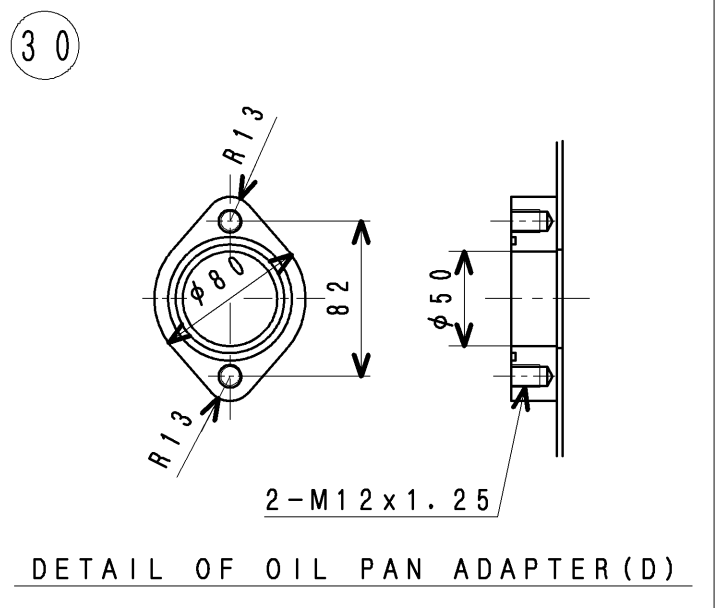
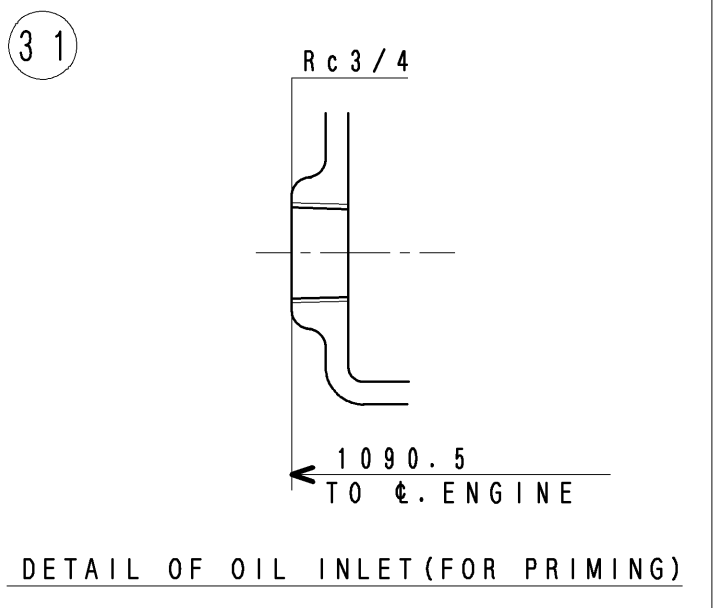
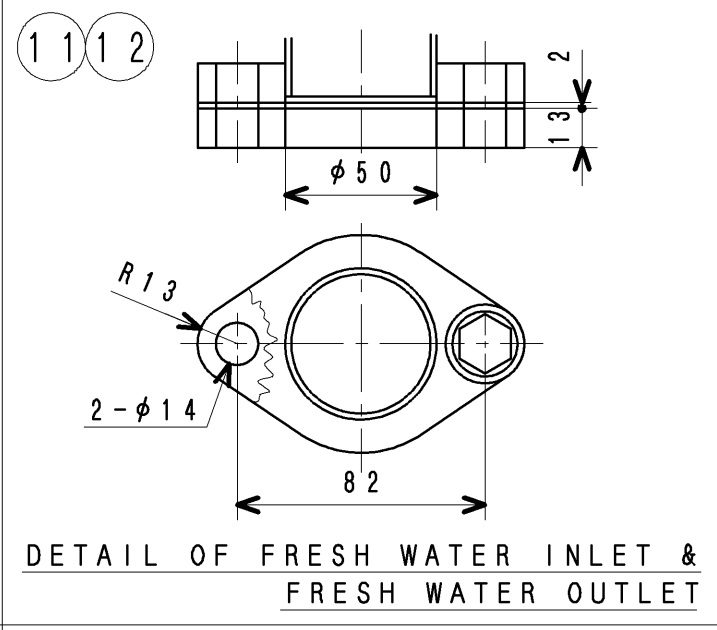
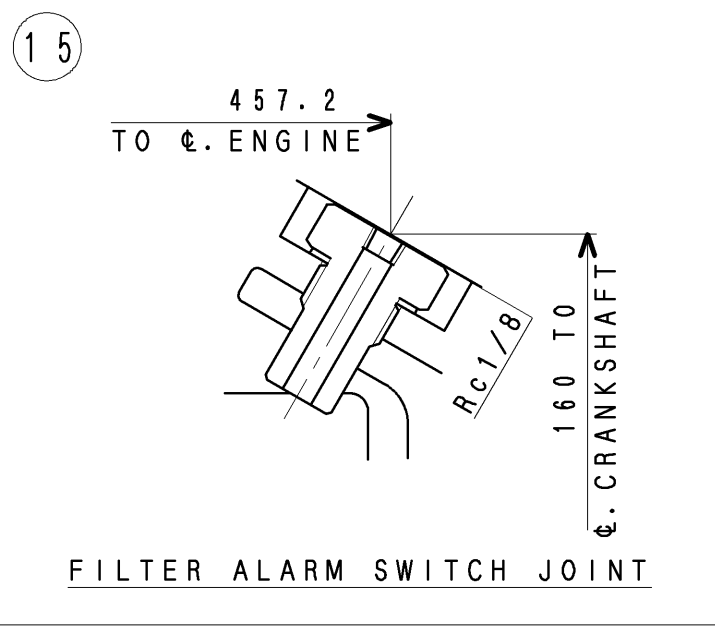
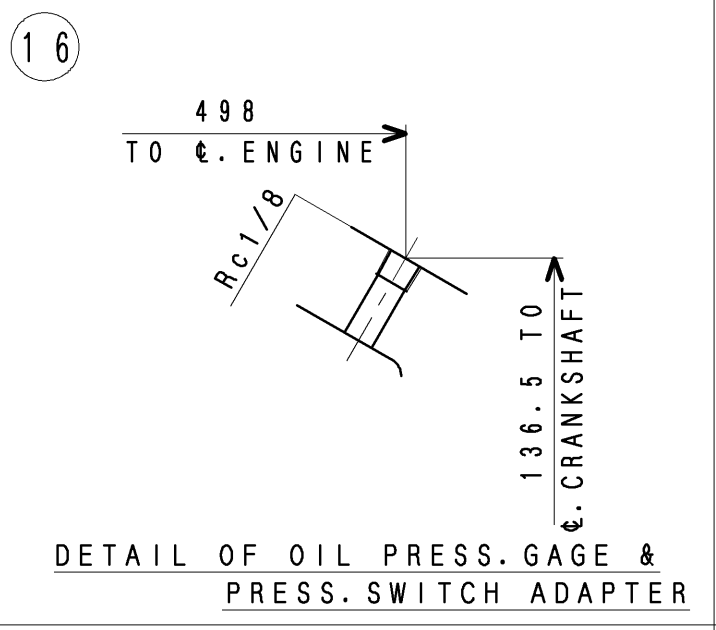
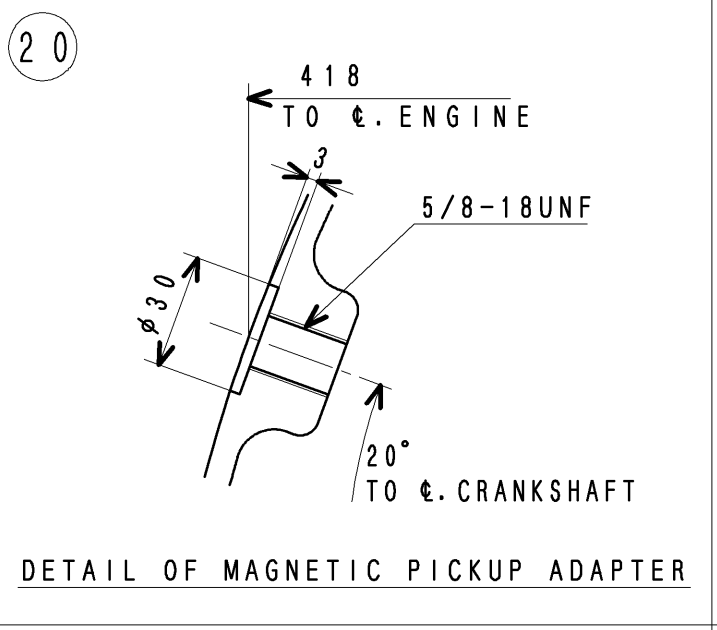
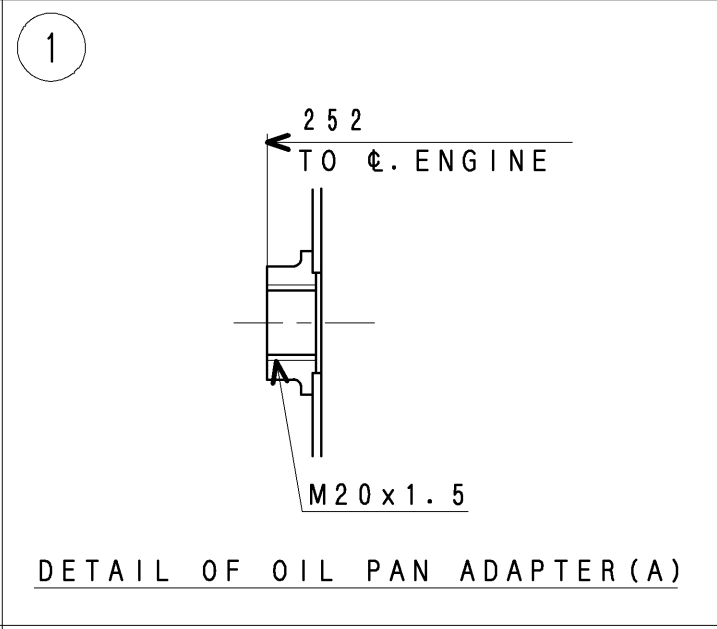
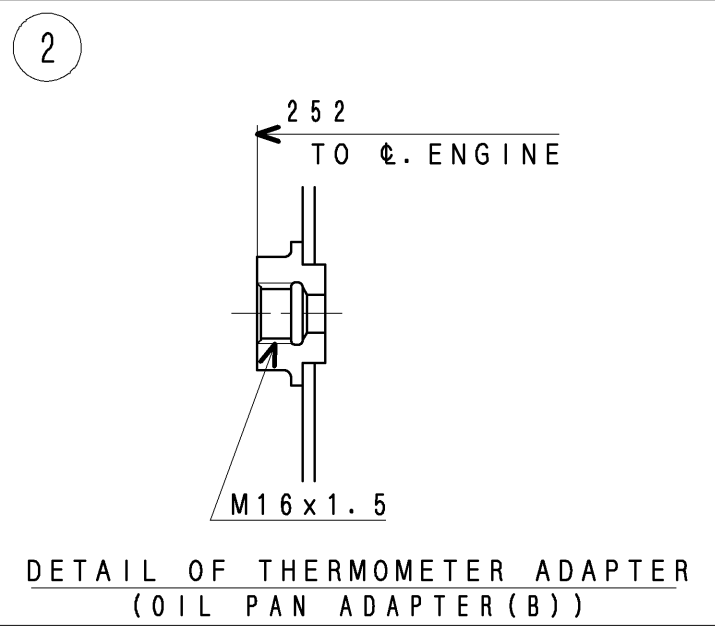
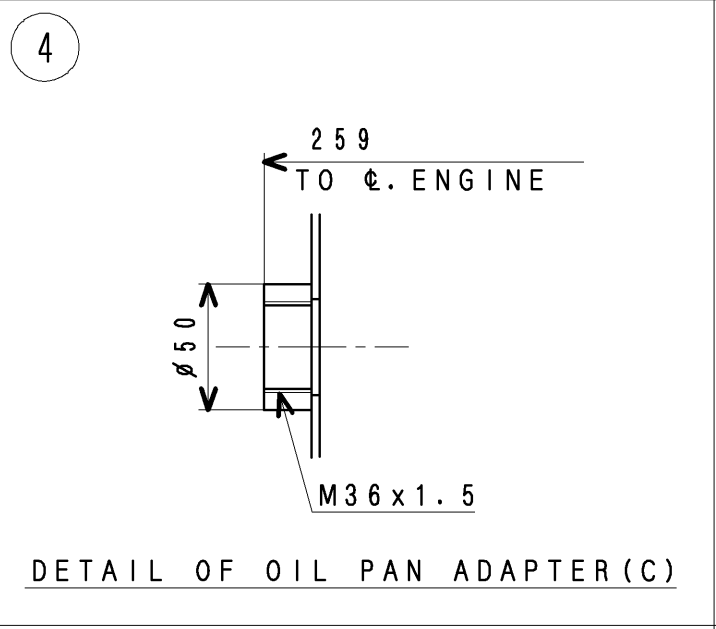
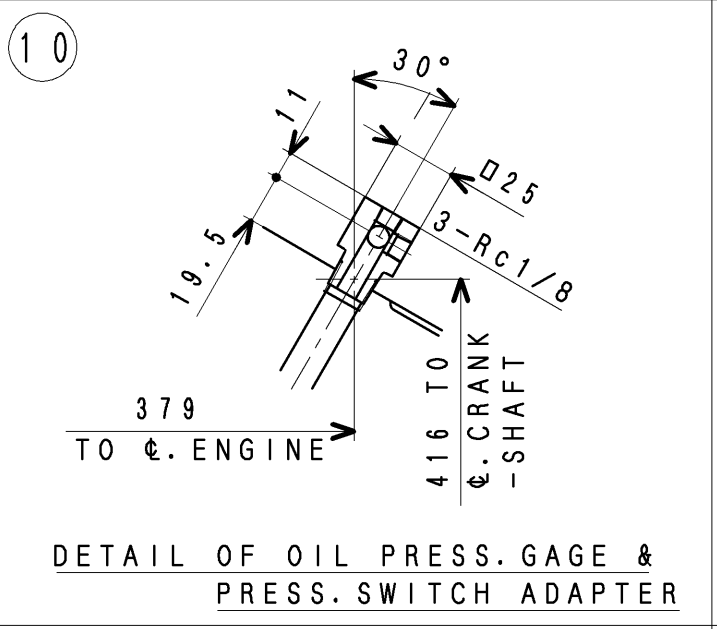
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DRAWING No. 45R96-09050

S12R-090-81A

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

出図
汎特
2001
10.9

FULL-CAD



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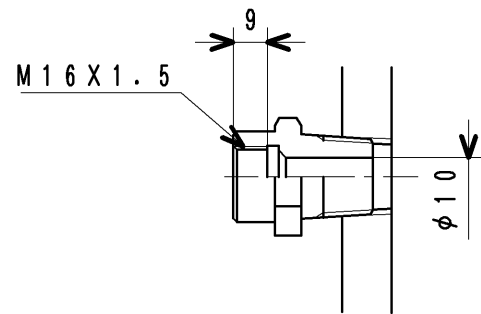
MODEL
S12R-C2MPTK
S12R-(Z3)MPTAW
S12R-Y2MPTK
S12R-Y3MPTAW

S12R
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 45R96-01062 5
DRAWING No. 1/2

旧引
汎特
2013
7.5

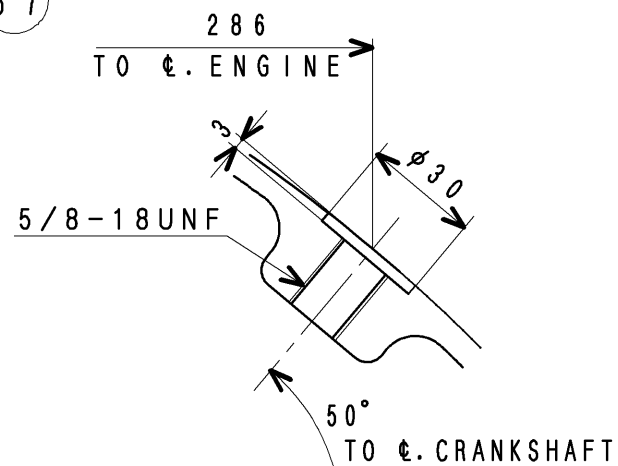
M/C

39



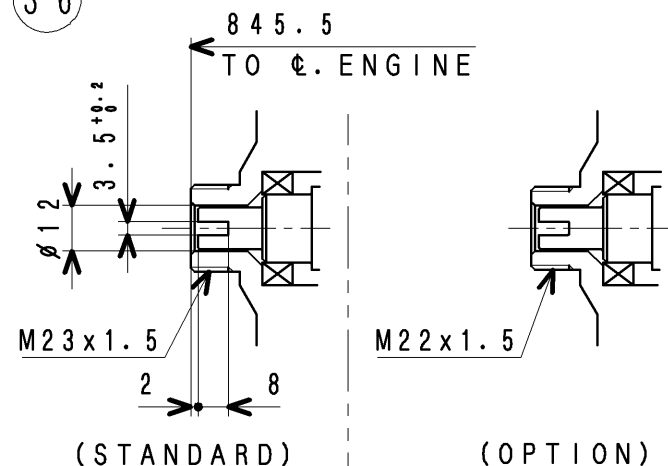
DETAIL OF THERMOMETER & THERMOSWITCH ADAPTER

37



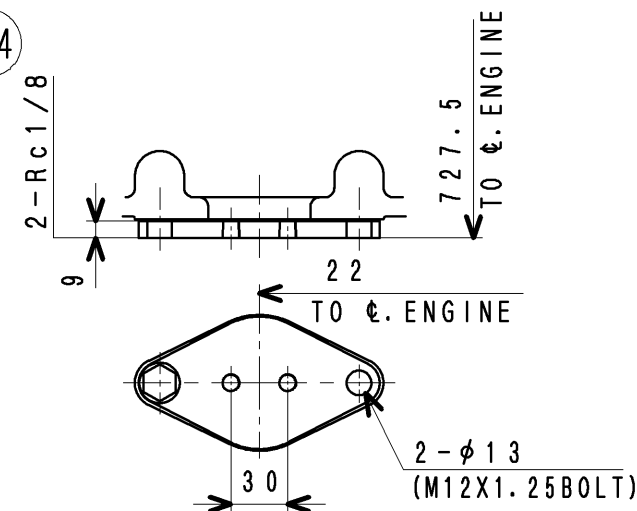
DETAIL OF MAGNETIC PICKUP ADAPTER

36



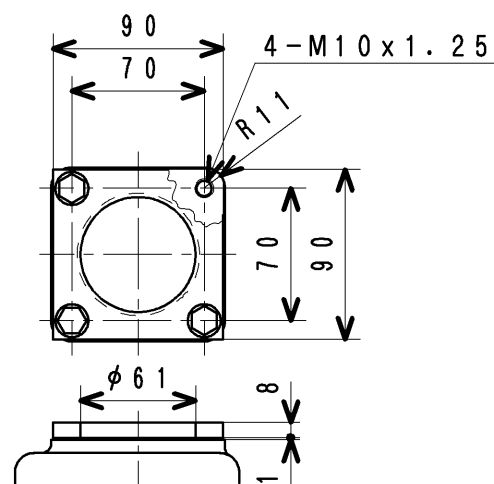
DETAIL OF TACHOMETER ADAPTER

34



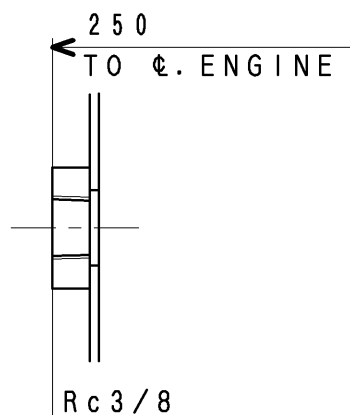
DETAIL OF AIR PRESS. GAGE ADAPTER

48



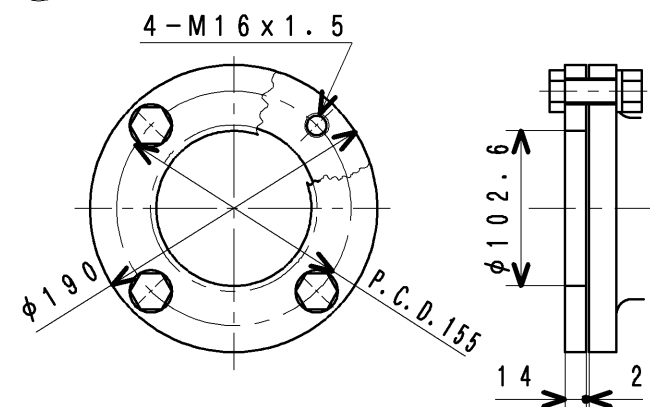
DETAIL OF FRESH WATER OUTLET

43



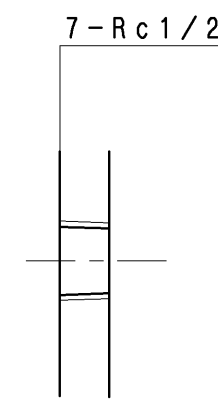
DETAIL OF OIL LEVEL GAGE ADAPTER (OIL PAN ADAPTER (E))

42



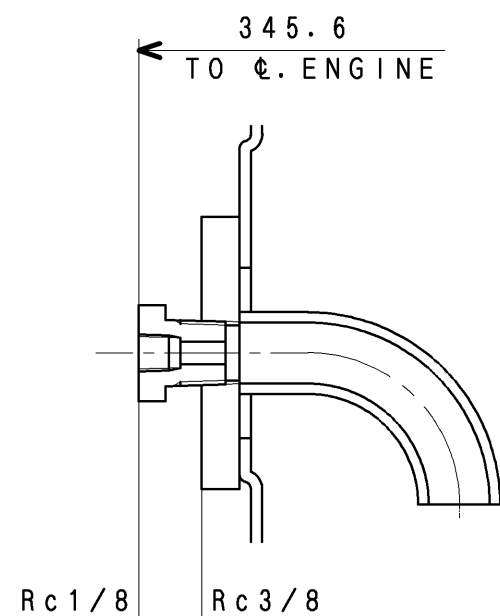
DETAIL OF FRESH WATER INLET

40



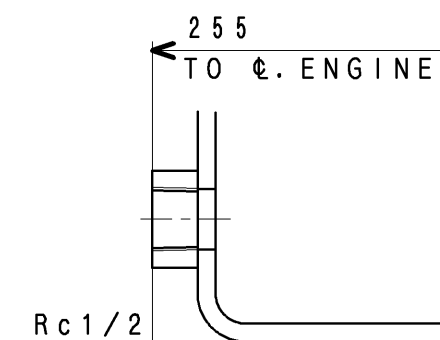
DETAIL OF THERMOMETER & THERMOSWITCH ADAPTER

51



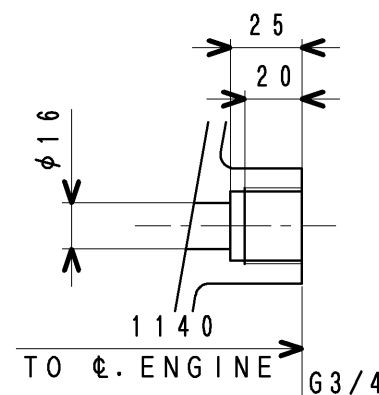
C/C INTERNAL PRESS. ADAPTER

50



OIL PAN ADAPTER (F)

49



DETAIL OF THERMOMETER, ex. ADAPTER

MHI CONFIDENTIAL

S12R
 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 45R96-01062 ④
 DRAWING No. 2/2

旧引
 汎特
 2013
 7.5

M/C



**MITSUBISHI DIESEL ENGINE
TECHNICAL INFORMATION**

ITEM NO.

T0406-0006E (1/3)

DATE

August, 2010

**Performance Curve of S12R-(Z3)MPTAW Engine
(EUstage IIIA & IMO- II Certified Engine)**

Performance Curve of S12R-(Z3)MPTAW Engine that is satisfied with EUstage IIIA & IMO- II are enclosed herein.

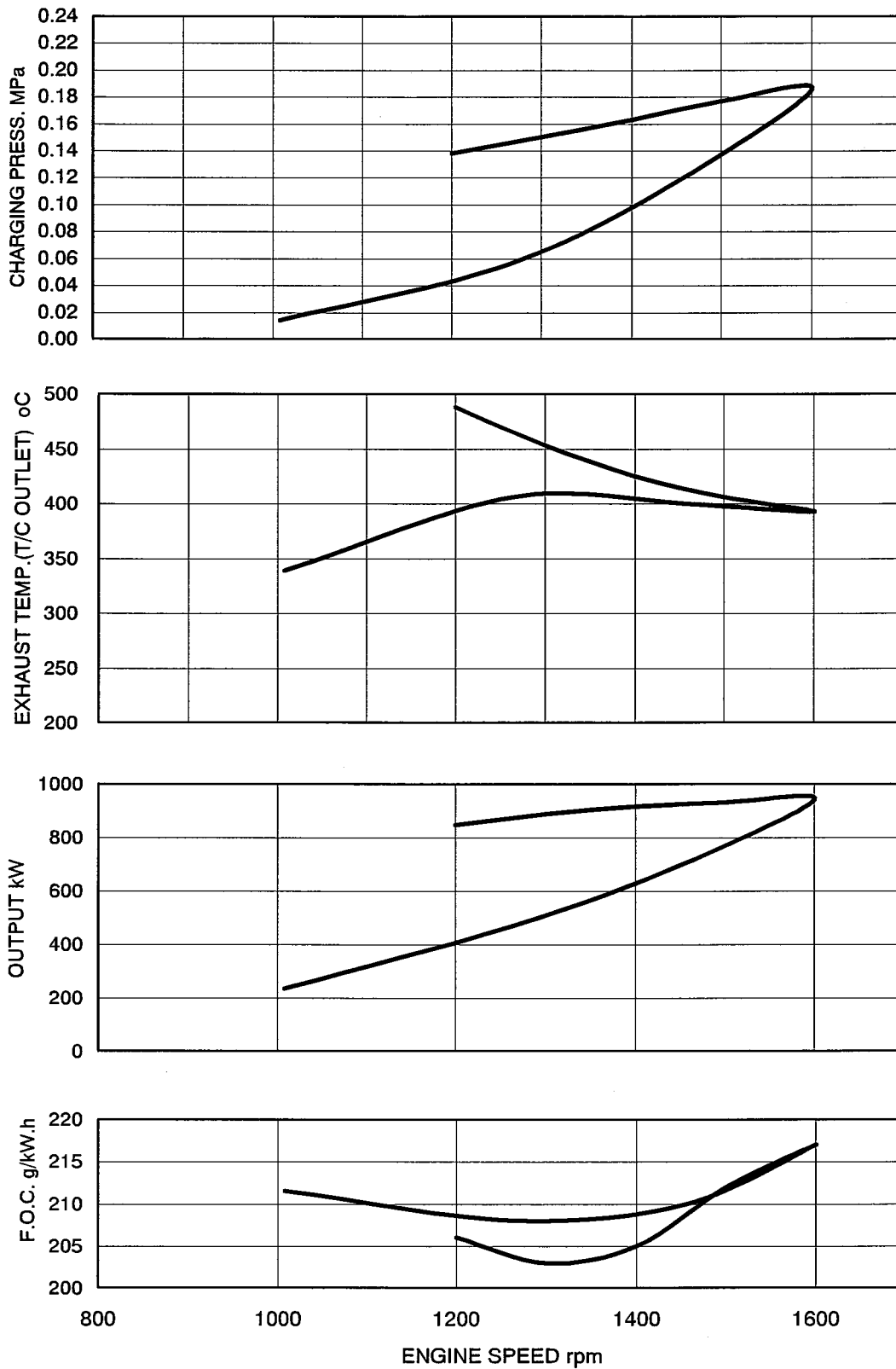
First Edition : August, 2010

Engine Engineering Department
Large Engine Design Section

Revision

Approved by | Checked by | Drawn by

Rating: HEAVY DUTY-E3

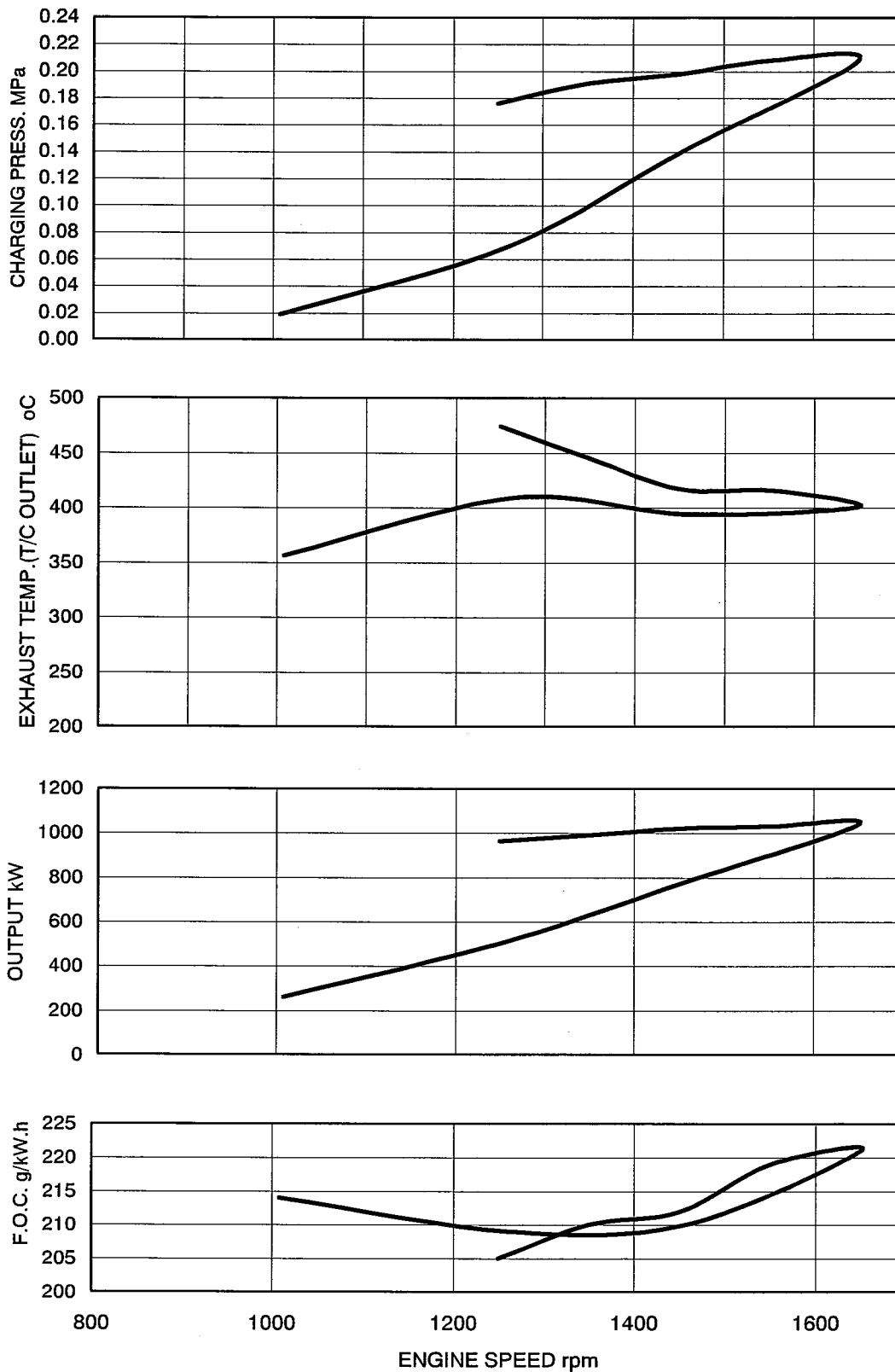


The specifications are subject to change without notice.

APPLICATION : MARINE PROPULSION

Pub. No. T0406-0006E 2/3

Rating: MEDIUM DUTY-E3



The specifications are subject to change without notice.

APPLICATION : MARINE PROPULSION

Pub. No.T0406-0006E 3/3