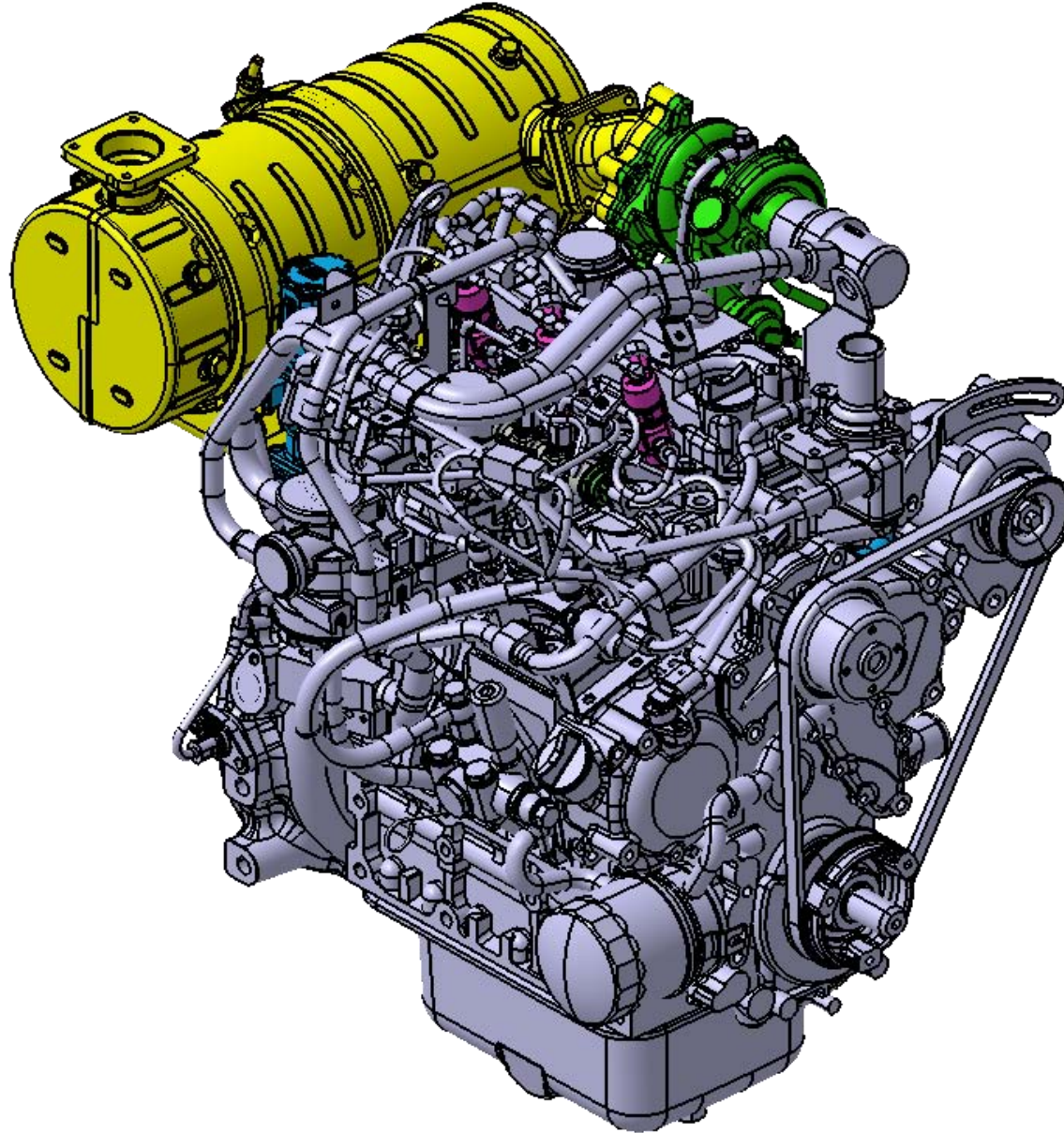

Technical information
D1803-CR-TIE4 DOC model

Notes

- This document is applied for Kubota **D1803-CR-TIE4**.
- This document is intend to provide installation guide for the engine to the application.
- The information in this document subject to change without notice.

The latest document is available on the K-iSS website.
Printed copies are for reference only.

D1803-CR-TIE4



Engine Specifications (1/2)

D1803-CR-TIE4

	Unit	D1803-CR-TIE4		
Cylinders		3		
Type		Vertical, water cooled 4-cycle DI diesel engine		
Bore and Stroke	mm (in)	87.0 x 102.4 (3.43 x 4.031)		
Displacement	L (cu.in)	1.826 (111.4)		
Aspiration		Turbocharged + Turbo After Cooler (TAC)		
Aftertreatment		Diesel Oxidation Catalyst (DOC)		
Rated power* ¹	kW (HP) / rpm	30.1 (40.4) / 2200	32.8 (44.0) / 2400	37.0 (49.6) / 2700
Maximum torque* ¹	Nm (lbf-ft) / rpm	150.5 (111.0) / 1500	150.5 (111.0) / 1500	150.5 (111.0) / 1600
No load maximum speed* ¹	rpm	2400	2600	2900
No load minimum idling speed* ¹	rpm	900		
Maximum air intake restriction with new air cleaner element	kPa (mmAq)	3.92 (400)		
Maximum air intake restriction with dirty air cleaner element	kPa (mmAq)	6.18 (630)		
Maximum exhaust pressure (before the inlet of DPF)	kPa (mmHg)	15.0 (113)		
Maximum exhaust pressure (after the exit of DOC)	kPa (mmHg)	6.7 (50)		
Injection timing	degree	Common Rail System		
Fuel injection pressure	MPa (psi)			

*1:Gross intermittent SAE J1995

*Specifications are subjected to change without prior notice.

Engine Specifications (2/2)

D1803-CR-TIE4

	Unit	D1803-CR-TIE4
Combustion chamber type		Reentrant type (Direct Injection)
Fuel injection pump type		Common Rail System
Governor type		
Injector		
Firing order		1 - 2 - 3
Compression ratio		16.0
Lubricating system		Forced lubrication by trochoid pump
Cooling system		Pressurized radiator, forced circulation with water pump
Exhaust Gas Recirculation (EGR)		External EGR (EGR cooler + Electric EGR valve + Reed valve)
Starting aid device		Glow plug
Starter motor	V - kW	12 - 2.0
Charging alternator	V - W	12 - 720
Fuel		Ultra low sulfur diesel
Lubricating oil		CJ-4
Lubricating oil capacity	L (U.S. gal)	7.0 (1.85)
Length x Width x Height* ¹	mm (in)	746 x 536 x 728 (29.4 x 21.1 x 28.7)
Dry weight* ¹	kg (lb)	195 (430)

*1: Included DOC muffler, Excluded cooling fan

*Specifications are subjected to change without prior notice.

Turbo After Cooler Requirements

D1803-CR-TIE4

	Unit	D1803-CR-TIE4		
Aspiration		Turbocharged + Turbo After Cooler (TAC)		
Rated power* ¹	kW (HP) / rpm	30.1 (40.4) / 2200	32.8 (44.0) / 2400	37.0 (49.6) / 2700
Heat rejection to air* ²	kW	2.9	3.7	4.9
Max. air inlet temp.* ³	degC	Ambient + 25	Ambient + 25	Ambient + 25
Allowable pressure drop* ² turbo out to inlet	kPa	10	10	10
Boost pressure* ²	kPa	79	89	95

*1: Gross intermittent SAE J1995, *2: at rated power (at amb. 25 degC, 100 kPa),

*3: at rated power (at amb. more than 24 degC)

*Specifications are subjected to change without prior notice.

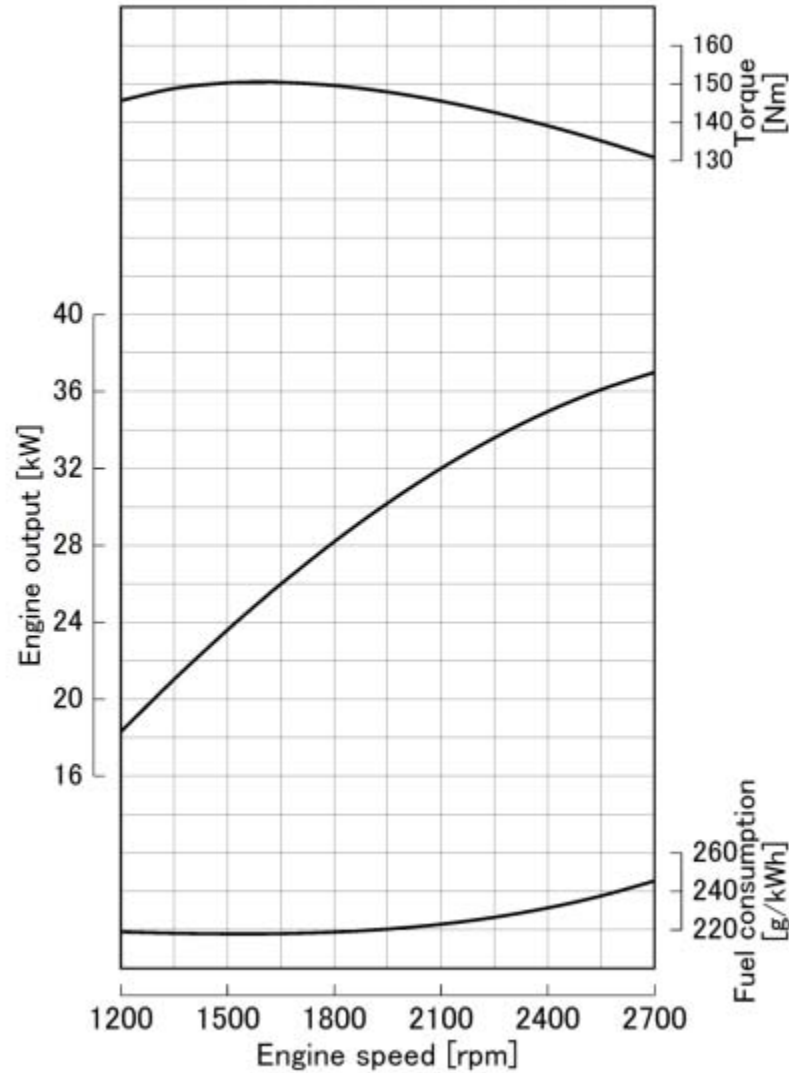
The TAC hose material and clamps should be chosen in consideration with the below conditions;

- inside air pressure and its pulsation.
- inside air temp and ambient temp. in engine compartment.
- engine oil resistance

D1803-CR-TIE4

Performance Curves

Rated power 37.0 kW / 2700 rpm
Gross intermittent SAE J1995



Rated power at each engine speed.

Model				Engine speed (rpm)		
				2200	2400	2700
D1803-CR-TI	E4	Gross intermittent ^{*1}	kW	30.1	32.8	37.0
			HP	40.4	44.0	49.6
		Net intermittent ^{*2}	kW	29.0	31.4	35.3
			HP	38.9	42.1	47.3
		Net continuous ^{*2}	kW	25.2	27.3	30.7
			HP	33.8	36.6	41.1

*1: SAE J1995, *2: SAE J1349

Model				Engine speed (rpm)		
				2200	2400	2700
D1803-CR-TI	E4	Rated power* ¹	kW	30.1	32.8	37.0
			HP	40.4	44.0	49.6
		Engine speed at maximum torque	rpm	1500	1500	1600
		Maximum torque* ¹	Nm	150.5	150.5	150.5
			Lb-ft	111.0	111.0	111.0

*1: Gross intermittent SAE J1995

Fuel Consumption (at rated power)

D1803-CR-TIE4

Model				Engine speed (rpm)		
				2200	2400	2700
D1803-CR-TI	E4	Rated power* ¹	kW	30.1	32.8	37.0
			HP	40.4	44.0	49.6
		Specific fuel consumption	g/kWh	234	240	245
			lb/HPh	0.385	0.395	0.403
		Fuel consumption	L/h	8.40	9.37	10.8
			gal/h	2.22	2.48	2.86

*1: Gross intermittent SAE J1995

Note 1: at amb. temp. 25 degC and 100 kPa

Note 2: Density of diesel fuel 0.84 g/cm³

Fuel Consumption (at maximum torque)

D1803-CR-TIE4

Model			Engine speed (rpm)			
			2200	2400	2700	
D1803-CR-TI	E4	Rated power* ¹	kW	30.1	32.8	37.0
		Engine speed at maximum torque	rpm	1500	1500	1600
		Maximum torque* ¹	Nm	150.5	150.5	150.5
		Specific fuel consumption	g/kWh	218	218	218
			lb/HPh	0.358	0.358	0.358
		Fuel consumption	L/h	6.13	6.13	6.54
			gal/h	1.62	1.62	1.73

*1: Gross intermittent SAE J1995

Note 1: at amb. temp. 25 degC and 100 kPa

Note 2: Density of diesel fuel 0.84 g/cm³

Noise Level

D1803-CR-TIE4

Model			Engine speed (rpm)		
			No load minimum speed	No load maximum speed	Full load rated speed
D1803-CR-TI	E4	dB (A) / rpm	73.0 / 900	94.5 / 2900	93.0 / 2700

The data show the average noise level at four points.

Note:

- Measurement conditions: with radiator, cooling fan, air cleaner and DOC muffler.
- Cooling fan, fan drive pulley, and fan pulley specifications

Model	Fan diameter (mm)	Number of blade	Shape	Fan drive pulley diameter (mm)	Fan pulley diameter (mm)
D1803-CR-TI	380	7	curved	104	97

Model			Engine speed (rpm)		
			2200	2400	2700
D1803-CR-TI	E4	m ³ /min	2.1	2.5	3.1
		ft ³ /min	74	88	110

Note 1:
at amb. temp. 25 degC, and 100 kPa

Model				Engine speed (rpm)		
				2200	2400	2700
D1803-CR-TI	E4	Rated power*1	kW	30.1	32.8	37.0
		Combustion air requirements	m ³ /min	2.1	2.5	3.1
		Fuel consumption	L/h	8.40	9.37	10.8
		Exhaust gas volume	m ³ /min	3.5	4.7	6.2
ft ³ /min	120		170	220		

*1: Gross intermittent SAE J1995

Note 1: at amb. temp. 25 degC and 100 kPa

Note 2: Exhaust gas volume calculating formula

$$GL = (AL + 7.1 \times Be \times d / 600) \times (273 + t) / (273 + t_0) \times P_0 / (P_0 + P_s)$$

GL: Exhaust gas volume (m³/min),

AL: Combustion air requirements (m³/min),

Be: Fuel consumption (L/h),

d: 0.84 (g/cm³),

t: Exhaust gas temperature (degC),

t₀: 25.0 (degC),

P_s: Exhaust gas back pressure (kPa),

P₀: 100 (kPa)

Heat Rejection to Coolant

D1803-CR-TIE4

Model				Engine speed (rpm)		
				2200	2400	2700
D1803-CR-TI	E4	Rated power*1	kW	30.1	32.8	37.0
		Specific fuel consumption	g/kWh	234	240	245
		Heat rejection to coolant	kW	22.8	25.5	29.1
			kJ/h	82000	91700	105000
			kcal/h	19600	21900	25000

*1: Gross intermittent SAE J1995

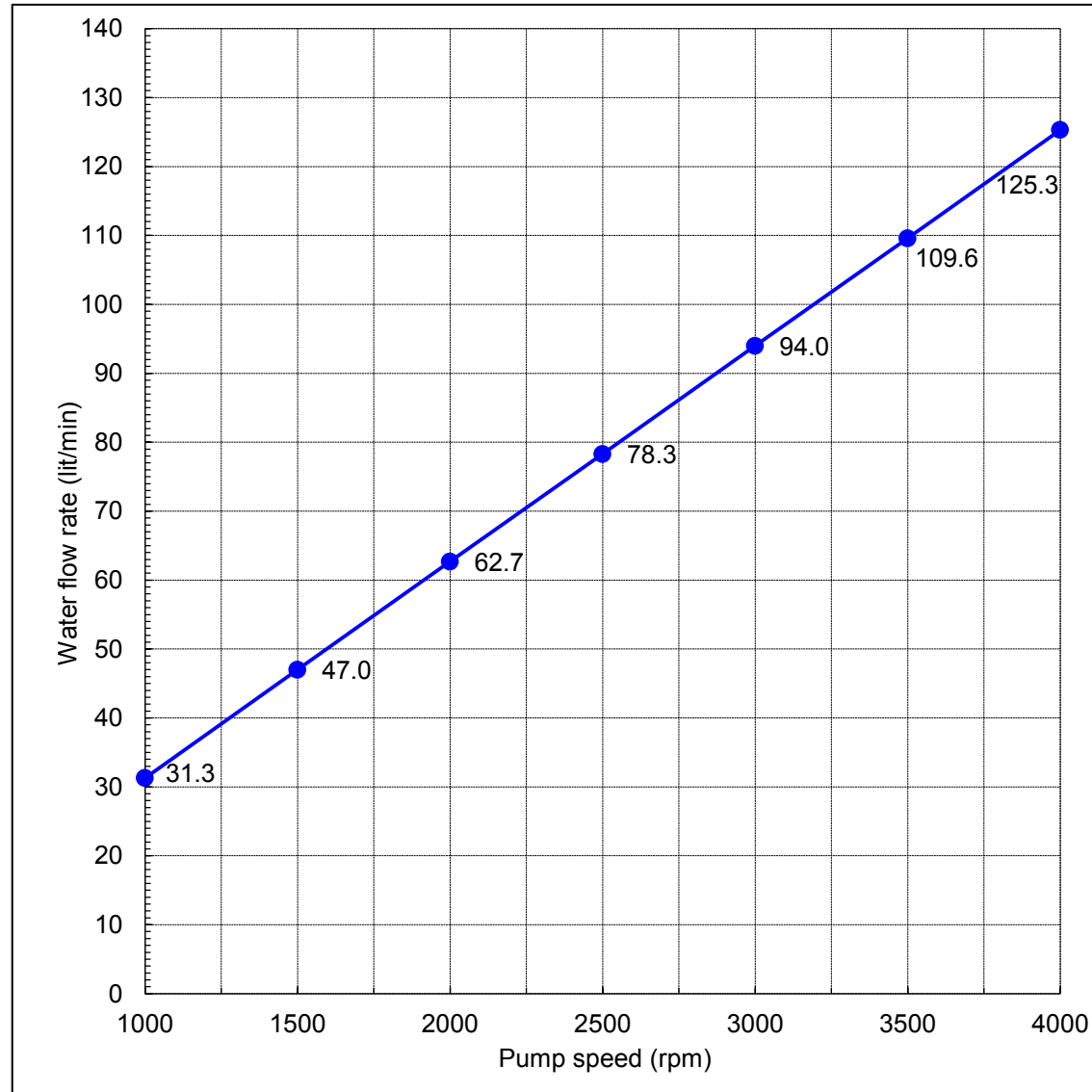
Note 1: at amb. temp. 25 degC and 100 kPa

Note 2: Diesel fuel low caloric value: 43074 kJ/kg (10290 kcal/kg)

Water Flow Rate

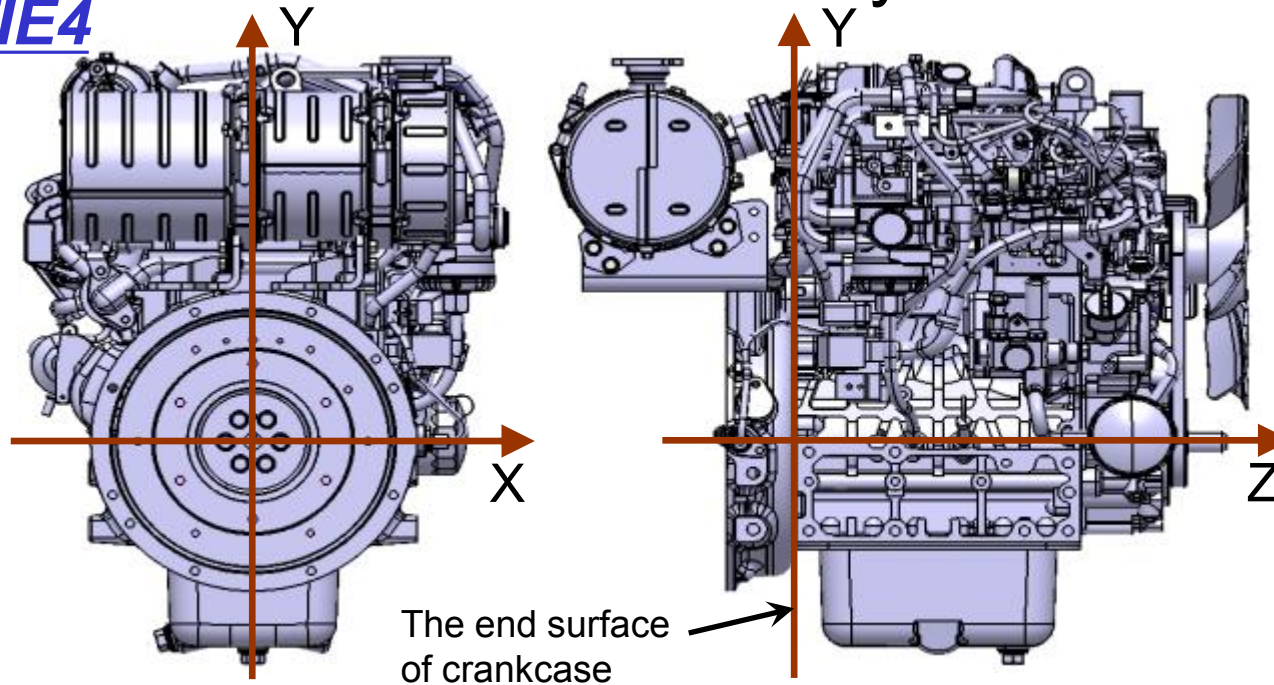
D1803-CR-TIE4

Water pump	1G489-7303*
Thermostat	1G924-7301*



D1803-CR-TIE4

Center of Gravity



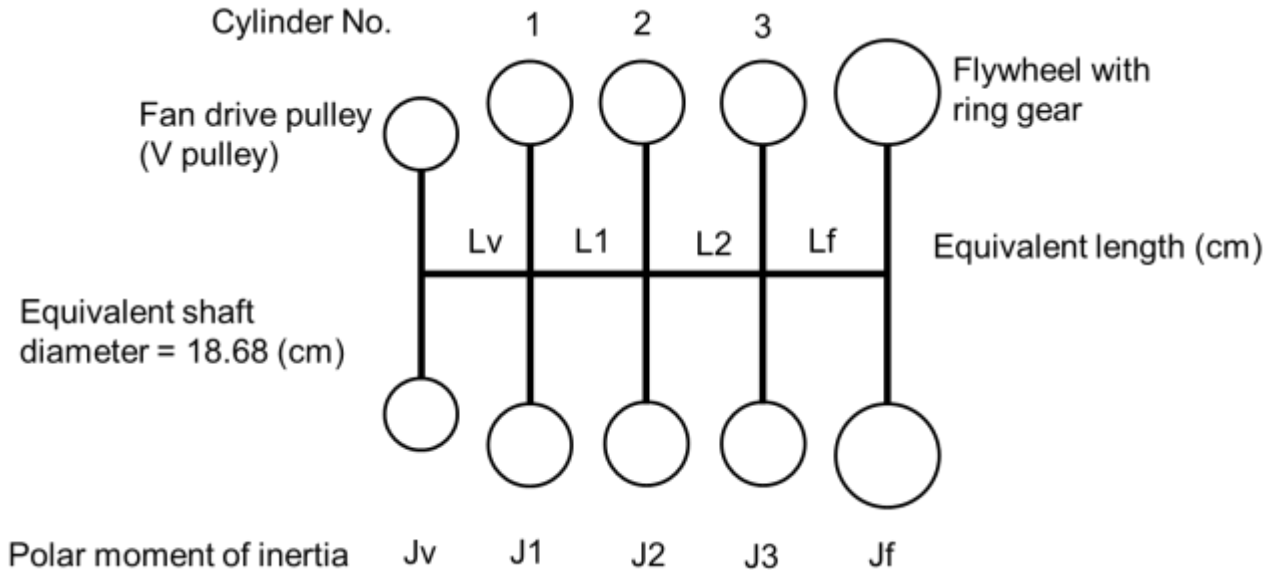
1. With Kubota standard flywheel and flywheel housing

Dry weight		Center of gravity					
kg	lb	X		Y		Z	
		mm	in	mm	in	mm	in
195	430	2.0	0.08	107.5	4.23	152.0	5.98

2. With short SAE No.7-1/2 flywheel and short SAE No.4 flywheel housing

Dry weight		Center of gravity					
kg	lb	X		Y		Z	
		mm	in	mm	in	mm	in
213	469	0.5	0.02	96.0	3.78	126.0	4.96

Mass Elastic Systems



1. With Kubota standard flywheel

Comp. Flywheel	1J804-2501*
Fan drive pulley	1G846-7428*

Equivalent length (cm)				Polar moment of inertia (kgcm ²)				
L_v	L_1	L_2	L_f	J_v	J_1	J_2	J_3	J_f
10272	1653	1653	1038	40.2	93.2	93.2	93.2	2991

2. With SAE No.7-1/2 flywheel

Comp. Flywheel	1E516-2501*
Fan drive pulley	1G846-7428*

Equivalent length (cm)				Polar moment of inertia (kgcm ²)				
L_v	L_1	L_2	L_f	J_v	J_1	J_2	J_3	J_f
10272	1653	1653	1038	40.2	93.2	93.2	93.2	3820

Unbalanced Forces

D1803-CR-TIE4

1. Base data

l (m)	r (m)	L (m)	mp (kg)	Bore (mm)	Stroke (mm)
0.1330	0.0512	0.0950	0.979	87.0	102.4

l = Center distance of connecting rod

r = Crank radius

L = Cylinder distance

mp = Reciprocating mass

G = Gravitational acceleration (=9.80665 (m/s²))

2. Unbalanced inertia force and couple

Model	Cylinders	Bore (mm)	Order	Fz (N)	Npy (Nm)	Noz (Nm)
D1803-CR-TI	3	87.0	1	0	$0.00413 \times \omega^2$	$0.00413 \times \omega^2$
			2	0	$0.00318 \times \omega^2$	0

Fz = Unbalanced inertia force = 0 (N)

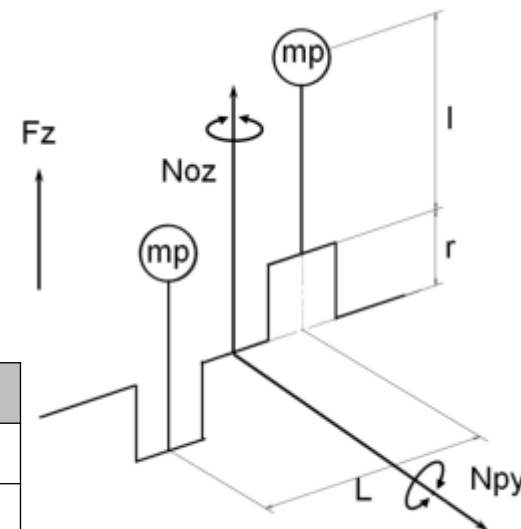
Npy = Unbalanced inertia couple = $\frac{\sqrt{3}}{2} \times mp \times r \times L \times \omega^2 \times \sin\theta + \sqrt{3} \times mp \times r \times L \times (r/l) \times \omega^2 \times \sin 2\theta$ (Nm)

Noz = Unbalanced inertia couple = $\frac{\sqrt{3}}{2} \times mp \times r \times L \times \omega^2 \times \sin\theta$ (Nm)

ω = Angular velocity = $2\pi n/60$ (rad/s), n = Engine speed (rpm)

3. An example of calculation

Calculation condition	ω^2	Fz, Npy, Noz		
			Order	Calculation
Engine model: D1803-CR-TI Engine speed: 2700 rpm	$(2 \times \pi \times 2700/60)^2$ = 79944	Fz (N)	1	0
			2	0
		Npy (Nm)	1	330.1
			2	254.0
		Noz (Nm)	1	330.1
			2	0



Engine for Generator Specifications (1/3)

D1803-CR-TIE4

	Unit	D1803-CR-TIE4-BG
Cylinders		3
Type		Vertical, water cooled 4-cycle DI diesel engine
Bore and Stroke	mm (in)	87.0 x 102.4 (3.43 x 4.031)
Displacement	L (cu.in)	1.826 (111.4)
Aspiration		Turbocharged + Turbo After Cooler (TAC)
Aftertreatment		Diesel Oxidation Catalyst (DOC)
Gross intermittent ^{*1}	kW (HP) / rpm	27.0 (36.2) / 1800
Net stand-by power ^{*2}	kW (HP) / rpm	24.2 (32.4) / 1800
Net continuous power ^{*2}	kW (HP) / rpm	20.2 (27.1) / 1800
Fuel consumption at stand-by power	g/kWh (lb/HPh)	229 (0.376)
No load maximum speed ^{*1}	rpm	1800
Maximum air intake restriction with new air cleaner element	kPa (mmAq)	2.45 (250)
Maximum air intake restriction with dirty air cleaner element	kPa (mmAq)	4.90 (500)
Maximum exhaust pressure (after turbocharger)	kPa (mmHg)	12.7 (95)
Maximum exhaust pressure (after the exit of DOC)	kPa (mmHg)	5.3 (40)
Heat rejection to coolant (excluded TAC) ^{*3*4}	kW (kcal/h)	20.8 (17900)
Combustion air requirements ^{*3}	m ³ /min (ft ³ /min)	1.8 (63.6)
Exhaust gas volume ^{*4}	m ³ /min (ft ³ /min)	3.4 (120)

*1: SAE J1995, *2: SAE J1349, *3: at rated power (amb. 25 degC, 100 kPa), *4: Diesel fuel low caloric value 43074 kJ/kg (10290 kcal/kg)

*Specifications are subjected to change without prior notice.

Engine for Generator Specifications (2/3)

D1803-CR-TIE4

	Unit	D1803-CR-TIE4-BG
Combustion chamber type		Reentrant type (Direct Injection)
Injection timing	degree	Common Rail System
Fuel injection pressure	MPa (psi)	
Fuel injection pump type		
Governor type		
Injector		
Direction of rotation		Counter clockwise viewed from flywheel side
Firing order		1 - 2 - 3
Compression ratio		16.0
Lubricating system		Forced lubrication by trochoid pump
Cooling system		Pressurized radiator, forced circulation with water pump
Exhaust Gas Recirculation (EGR)		External EGR (EGR cooler + Electric EGR valve + Reed valve)
Starting aid device		Glow plug
Starter motor	V - kW	12 - 2.0
Charging alternator	V - W	12 - 720
Fuel		Ultra low sulfur diesel
Lubricating oil		CJ-4
Lubricating oil capacity	L (U.S. gal)	7.0 (1.85)
Length x Width x Height ^{*1}	mm (in)	746 x 536 x 745 (29.4 x 21.1 x 29.3)
Dry weight ^{*1}	kg (lb)	213 (469)

*1: Excluded cooling fan, with SAE No.7-1/2 flywheel and SAE No.4 flywheel housing

*Specifications are subjected to change without prior notice.

Engine for Generator Specifications (3/3)

Turbo After Cooler requirement

	Unit	D1803-CR-TIE4-BG
Aspiration		Turbocharged + Turbo After Cooler (TAC)
Rated power* ¹	kW (HP) / rpm	27.0 (36.2) / 1800
Heat rejection to air* ²	kW (kcal/h)	1.8 (1500)
Max. air inlet temp.* ³	degC	Ambient + 25
Allowable pressure drop* ² turbo out to inlet	kPa	10
Boost pressure* ²	kPa	65

*1: Gross intermittent SAE J1995, *2: at rated power (at amb. 25 degC, 100 kPa),

*3: at rated power (at amb. more than 24 degC)

*Specifications are subjected to change without prior notice.

The TAC hose material and clamps should be chosen in consideration with the below conditions;

- inside air pressure and its pulsation.
- inside air temp and ambient temp. in engine compartment.
- engine oil resistance

Revision History

File Name	Remarks	Date
KORD3_14-095_ Technical_information_for_D1803-CR-TIE4_DOC_model.pdf	New release	Dec 10, 2014
KORD3_15-003_ Technical_information_for_D1803-CR-TIE4_DOC_model.pdf	- Page.4: Add noise measurement condition	Jan 20, 2015
KORD3_15-032_ Technical_Information_for_D1803-CR-TIE4_DOC_model.pdf	- Page 4: Add “Maximum air intake restriction” “Maximum exhaust pressure”	Aug 4, 2015
KORD3_16-001_ Technical_information_for_D1803-CR-TIE4_DOC_model.pdf	- Page 4, 6: Add measurement conditions	Jan 21, 2016
KORD3_16-165_ Technical_information_for_D1803-CR-TIE4_DOC_model.pdf	- Document style standardization	Sep 7, 2016
KORD3_17-027_ Technical_information_for_D1803-CR-TIE4_DOC_model.pdf	- Document style standardization	Jan 12, 2017
KORD3_17-051_ Technical_information_for_D1803-CR-TIE4_DOC_model.pdf	- Typo correction	Apr 25, 2017
KORD3_17-069_ Technical_information_for_D1803-CR-TIE4_DOC_model.pdf	- Typo correction	Jul 20, 2017