



Operation & Maintenance Manual

DIESEL ENGINE

DE 12

DE 12T

DE 12T1
















DE 12T1S

FOREWORD

This maintenance manual is designed to serve as a reference for DOOSAN Infracore (here after DOOSAN's) customers and distributors who wish to gain basic product knowledge on DOOSAN's DE series diesel engines (**DE12, DE12T, DE12TI and DE12TIS**).

These economical and high-performance diesel engines (6 cylinders, 4 strokes, in-line, direct injection type) have been so designed and manufactured to be used for overland transport industrial purpose. That meets all the requirements such as low noise, fuel economy, high engine speed, and durability. To maintain the engine in optimum condition and retain maximum performance for a long time, **CORRECT OPERATION** and **PROPER MAINTENANCE** are essential.

In this manual, the following symbols are used to indicate the type of service operations to be performed.

	Removal		Adjustment
	Installation		Cleaning
	Disassembly		Pay close attention-Important
	Reassembly		Tighten to specified torque
	Align the marks		Use special tools of manufacturer's
	Directional Indication		Lubricate with oil
	Inspection		Lubricate with grease
	Measurement		

During engine maintenance, please observe following instructions to prevent environmental damage;

- Take old oil to an old oil disposal point only.
- Ensure without fail that oil and diesel fuel will not get into the sea or rivers and canals or the ground.
- Treat undiluted anti-corrosion agents, antifreeze agents, filter element and cartridges as special waste.
- The regulations of the relevant local authorities are to be observed for the disposal of spent coolants and special waste.

If you have any question or recommendation in connection with this manual, please do not hesitate to contact our head office, dealers or authorized service shops near by your location for any services.

For the last, the content of this maintenance instruction may be changed without notice for some quality improvement. Thank you.

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1. GENERAL INFORMATION

1.1. General Repair Instructions

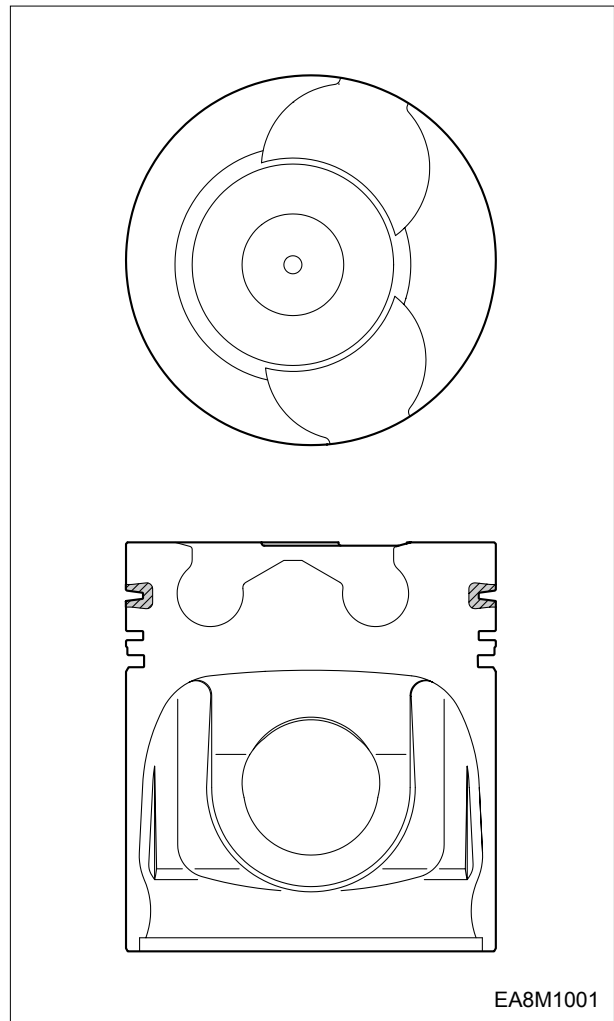
1. Before performing service operation, disconnect the grounding cable from the battery for reducing the chance of cable damage and burning due to short-circuiting.
2. Use covers for preventing the components from damage or pollution.
3. Engine oil and anti-freeze solution must be handled with reasonable care as they cause paint damage.
4. The use of proper tools and special tools where specified is important to efficient and reliable service operation.
5. Use genuine DAEWOO parts necessarily.
6. Used cotter pins, gaskets, O-rings, oil seals, lock washer and self-lock nuts should be discarded and new ones should be prepared for installation as normal function of the parts can not be maintained if these parts are reused.
7. To facilitate proper and smooth reassemble operation, keep disassembled parts neatly in groups. Keeping fixing bolts and nut separate is very important as they vary in hardness and design depending on position of installation.
8. Clean the parts before inspection or reassembly. Also clean oil ports, etc. using compressed air to make certain they are free from restrictions.
9. Lubricate rotating and sliding faces of parts with oil or grease before installation.
10. When necessary, use a sealer on gaskets to prevent leakage.
11. Carefully observe all specifications for bolts and nuts torques.
12. When service operation is completed, make a final check to be sure service has been done property.

1.2. Engine Characteristics

1.2.1. OMEGA combustion bowl

The OMEGA combustion bowl is a unit designed to perform high efficiency, low emission combustion. As the rim around the combustion bowl port of the upper of the piston has been machined in a smaller size than the interior of the combustion bowl, strong swirl is produced in the combustion bowl and strong squish flow makes the fuel be mixed more sufficiently with air.

Due to the application of **OMEGA** combustion system and optimal utilization of intake and exhaust port configuration within the cylinder head, the **DE12** series diesel engines discharge very low level of hazardous exhaust gases such as smoke, nitrogen oxide, hydrocarbon, or carbon monoxide and thus ensure high performance and low fuel consumption.



1.3. Engine Specification

1.3.1. Specification

Engine Model		DE12	DE12T	DE12TI	DE12TIS
Spec.					
Engine type		4 cycle in-line, Water-cooled type Naturally aspirated	4 cycle in-line, Water-cooled type Turbo charged	4 cycle in-line, Water-cooled type Turbo charged & intercooled	
Combustion chamber type		Direct injection type			
Cylinder liner type		Replaceable dry liner			
Timing gear system		Gear driven type			
No. of piston ring		Compression ring 2, oil ring 1			
No. of cylinder-bore x stroke (mm)		6 - 123 x 155			
Total piston displacement (cc)		11,051			
Compression ratio		17.1 : 1	17.1 : 1	16.5 : 1	16.8 : 1
Engine dimension (length x width x height) (mm)		1,317 x 795 x 1,029	1,317 x 847 x 1,064	1,368 x 932 x 1,151	
Engine weight (kg)		872	909	990	
Rotating direction (viewed from flywheel)		Counter clockwise			
Fuel injection order		1 - 5 - 3 - 6 - 2 - 4			
Fuel injection timing (B.T.D.C static)		12	9	12	1
Injection pump type		Mechanical	Mechanical	Mechanical	Electrical
Governor type		RFD-C / RLD	RFD-C	RFD-D	RLD-J
Injection nozzle type		Multi-hole(5- ϕ 0.29)	Multi-hole (5- ϕ 0.31)	Multi-hole(5- ϕ 0.33)	Multi-hole(5- ϕ 0.29)
Fuel injection pressure (kg/cm ²)		220	220	1st : 160 2nd : 220	1st : 160 2nd : 220
Compression pressure (kg/cm ²)		28 (at 200rpm)			
Intake and exhaust valve clearance(at cold) (mm)		0.3			
Intake valve	Open at	18 (B.T.D.C)			18 (B.T.D.C)
	Close at	34 (A.B.D.C)			32 (A.B.D.C)
Exhaust valve	Open at	46 (B.B.D.C)			70 (B.B.D.C)
	Close at	14 (A.T.D.C)			30 (A.T.D.C)
Lubrication method		Full forced pressure feed type			
Oil pump type		Gear type driven by crankshaft			
Oil filter type		Cartridge type			
Lubricating oil capacity(max./min) (liter)		17/14			
Oil cooler type		Water cooled			
Water pump		Centrifugal type driven by gear			
Cooling method		Fresh water forced circulation			
Cooling water capacity (engine only) (liter)		19			
Thermostat type		Wax pallet type (83 ~ 95 C)			
Air compressor type & capacity (cc/rev)		Gear driven type, Truck : 220 , Bus : 318			
Power steering pump (lit/bar)		Bus : 16 / 100 , Truck : 18 / 125			
Alternator voltage - capacity (V - A)		Truck : 24 - 45 , Bus : 24 - 150			
Starting motor voltage - output (V - kW)		24 - 6.0			
Air heater capacity (V - A)		22 - 95 (2.1 kW)			
Battery capacity (V - AH)		24 - 200			

1.3.2. Engine power

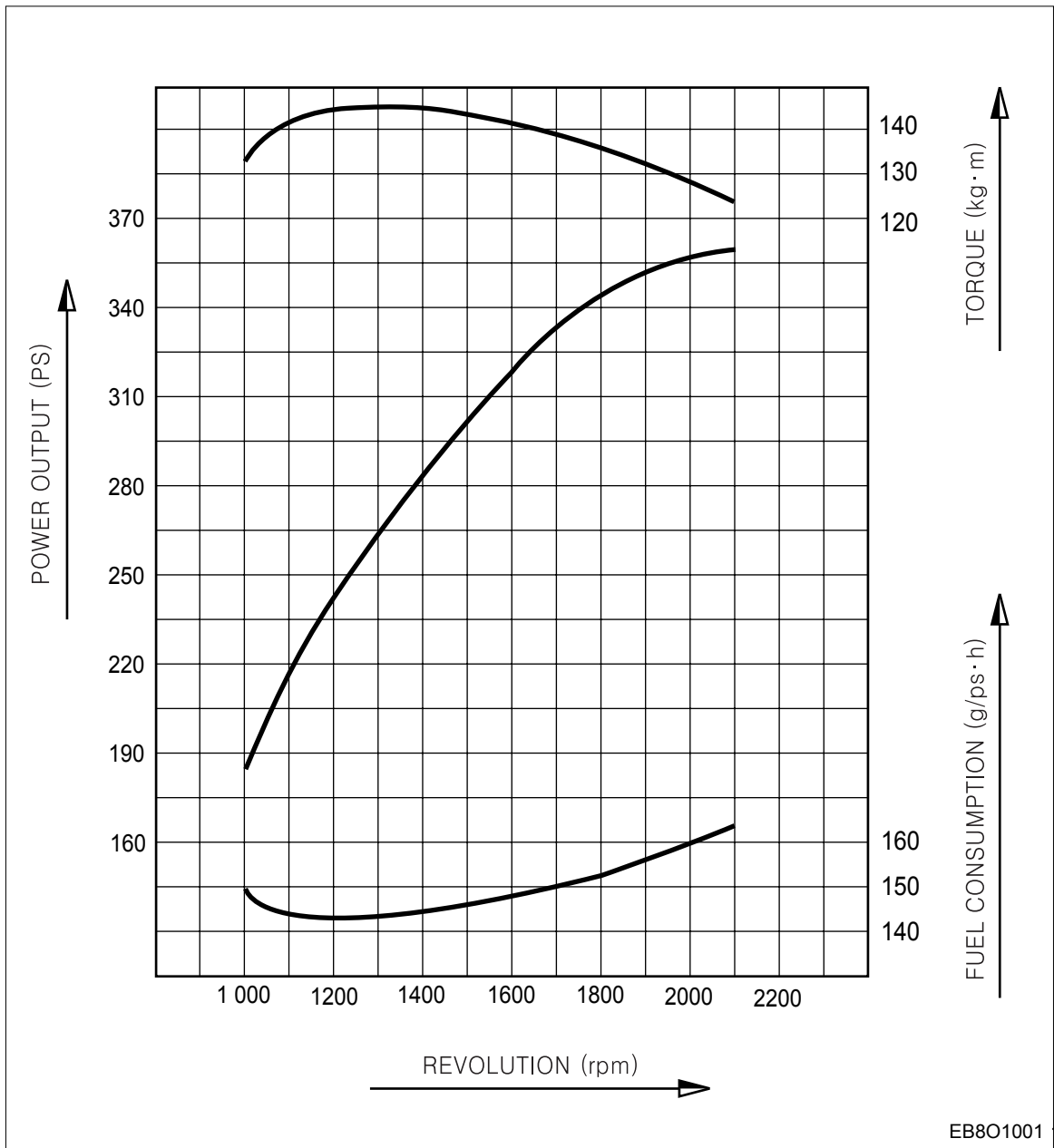
Production tolerance : ±5%

Engine Model		Performance					Remark		
Model	Suffix	Injection timing (BTDC)	Power (PS / rpm)	Torque (kg.m / rpm)	Low idle (rpm)	High idle (rpm)			
DE12	EBGBA EBGBB EBGBC EBGBD EBGBR	12	225 / 2,200	81.5 / 1,400	600 - 650	2420±50			
	EBGBE EBGBF EBGBJ EBGBK EBGBL EBGBM	10	230 / 2,200	81 / 1,400	600-650	2420±50			
	EBGBO EBGBQ	8	228 / 2,200	81.5 / 1,400	600-650	2420±50			
	EBGCA	12	225 / 2,200	81.5 / 1,400	600-650	2420±50			
	DE12T	EBHBA EBHBC	8	300 / 2,200	110 / 1,300	600-650		2420±50	
		DE12TI	EBIBA	12	340 / 2,100	135 / 1,260		600-650	
EBIBB	9		300 / 2,100	120 / 1,260	600-650	2,320±50			
EBIBC	9		280 / 2,100	115 / 1,260	600-650	2,320±50			
EBIBD	9		310 / 2,100	125 / 1,260	600-650	2,320±50			
EBICA /B/C/E//L/M	12		340 / 2,100	135 / 1,260	600-650	2,320±50			
DE12TIS	ECIBA ECICA ECICB ECICD ECIBD	1	340 / 2,100 335 / 2,100	145 / 1,260	600±25	2,350-2,400	EURO-II		
	ECICC	1	320 / 2,100	135 / 1,260					
	ECIBB	1	310 / 2,100	125 / 1,260					
	ECIBC	1	290 / 2,100	115 / 1,260					
	ECIBE	1	360 / 2,100	145 / 1,260					

* Note : All data are based on operation without cooling fan at ISO 1585(SAE J1349).

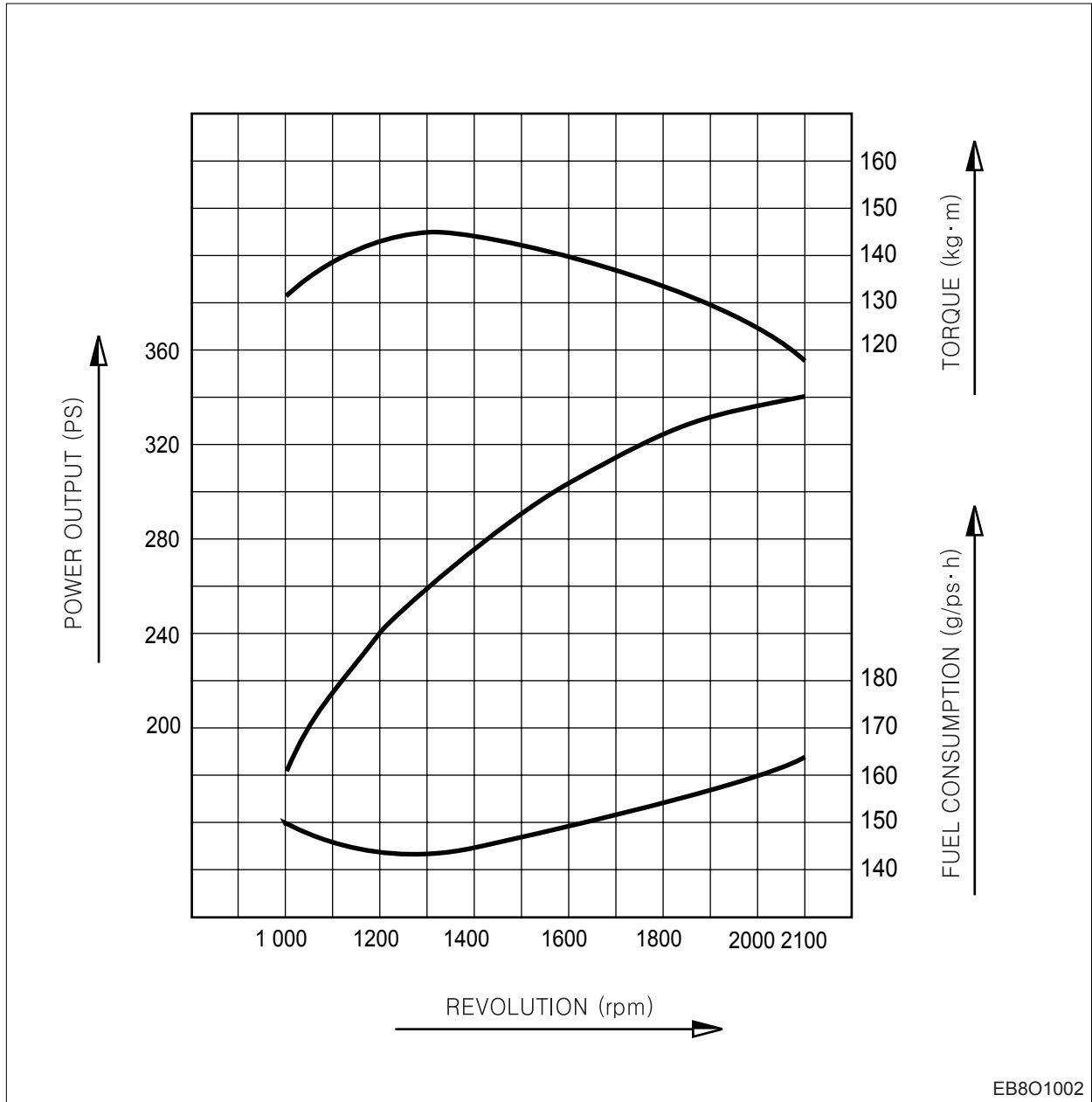
1.3.3. Performance curve

1) DE12TIS - 360PS



Performance		ISO 1585 (SAE J1349)
Output	(max.)	265 kW (360PS) / 2,100 rpm
Torque	(max.)	1,421 N.m (145 kg.m) / 1,260 rpm
Fuel consumption	(min.)	186 g/kW.h (143 g / PS.h)

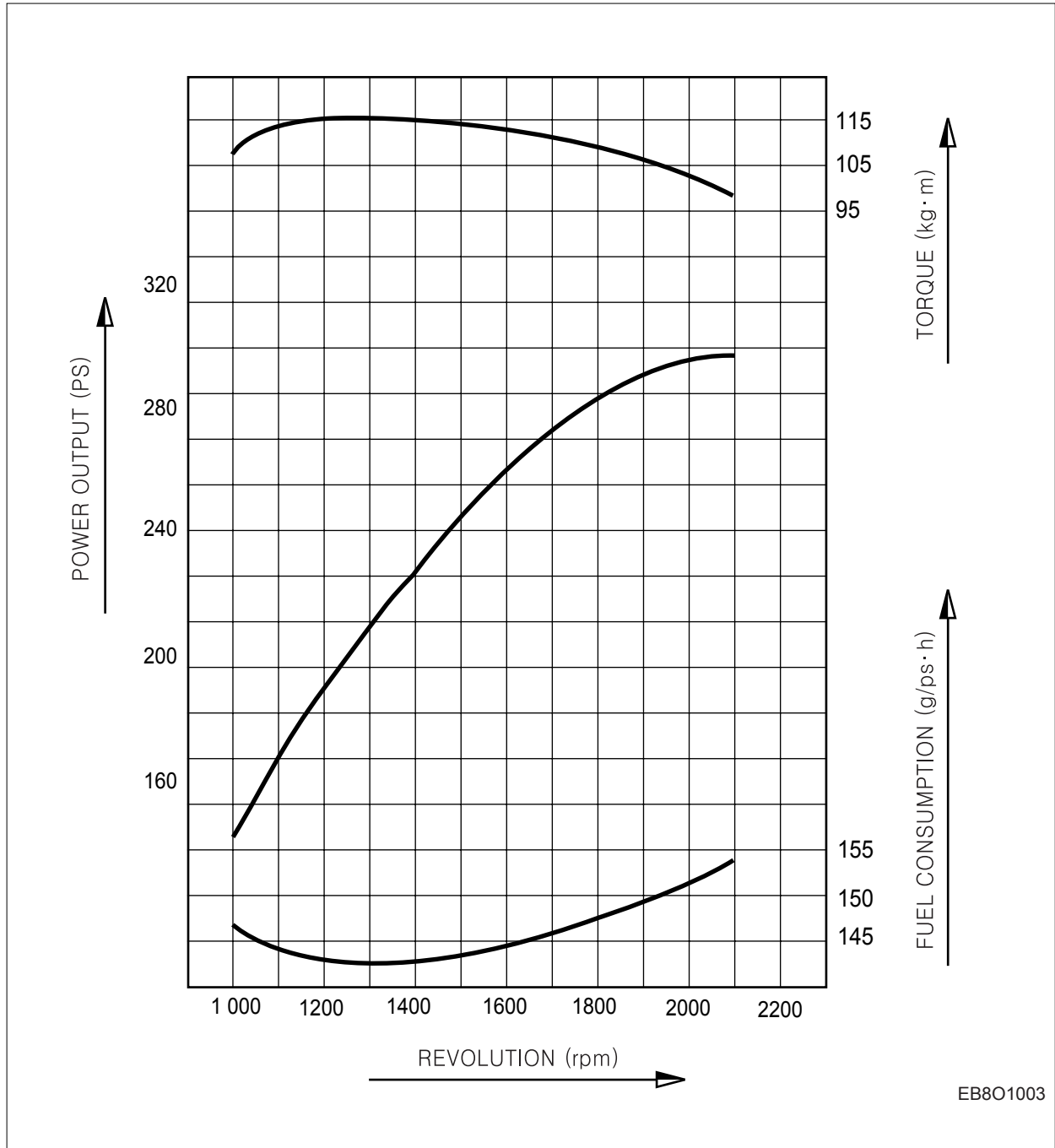
2) DE12TIS - 340PS



EB801002

Performance		ISO 1585 (SAE J1349)
Output	(max.)	250 kW (340PS) / 2,100 rpm
Torque	(max.)	1,421 N.m (145 kg.m) / 1,260 rpm
Fuel consumption	(min.)	186 g/kW.h (143 g / PS.h)

3) DE12TIS - 290PS



Performance		ISO 1585 (SAE J1349)
Output	(max.)	223 kW (290PS) / 2,100 rpm
Torque	(max.)	1,127 N.m (115 kg.m) / 1,260 rpm
Fuel consumption	(min.)	186 g/kW.h (143 g / PS.h)