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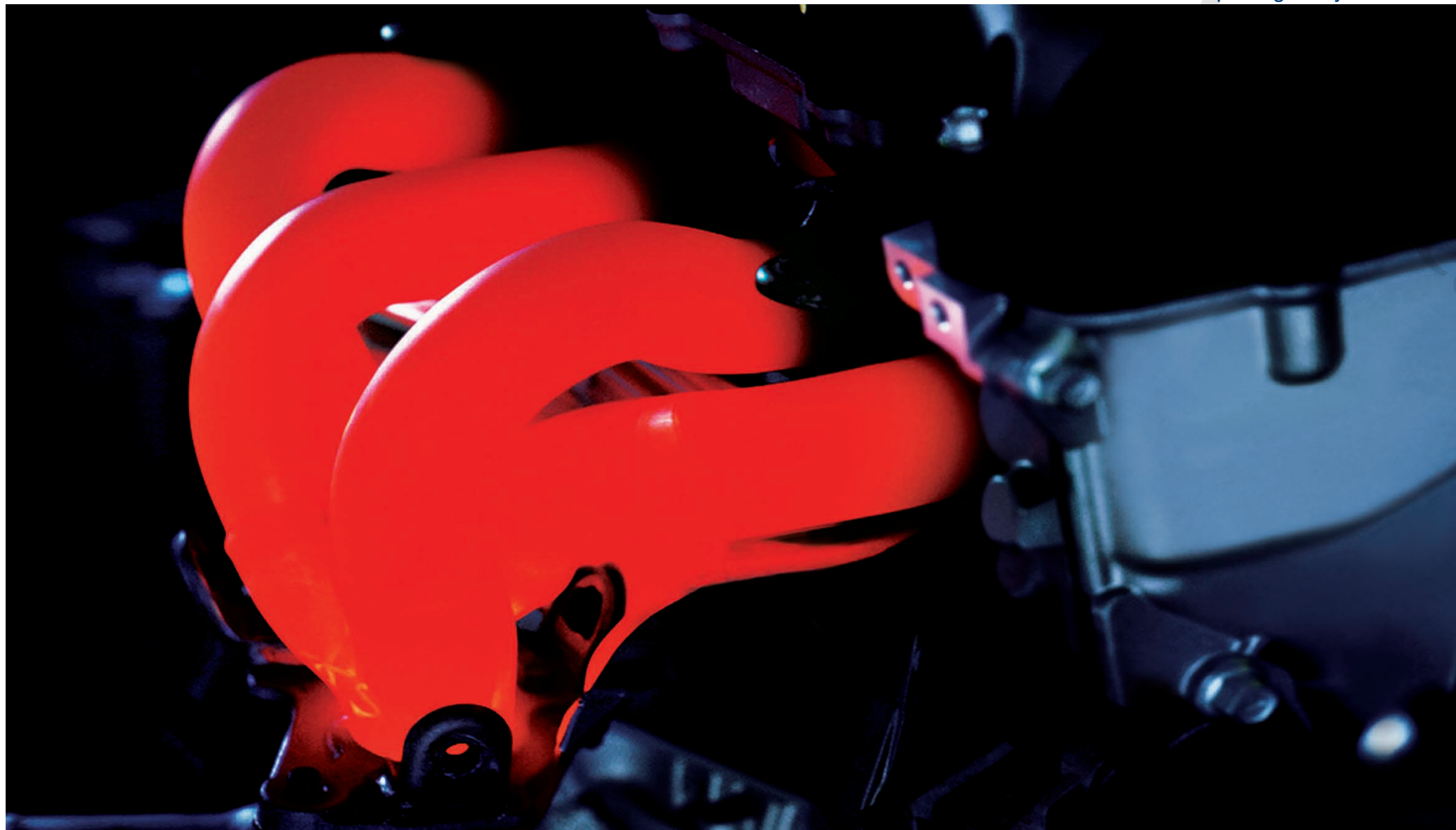
The Family of HYUNDAI ENGINE

- Generator Engine
- Industrial Engine
- Automotive Engine

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| | | | - Diesel Engine |

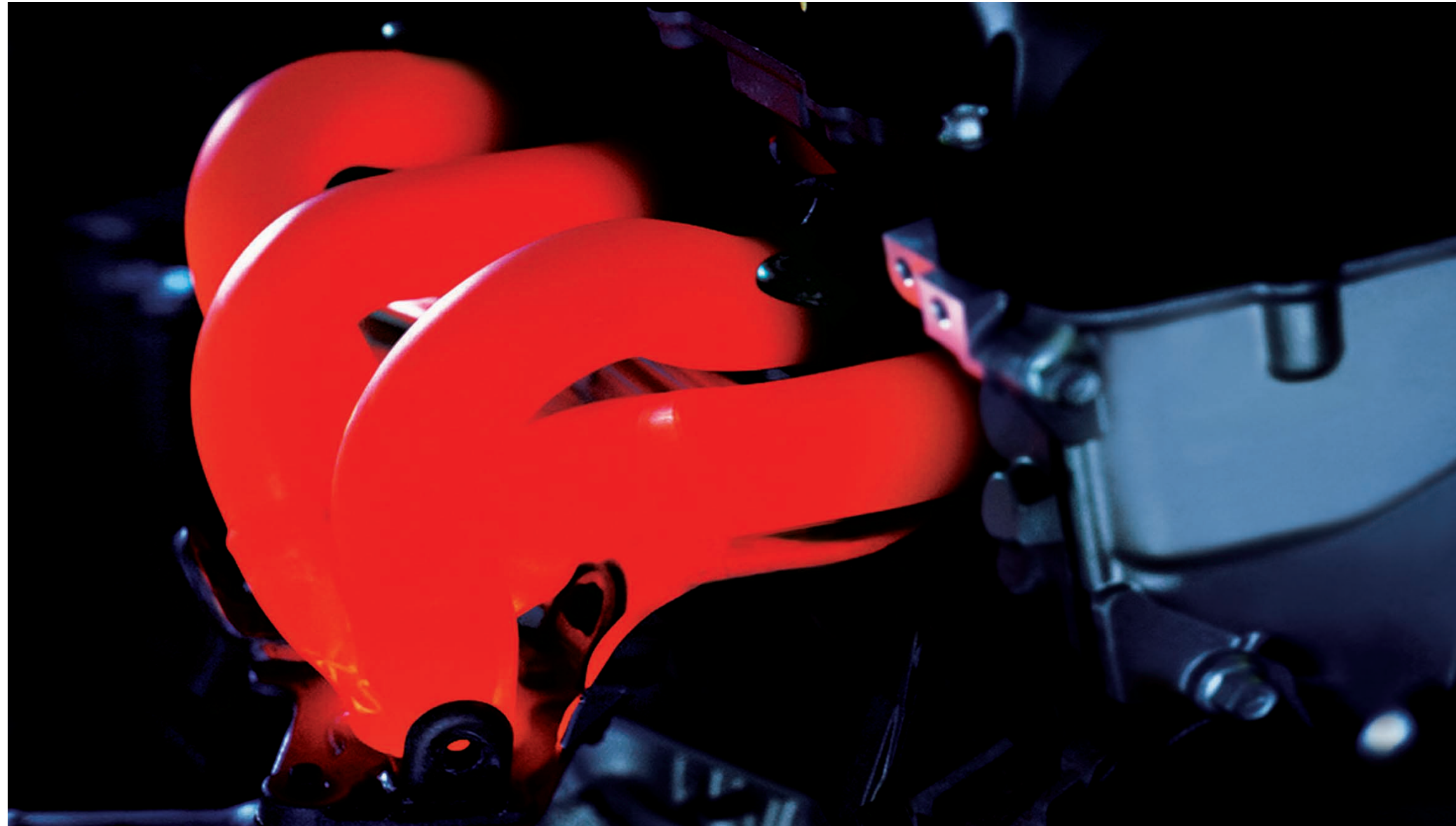
<http://engine.hyundai.co.kr>



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- Gasoline Engine
- Diesel Engine

<http://engine.hyundai.co.kr>



ULSAN PLANT

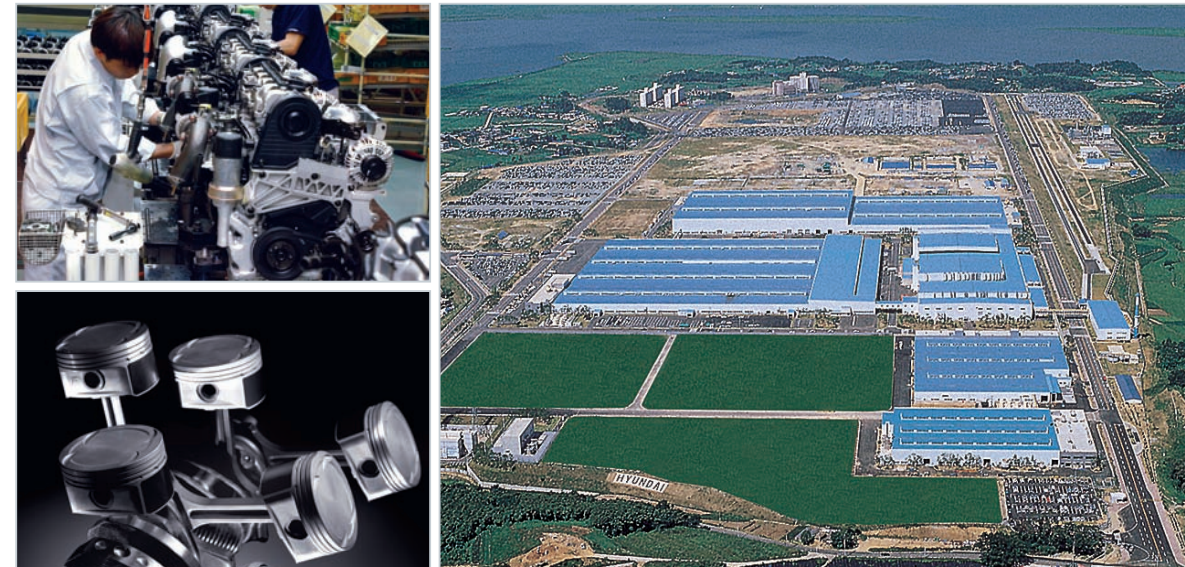
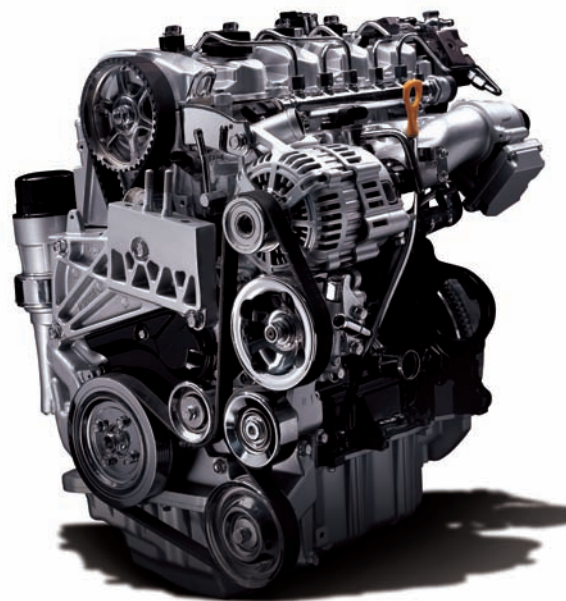
- | | | |
|---|---|---|
| 1 | 2 | 3 |
|---|---|---|
- 1 Engine test cell
2 Common Rail Diesel Engine
3 Ulsan Plant



Our global manufacturing hub: the Ulsan manufacturing plant

Our Ulsan manufacturing plant, consisting of five independent manufacturing facilities and covering 1,215 acres of land, has an annual manufacturing capacity of 1.53 million vehicles. Approximately 34,000 employees work here. This plant has its own exclusive pier, which can accommodate three ships of 42 thousand tons each. It is one of the biggest auto plants in the world and plays a core role in the Korean motor industry. It is eco-friendly plant, with over 450 thousand trees on site and water-treatment facility. It is affectionately known as 'The Plant in the Forest', possessing cutting edge environmental protection facilities.

울산공장은 150만 평의 부지에 5개의 독립된 공장설비로 이루어진 현대자동차의 주력 공장으로 3만 4,000여명의 종업원이 근무하고 있으며 연간 153만 대의 생산 능력을 보유하고 있습니다. 또한, 4만 2,000톤급 선박 3척을 동시에 접안 할 수 있는 전용부두까지 갖추는 등 단일공장으로 세계 최대 규모를 자랑하는 우리나라 자동차산업의 산실입니다. 45만 그루의 조경수가 둘러싸여 '숲속의 공장'을 방불케 하는 울산공장은 오.폐수 처리장을 비롯한 최첨단 환경보호 시설도 갖추고 있어 환경친화 기업으로 자리매김하고 있습니다.



ASAN PLANT

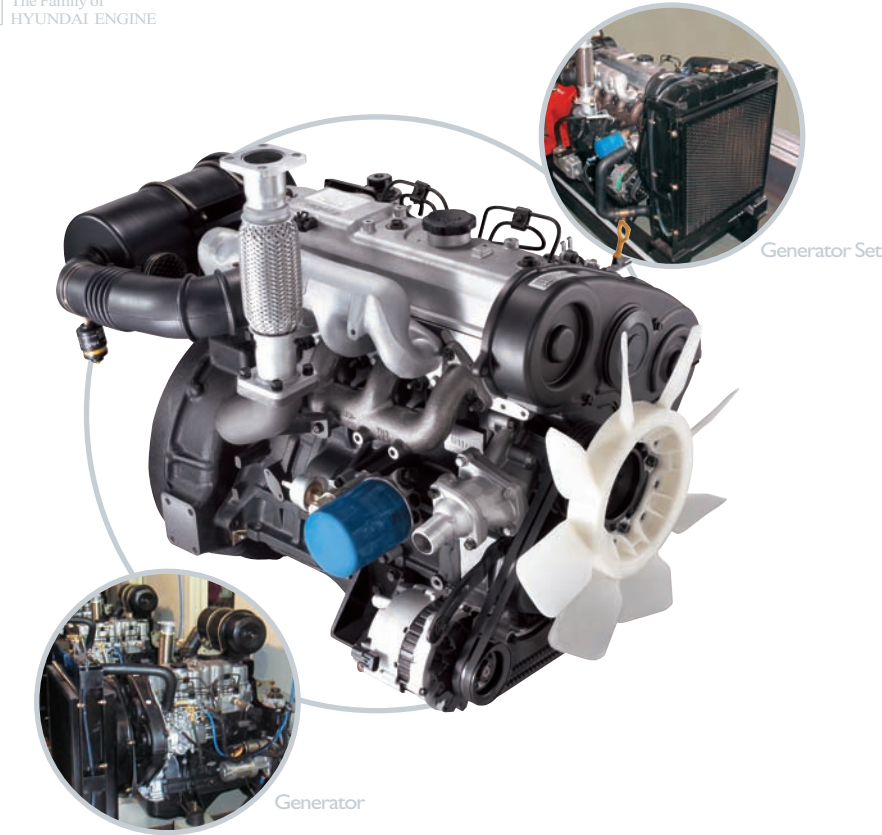
- | | | |
|---|---|---|
| 1 | 2 | 3 |
|---|---|---|
- 1 Engine assembly line
2 Engine Piston
3 Asan Plant

Our export-strategic manufacturing plant: the Asan plant

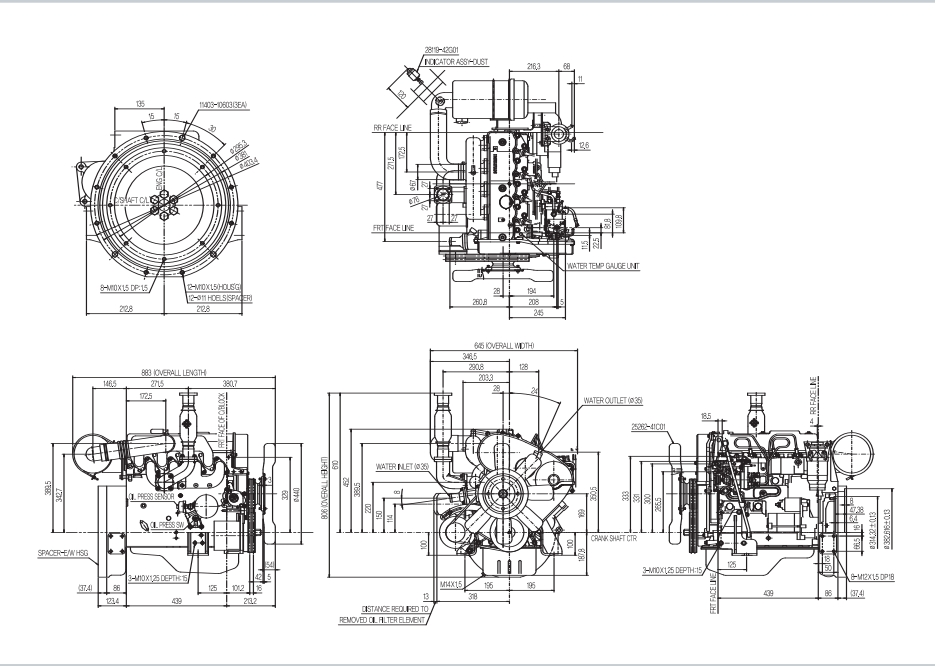
Our Asan manufacturing plant, focused on manufacturing passenger cars for export, consists of a stamping shop, a highly automated body line, paint shop and final trim and assembly line as well as a foundry and an engine manufacturing facility. It stands on a 445 acre site and has an annual manufacturing capacity of 290,000 vehicles. This plant was built with the philosophy of creating the safest and most eco-friendly work environment possible. We have paid careful attention to environmental protection at this plant. We have also designed a wide variety of facilities for the comfort and convenience of our employees, as we believe in creating an optimal working environment for them, as they create excellence for our customers.

수출전략형 승용차를 중점적으로 생산하고 있는 아산공장은 부지 면적 55만 평에 연간평 20만평 규모의 프레스, 차체, 페인트, 조립 공장과 엔진 및 소재공장 등 연간 29만 대 규모의 중대형 승용차를 생산할 수 있는 완전 자립형 승용차 전문 생산 공장입니다. 사람 중심의 안전한 작업 환경 조성과 환경 친화적 기업이념의 실천이라는 대명제 아래 설립된 아산공장은 작업자에 대한 세심한 배려와 환경보호를 위해 각별한 노력을 기울이고 있습니다. 또한 공장 내부는 일반 공장시설에 대한 고정관념을 뛰어넘는 밝은 색으로 공장 분위기를 쇄신하였고, 작업환경의 질이 곧 자동차의 품질이라는 신념으로 최적의 작업환경을 조성하기 위한 각종 작업 편의시설을 설치하였습니다.





General View of Basic Engine



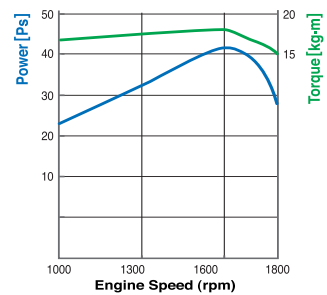
D4BB (4Pole)

Specifications

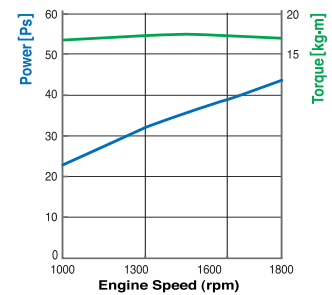
ENGINE CODE		AG3I	AG39	AG4I
Max Power	ps/rpm	28/1,800	45/1,800	26/1,500
Combustion Chamber Type		Swirl Chamber Type		
Aspiration		Natural Aspiration		
* Stand-by Power	kw, KVA	15/19	26/33	15/19
Prime Power	kw, KVA	14/17	24/30	14/17
Number of Cylinders		4- In line		
Bore x Stroke	mm	91.1mm x 100mm		
Total Piston Displacement		cc		
Compression Ratio		22 : 1		
Rotation		Counter-Clockwise Rotation as Viewed from Flywheel Side		
Firing Order		1- 3 - 4 - 2		
Dry Weight	kg	210kg (Approx)		
ENG Rpm Controller(Optional)		ETCM		
Fuel Injection Pump		Bosch VE Type		
Fly Wheel		SAE # 10		
Fly Wheel Housing		SAE # 4		
Air Cleaner		Cyclone Filter Paper Type		
Fuel Filter		Paper Element Type		
Lubrication Oil Filter		Paper Element (Cartridge) Type		
Alternator		12V - 65A		
Starting Motor		12V - 2.2Kw		
Fuel Consumption	g/ps-h/rpm	185/1,800	190/1,800	174/1,500

Engine Type 4Cycle, Water-Cooled Diesel Engine (IDI)
* Calculation Base:Power x 0.735 x 80% (Engine & Generator Efficiency) As technology advancements Continue, specification may change.
ETCM:Electronic Throttle Control Module

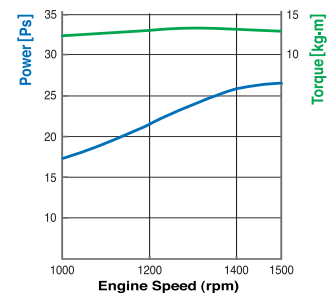
AG3I 28 ps/ 1,800 rpm
15.0 kg-m/1,800 rpm



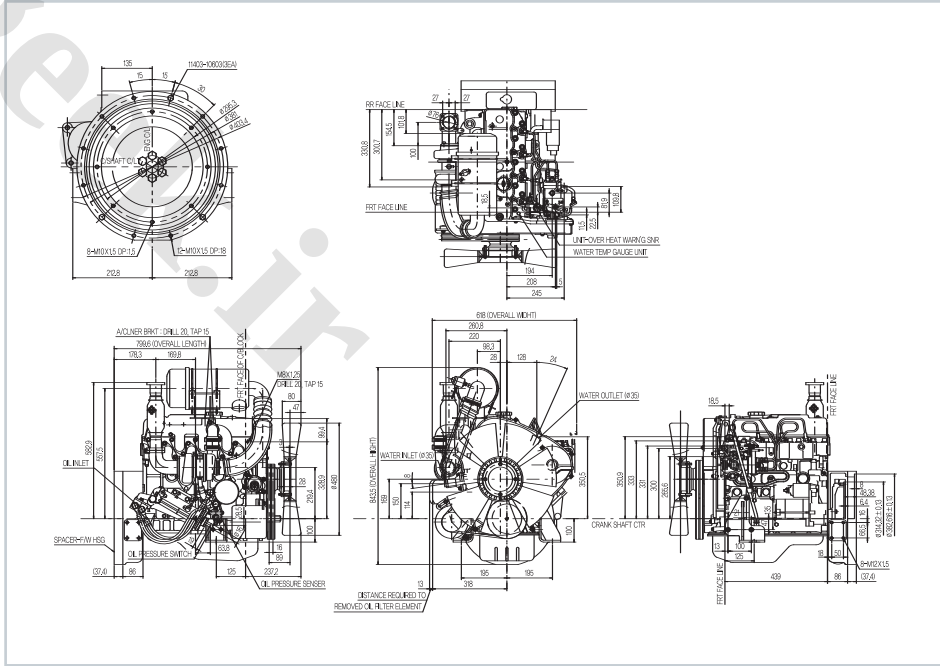
AG39 45 ps/ 1,800 rpm
17.3 kg-m/1,800 rpm



AG4I 26 ps/ 1,500 rpm
12.5 kg-m/1,500 rpm



General View of Basic Engine



D4BB T/C (4Pole)

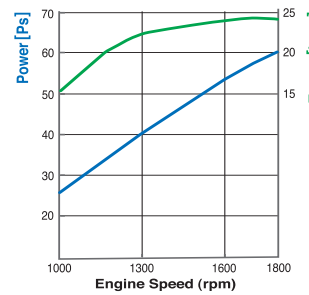
Turbo Charged

Specifications

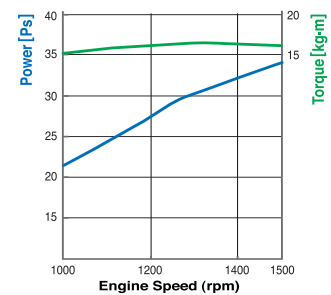
ENGINE CODE		AG49	AH23
Max Power	ps/rpm	53~60/1,800	34/1,500
Combustion Chamber Type		Swirl Chamber Type	
Aspiration		Turbo Charger	
* Stand-by Power	kw, KVA	35/44	20/25
Prime Power	kw, KVA	32/40	18/23
Number of Cylinders		4- In line	
Bore x Stroke	mm	91.1mm x 100mm	
Total Piston Displacement	cc	2,607	
Compression Ratio		22 : 1	
Rotation		Counter-Clockwise Rotation as Viewed from Flywheel Side	
Firing Order		1- 3 - 4 - 2	
Dry Weight	kg	215kg (Approx)	
ENG Rpm Controller(Optional)		ETCM	
Fuel Injection Pump		Bosch VE Type	
Fly Wheel		SAE # 10	
Fly Wheel Housing		SAE # 4	
Air Cleaner		Cyclone Filter Paper Type	
Fuel Filter		Paper Element Type	
Lubrication Oil Filter		Paper Element (Cartridge) Type	
Alternator(for Generator Only)		12V - 65A	
Starting Motor		12V - 2.2Kw	
Fuel Consumption	g/ps-h/rpm	172.6(173)/1,800	174/1,500

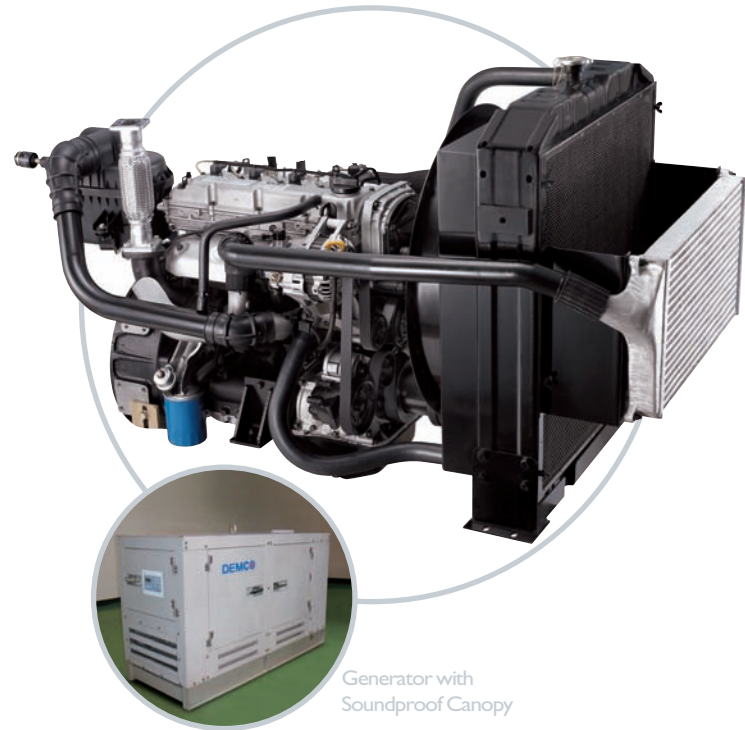
Engine Type 4Cycle, Water-Cooled Diesel Engine (IDI)
Application Fire Pump / Generator Generator
* Calculation Base:Power x 0.735 x 80% (Engine & Generator Efficiency) As technology advancements Continue, specification may change.
ETCM:Electronic Throttle Control Module

AG49 60 ps/ 1,800 rpm
24 kg-m/1,800 rpm

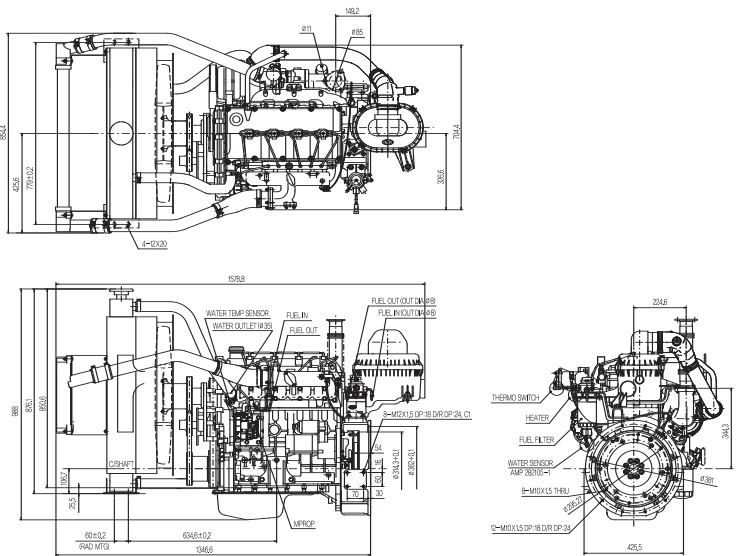


AH23 34 ps/ 1,500 rpm
16.3 kg-m/1,500 rpm





General View of Basic Engine



D4CB (2Pole)

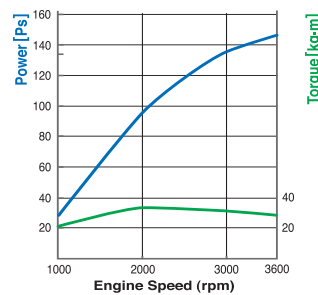
CRDi - Turbo Charged Intercooler

Specifications

ENGINE CODE		AH7I		
		3,600rpm	3,000rpm	1,800rpm
Max Power	ps/rpm	146/3,600	136/3,000	83/1,800
Combustion Chamber Type		Direct Injection Type		
Aspiration		Turbo Charged Intercooler		
* Stand-by Power	kw, KVA	80/100	75/94	45/56
Prime Power	kw, KVA	72/90	68/81	40/50
Number of Cylinders		4- In line		
Bore x Stroke	mm	91mm x 96mm		
Total Piston Displacement	cc	2,497		
Compression Ratio		17.7 : 1		
Rotation		Counter-Clockwise Rotation as Viewed from Flywheel Side		
Firing Order		1- 3 - 4 - 2		
Dry Weight	kg	290kg (Approx)		
ENG Rpm Controller		ECU		
Fuel Injection Pump		CRDi		
Fly Wheel		SAE # 10		
Fly Wheel Housing		SAE # 4		
Air Cleaner		Cyclone Filter Paper Type		
Fuel Filter		Paper Element Type		
Lubrication Oil Filter		Paper Element (Cartridge) Type		
Alternator		12V - 110A		
Starting Motor		12V - 2.2Kw		
Fuel Consumption	g/ps-h/rpm	182/3,600	170/3,000	157/1,800
Engine Type		4Cycle, Water-Cooled Diesel Engine (DI)		

* Calculation Base: Power x 0.735 x 75% (Engine & Generator Efficiency) As technology advancements Continue, specification may change

AH7I 146.4 ps/ 3,600 rpm
29.1 kg-m/3,600 rpm



Common Rail Diesel Engine

By combining a low-fuel-consumption, high-performance, low-noise, low-vibration direct-injection diesel engine with up-to-date common rail system technology and turbo technology, Hyundai Motor Company is developing a green engine for use in cars, RVs, and SUVs, that will dramatically reduce fuel consumption and CO₂ emissions.

Major Point

High Performance

Increased output through high driving force of a turbine by enlarging emission passage at high rpm

배기가스가 많이 배출되는 고속구간에서 배기유로를 확대, 많은 양의 배기가스가 터빈의 구동력을 높혀줌으로써 출력 향상

Low Fuel Consumption

Great gas efficiency through optimal combustion condition by VGT optimally controlling air and CRDi system injecting high-pressure gas

VGT에 의해 최적 제어된 흡입 공기에 커먼레일 시스템을 통한 고압 연료가 분사되어 최적 연소조건을 실현시킴으로써 대폭적인 연비 향상

**CRDi
ENGINE**

Low Noise

Dramatic improvement of typical diesel combustion noise by multi-fuel injection and optimal tuning. Realization of minimal noise through the high durable engine design.

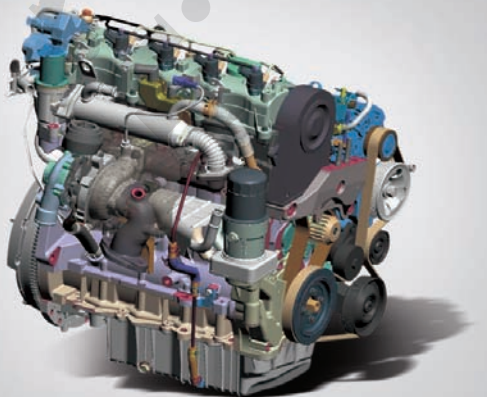
다중 연료분사 및 연소음 최적 튜닝을 통해 디젤 특유의 연소음을 획기적으로 개선하고 엔진 본체의 고강성 구조설계로 방사음을 저감하여 실내 저소음 실현

Low Emission

Decreased smoke and exhaust gas through optimal combustion by inspiring enough air which encourage driving force of turbine at all rpm

배기유로 정밀 제어를 통해 저속 및 고속 전구간에서 터빈의 구동력이 증대되는 충분한 공기 흡입으로 최적 연소가 이루어지므로 불완전 연소를 감소시켜 매연 및 배기가스 저감

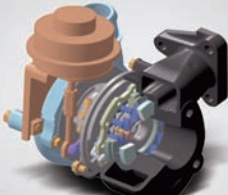
Major Applied New Technology



High Capacity Cartridge VGT

Helping engine efficiency and durability by integrating vane and plate, which control emission passage

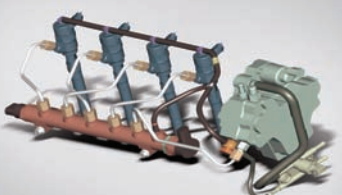
배기 유로를 조절하는 베인과 플레이트를 일체형 모듈화하여 엔진 효율 및 내구성을 향상



CRDi System

Controlling injection amount and interval more efficiently with high pressure(1,600 bar)

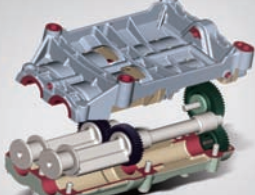
고분사압(1,600bar)의 커먼레일 시스템으로 분사량 및 분사 간격을 더욱 효율적으로 제어 가능



Low Friction Balance Shaft

Making low friction with 2 piece type carrier and reduce bearing diameter

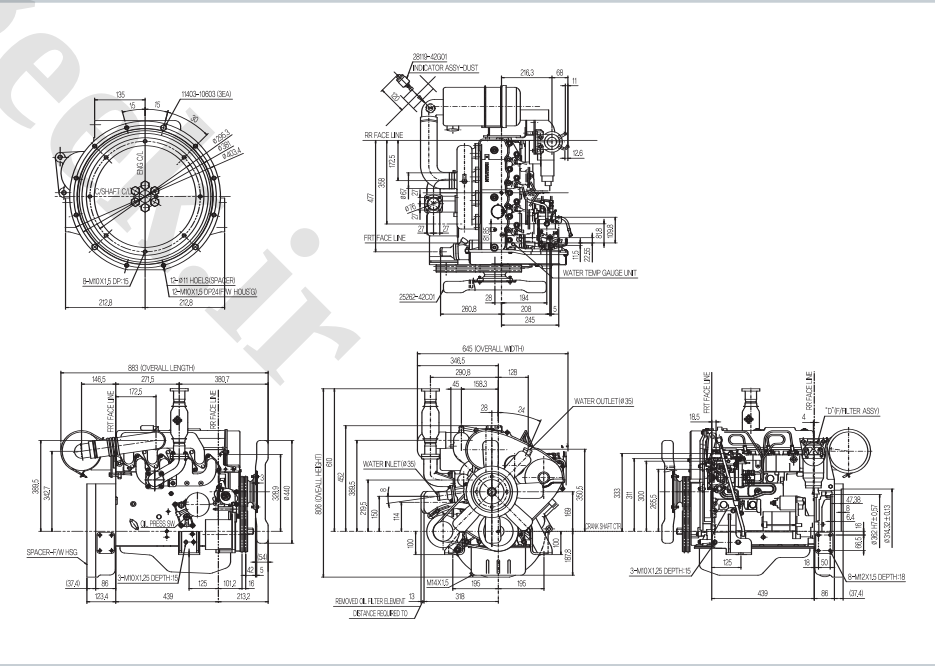
기존 1Piece 타입에서 2Piece 타입 캐리어로 변경하고 베어링 경이 축소된 저마찰식 발란스 샤프트를 적용



The Family of INDUSTRIAL ENGINE



General View of Basic Engine



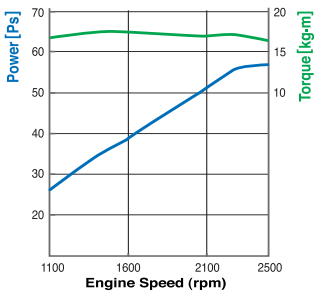
D4BB

Specifications

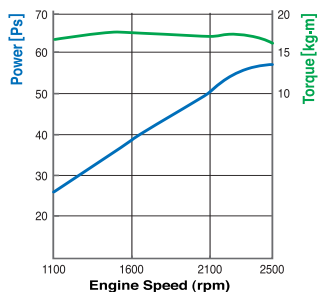
ENGINE CODE			AG35	AG90	AG45	AG32	AG47
Aspiration			NA	←	←	←	←
Dimension	Length	mm	883	669	655	756	743
	Width	mm	645	618	618	537	608
Dimension	Height	mm	806	648	660	648	←
Combustion Chamber Type			Swirl Chamber				
Number of Cylinders			4	←	←	←	←
Bore x Stroke			91.1 x 100	←	←	←	←
Total Displacement			mm	2,607	←	←	←
Compression Ratio			cc	22 : 1	←	←	←
Max Power (JIS)			ps/rpm	57/2,500	57/2,500	57/2,500	40/2,000
Max Torque (JIS)			kg·m/rpm	17.6/1,500	17.6/1,500	17.6/1,500	15/1,500
Specific Fuel Consumption			g/ps·h/rpm	189/2,500	189/2,500	189/2,500	177/2,000
Weight in Dry			kg	200	←	←	←
Starter Motor			v-kw	12 - 2.2	←	←	←
ENG Rpm Controller			Accel Cable	←	←	←	←
Cooling Water Quantity			l	3.9	←	←	←
Lubrication Oil Quantity			l	5.4	←	←	←
Engine Type			4Cycle, Water- Cooled Diesel Engine, in -line				
Application			Power Unit Skid-loader Agricultural Machinery		Fork Lift Truck	Bus Cooler	

As technology advancements Continue, specification may change

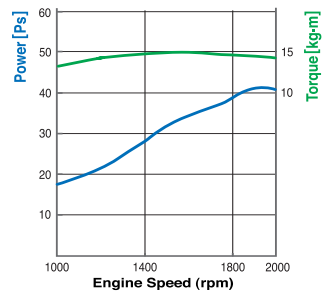
AG35 57 ps / 2,500 rpm
17.6 kg·m/1,500 rpm



AG45 57 ps / 2,500 rpm
17.6 kg·m/1,500 rpm

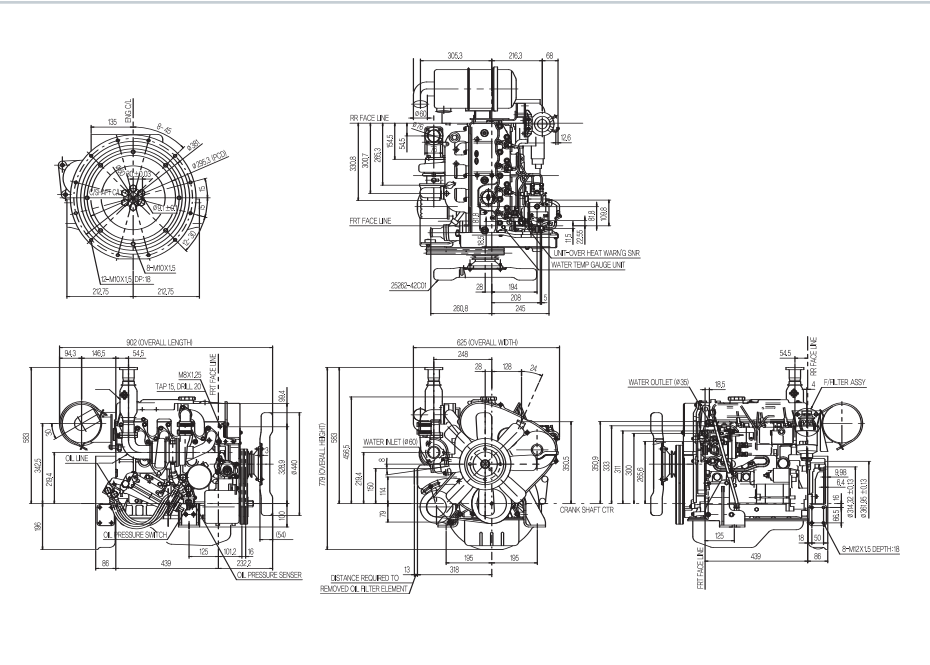


AG32 40 ps / 2,000 rpm
15.0 kg·m/1,500 rpm





General View of Basic Engine



D4BB T/C

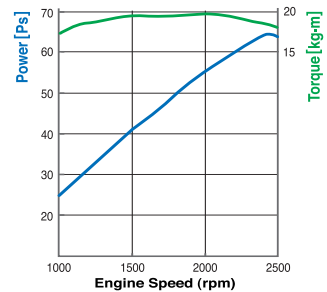
Turbo Charged

Specifications

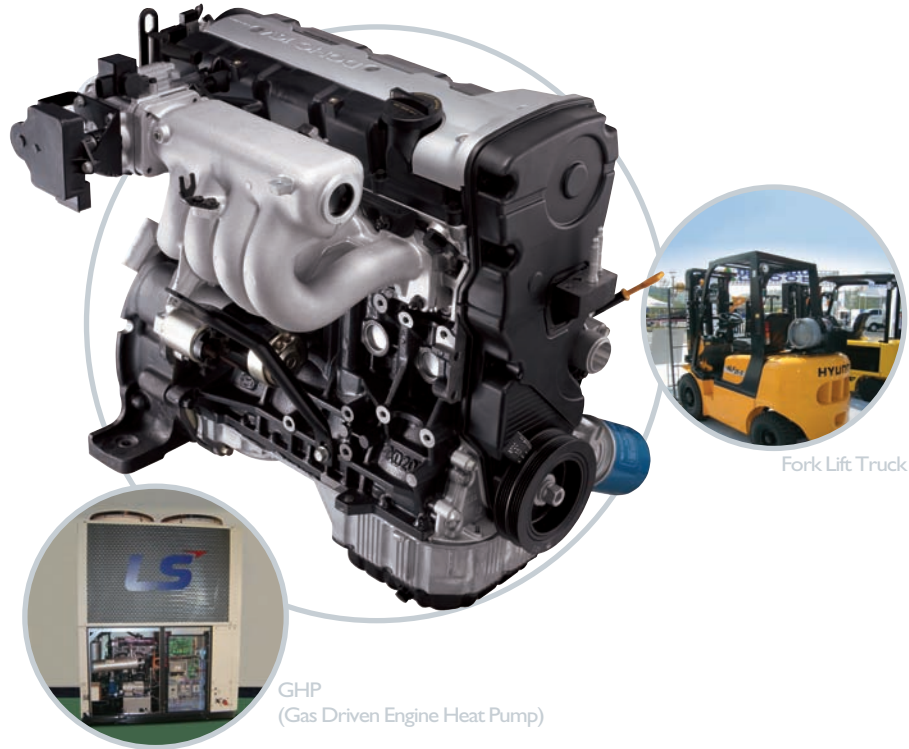
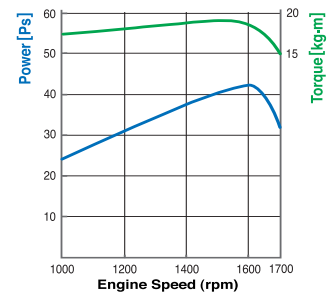
ENGINE CODE			AG50	AH24
Aspiration			T/C	←
Dimension	Length	mm	902	738
	Width	mm	625	618
	Height	mm	779	843.5
Combustion Chamber Type			Swirl Chamber	
Number of Cylinders			4	←
Bore x Stroke			91.1 x 100	←
Total Displacement			2,607	←
Compression Ratio			22 : 1	←
Max Power (JIS)			64/2,500	42/1,600
Max Torque (JIS)			19.9/2,000	19.3/1,500
Specific Fuel Consumption			180/2,500	188/1,600
Weight in Dry			215 (Approx)	210 (Approx)
Starter Motor			12 - 2.2	←
ENG Rpm Controller			Accel Cable	←
Cooling Water Quantity			3.9	←
Lubrication Oil Quantity			5.4	←
Engine Type			4Cycle, Water- Cooled Diesel Engine, in -line	
Application			Power Unit	Fire Pump
			Agricultural Machinery	

As technology advancements Continue, specification may change

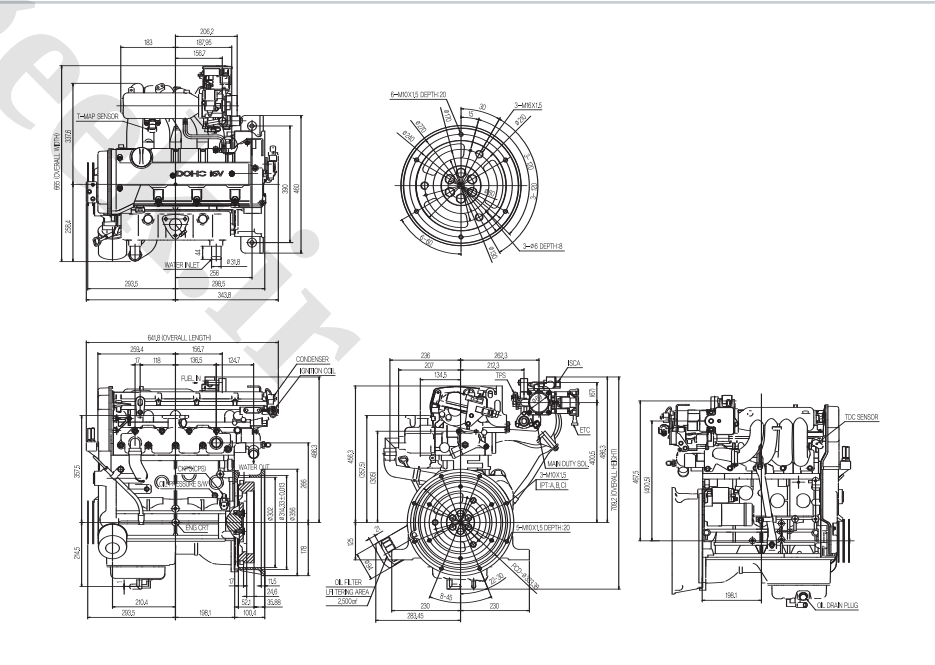
AG50 64 ps / 2,500 rpm
19.9 kg-m/2,000 rpm



AH24 42 ps / 1,600 rpm
19.3 kg-m/1,500 rpm



General View of Basic Engine



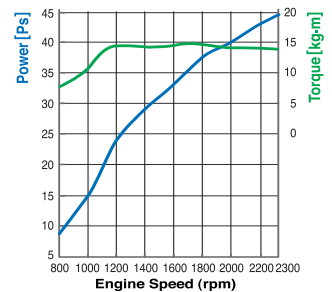
β-2.0

Specifications

ENGINE CODE			XE88
Aspiration			NA
Dimension	Length	mm	642
	Width	mm	655
	Height	mm	709
Combustion Chamber Type			Semi - Pent Roof
Number of Cylinders			4
Bore x Stroke			82 x 93.5
Total Displacement			1,975
Compression Ratio			13.5 : 1
Max Power (JIS)			44.7/2,300
Max Torque (JIS)			14.9/1,800
Weight in Dry			156 (Approx)
Starter Motor			12 - 1.7
ENG Rpm Controller			ETC
Cooling Water Quantity			3.0
Lubrication Oil Quantity			4.0
Engine Type			4Cycle, Water- Cooled LNG Engine, in -line
Application			GHP(Gas Heat Pump)

As technology advancements Continue, specification may change.
ETC:Electronic Throttle Control

XE88 44.7 ps / 2,300 rpm
14.9 kg-m/1,800 rpm



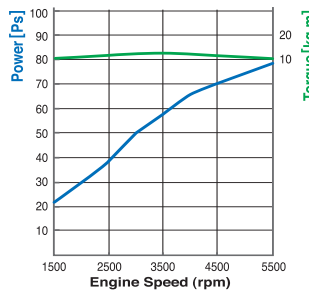
α-1.5 3V/V Carb.

Specifications

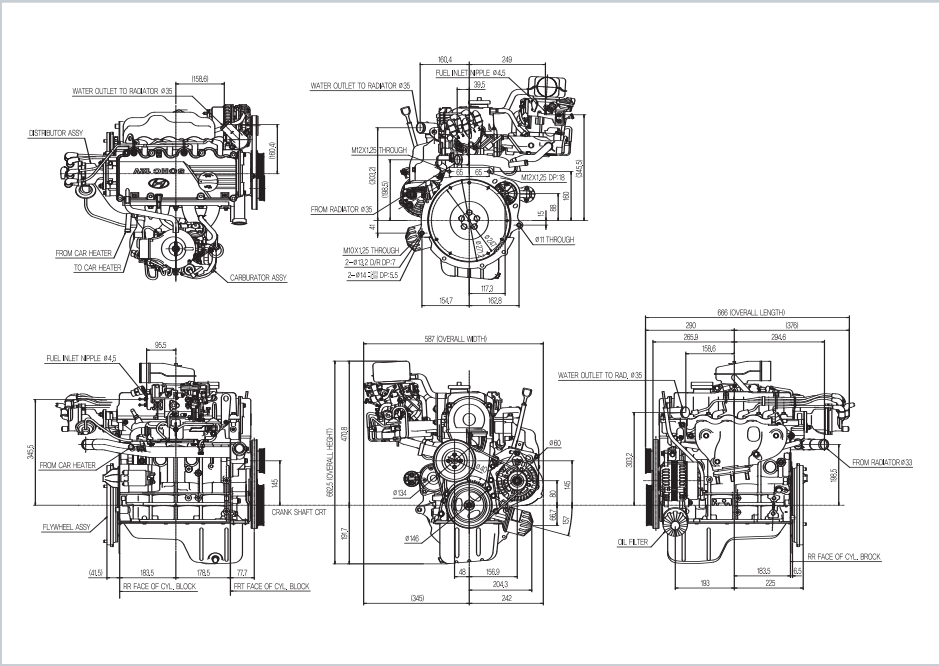
ENGINE CODE			DA98 / DA99
Aspiration			NA
Dimension	Length	mm	666
	Width	mm	587
	Height	mm	663
Combustion Chamber Type			Pent Roof
Number of Cylinders			4
Bore x Stroke			75.5 x 83.5
Total Displacement			1,495
Compression Ratio			10 : 1
Max Power (JIS)			78/5,500
Max Torque (JIS)			11.9/3,500
Specific Fuel Consumption			281/5,500
Weight in Dry			112
Starter Motor			12 - 0.9
ENG Rpm Controller			ETCM
Cooling Water Quantity			3.0
Lubrication Oil Quantity			3.3
Engine Type			4Cycle, Water-Cooled Gasoline Engine, in-line, Carburetor
Application			Speed Sprayer

As technology advancements Continue, specification may change.
ETCM:Electronic Throttle Control Module

DA98/99 78 ps / 5,500 rpm
11.9 kg-m/3,500 rpm



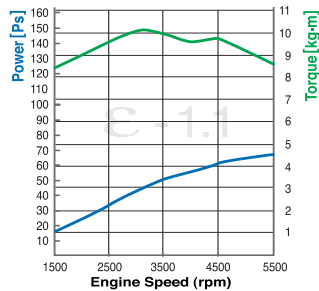
General View of Basic Engine



GASOLINE ENGINE

Ε - 1.0/1.1

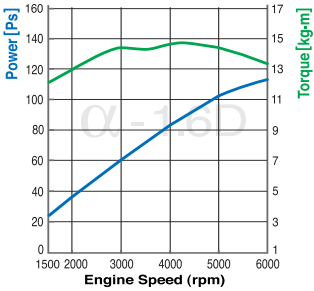
60ps/6,000 rpm | 8.7kg-m/4,000 rpm
66ps/5,500 rpm | 10.1kg-m/3,200 rpm



Description		EPSILON	
		1.0S	1.1S
Engine Size (mm)	Length	416	←
	Width	493	509
	Height	669	673
Weight (kg)	Dry	83.9	←
	Wet	87.9	←

Α - 1.4 /1.6D

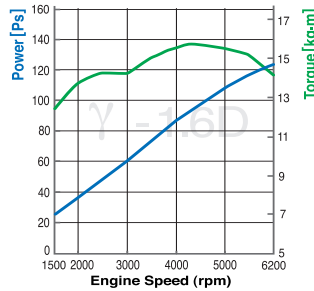
97ps/6,000 rpm | 12.8kg-m/4,700 rpm
112ps/6,000 rpm | 14.8kg-m/4,500 rpm



Description		ALPHA	
		1.4D	1.6D
Engine Size (mm)	Length	476	465.5
	Width	603	572.5
	Height	660	654.5
Weight (kg)	Dry	122	115.4
	Wet		121.5

Υ - 1.6D

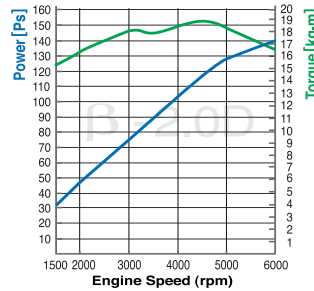
124ps/6,200 rpm | 15.8kg-m/4,200 rpm



Description		GAMMA	
		1.6D	
Engine Size (mm)	Length	480	
	Width	532	
	Height	621	
Weight (kg)	Dry	99.8	
	Wet		

Β - 2.0D

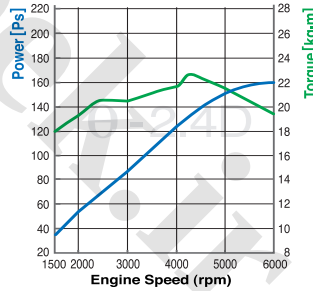
141ps/6,000 rpm | 18.8kg-m/4,500 rpm



Description		BETA	
		2.0D	
Engine Size (mm)	Length	496.4	
	Width	624.8	
	Height	672	
Weight (kg)	Dry	144	
	Wet	150.2	

Θ - 2.0/2.4D

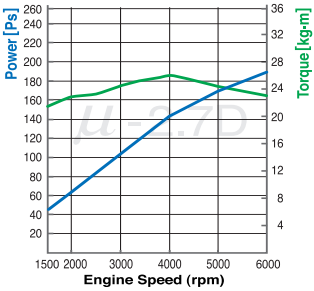
144ps/6,000 rpm | 19.2kg-m/4,250 rpm
160ps/6,000 rpm | 22.3kg-m/4,250 rpm



Description		THETA	
		2.0D	2.4D
Engine Size (mm)	Length	488	←
	Width	604	←
	Height	650	←
Weight (kg)	Dry	134.4	146.3
	Wet		

μ - 2.7D

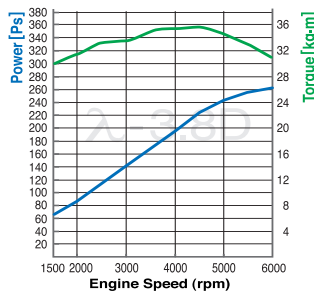
191ps/6,000 rpm | 25.5kg-m/4,000 rpm



Description		MU	
		2.7D	
Engine Size (mm)	Length	465	
	Width	637	
	Height	687	
Weight (kg)	Dry	164	
	Wet		

λ - 3.3 /3.8D

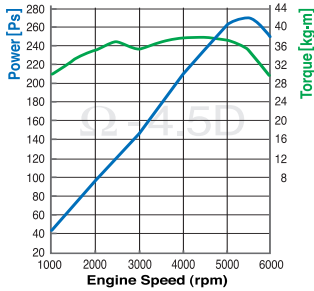
233ps/6,000 rpm | 31kg-m/3,500 rpm
261ps/6,000 rpm | 35.5kg-m/4,500 rpm



Description		LAMBDA	
		3.3D	3.8D
Engine Size (mm)	Length	477	←
	Width	689	←
	Height	702	←
Weight (kg)	Dry	184.2	186.6
	Wet		

Ω - 4.5D

270ps/5,500 rpm | 38kg-m/4,500 rpm

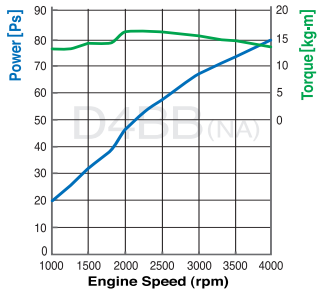


Description		OMEGA	
		4.5D	
Engine Size (mm)	Length	611	
	Width	846	
	Height	741	
Weight (kg)	Dry	235.7	
	Wet	245.7	

DIESEL ENGINE

D4BB (NA)

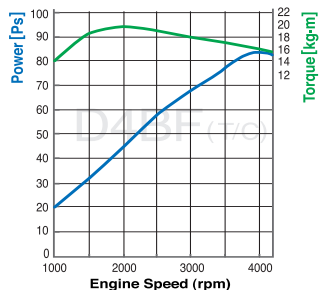
80ps/4,000 rpm | 17kg-m/2,200 rpm



Description		D4BB (NA)
Engine Size (mm)	Length	710
	Width	673.4
	Height	641
Weight (kg)	Dry	200.8
	Wet	212.9

D4BF (T/C)

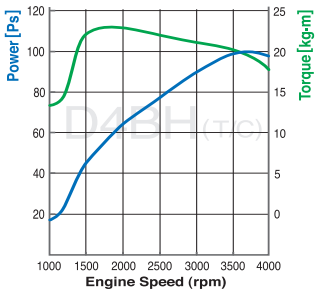
83ps/4,200 rpm | 20kg-m/2,000 rpm



Description		D4BF (T/C)
Engine Size (mm)	Length	717.5
	Width	629
	Height	736
Weight (kg)	Dry	204.8
	Wet	216.9

D4BH (TCl)

100ps/3,800 rpm | 23kg-m/2,000 rpm

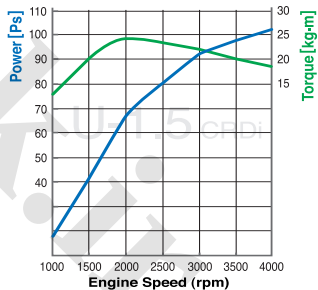


Description		D4BH (TCl)	
		EURO II	EURO III
Engine Size (mm)	Length	723.9	←
	Width	629	←
	Height	736	←
Weight (kg)	Dry	226.8	←
	Wet	238.9	←

U 1.1/1.5 - CRDi

75ps/4,000 rpm | 15.5kg-m/2,000 rpm

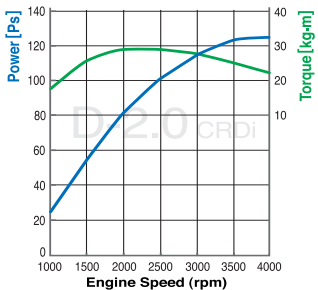
102ps/4,000 rpm | 24kg-m/2,000 rpm



Description		D3FA(1.1D)	D4FA(1.5D)
Engine Size (mm)	Length	394	479
	Width	587	587
	Height	644	634
Weight (kg)	Dry	140.4	157
	Wet		162.6

D 2.0 - CRDi

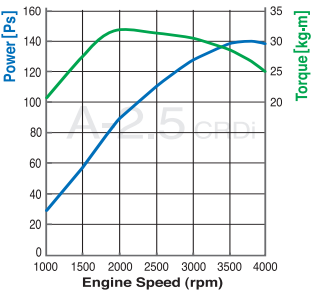
125ps/4,000 rpm | 29kg-m/2,000 rpm



Description		D4EA(2.0S)
Engine Size (mm)	Length	504
	Width	669
	Height	671
Weight (kg)	Dry	195.6
	Wet	205

A 2.5 - CRDi

140ps/3,800 rpm | 32kg-m/2,000 rpm



Description		D4CB(2.5D)
Engine Size (mm)	Length	696
	Width	614.5
	Height	740
Weight (kg)	Dry	263.2(VGT:269)
	Wet	274.8

SPECIFICATIONS

DESCRIPTION		EPSILON		ALPHA		GAMMA		BETA	THETA		MU	LAMBDA		OMEGA	D4BB	D4BF	D4BH	U-ENG		D-ENG	A-ENG
		1.0S	1.1S	1.4D	1.6D	1.4D	1.6D	2.0D	2.0D	2.4D	2.7D	3.3D	3.8D	4.5D				1.1D	1.5D		
Displacement	cc	999	1,086	1,399	1,599	1,396	1,591	1,975	1,998	2,359	2,656	3,342	3,778	4,498	2,607	2,476	2,476	1,120	1,493	1,991	2,497
Bore x Stroke	mm	66x73	67x77	75.5x78.1	76.5x87	77.7x74.99	77.7x85.44	82x93.5	86x86	88x97	86.7x75	92x83.8	96x87	86x96.8	91.1x100	91.1x95	66x73	75x84.5	75x84.5	83x92	91x96
Max Power	ps/rpm	58/5,700	61/6,000	95/5,800	103/5,800	100/6,000	111/6,000	137/6,000	145/6,000	165/5,800	182/6,000	233/6,000	252/6,000	260/5,000	80/4,000	83/4,200	100/3,800	75/4,000	110/4,000	125/4,000	140/3,800
Max Torque	kg.m/rpm	8.4/3,250	9.5/4,000	12.6/3,000	14.1/4,500	13.4/4,000	15.4/4,000	18.2/4,500	19.4/4,000	23/4,000	25/6,000	31/3,500	35/3,500	38/2,500	17/2,200	20/2,000	23/2,000	15.5/2,000	24/2,000	29/2,000	35/2,000
Dimension	Length	mm	416	416	476	465.5	480	480	488	488	465	477	477	611	710	717.5	723.9	394	479	504	696
	Width	mm	493	509	603	572.5	532	532	604	604	637	689	689	846	673.4	629	629	587	587	669	614.5
	Height	mm	669	673	660	654.5	621	621	650	650	669	702	702	741	641	736	736	644	634	671	740
Weight Dry		83.9	83.9	116	115.4	99.5	99.8	144	134.4	146.3	687	184.2	186.6	235.7	200.8	204.8	226.8	140.4	157	201.4	263.2
Cycle		4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Cylinder Number		4	4	4	4	4	4	4	4	4	4	6	6	8	4	4	4	3	4	4	4
Cylinder Arrangement		IN-LINE	IN-LINE	IN-LINE	IN-LINE	IN-LINE	IN-LINE	IN-LINE	IN-LINE	IN-LINE	V	V	V	V	IN-LINE	IN-LINE	IN-LINE	IN-LINE	IN-LINE	IN-LINE	IN-LINE
Firing Order		1-3-4-2	1-3-4-2	1-3-4-2	1-3-4-2	1-3-4-2	1-3-4-2	1-3-4-2	1-3-4-2	1-3-4-2	1-2-3-4-5-6	1-2-3-4-5-6	1-2-3-4-5-6	1-2-7-8-4-5-6-3	1-3-4-2	1-3-4-2	1-3-4-2	1-3-4-2	1-3-4-2	1-3-4-2	1-3-4-2
Compression Ratio		9.7	9.7	10	10	10.5	10.5	10.1	10.5	10.5	10	10.4	10.4	10.7	22	21	21	17.8	17.8	17.7	17.6
Aspiration		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	TC	TCI	VGT	VGT	TCI/VGT	TCI/VGT
Alternator	V-A	13.5-70	13.5-70	13.5-80	13.5-80	13.5-90	13.5-90	13.5-80	13.5-110	13.5-110	13.5-95	13.5-130	13.5-130	13.5-140	12-75	12-75	12-75	12-90	12-90	12-120	12-110
Starter Motor	V-kw	12-0.9	12-0.9	12-0.9	12-0.9	12-0.9	12-0.9	12-1.2	12-1.2	12-1.2	12-1.2	12-1.4	12-1.4	12-1.2	12-2.0	12-2.0	12-2.0	12-2.0	12-2.0	12-2.0	12-2.2
BSM(balance shaft module)		Non	Non	Non	Non	Non	Non	Non	BSM	BSM	BSM	Non	Non	Non	In Block	In Block	In Block	In Oil Pan	Non	Non	In Block
ETC(electronic throttle control)		Non	Non	Non	Non	Non	Non	Non	Non	ETC	Non	ETC	ETC	ETC	Non	Non	ECU CONTROL	ECU	ECU	ECU	ECU FUEL CONTROL
Timing Train		Belt	Belt	Belt	Belt	Chain	Chain	Belt	Chain	Chain	Chain	Chain	Chain	Belt	Belt	Belt	Belt	Chain	Chain	Belt	Chain

