ENGINE [SKYACTIV-G 2.5T]

id0100000002s4

Special Features

- For SKYACTIV-G 2.5T, the following has been implemented to lower fuel consumption.
  - — Sliding resistance*1 reduction
    - Rocker arm (with built-in needle roller bearing) adopted for cam-contact area
    - Reduced valve spring load
    - Narrowed down crankshaft journal
    - Optimized piston skirt shape
    - Lowered piston ring tension
    - Lowered drive belt tension
    - Suppressed chain tensioner load by stabilized timing chain behavior
    - Oil shower pipe adopted
  - — Mechanical resistance loss reduction
    - Optimized oil passage
    - Optimized oil pump shape
    - Engine oil variable control adopted
  - — Pumping loss*2 reduction
    - Variable valve timing mechanism adopted on both intake and exhaust sides for fine control of exhaust amount and internal EGR volume
  - — Weight reductions
    - Hard-plastic intake manifold adopted
    - Exhaust manifold integrated cylinder head adopted
  - — Heat loss reduction
    - Water jacket spacer adopted
  - — Cooling loss reduction in early stage of combustion
    - Piston cavity adopted
  - — Cooling efficiency improvement
    - Air seal cowl adopted
    - Optimized cooling fan shape
    - Optimized engine coolant passage
    - Optimized water pump impeller shape
  - — Combustion efficiency improvement
    - Multiple hole-type fuel injectors adopted
    - High-pressure fuel pump adopted
- The HLA has been adopted to achieve the maintenance-free valve clearance.
- 4-3-1 type exhaust passages have been adopted to improve the acceleration/environmental performance.
- L-jetronic*3 and D-jetronic*4 types have been adopted for the intake air amount measurement to achieve stable combustion free from abnormal combustion.
  - — MAF sensor adopted
  - — MAP sensor adopted
  - — IAT sensor No.1 and No.2 adopted
  - — Boost pressure sensor and boost air temperature sensor adopted
- An ejector which can recirculate the evaporative gas in all engine ranges (boost range from non-boost range) has been adopted to improve the emission performance.
- To improve the fuel economy and emission performance, an electric variable valve timing control has been adopted for the intake side, and a hydraulic variable valve timing control for the exhaust side. The electric type is adopted for the intake side to achieve expanded valve overlap and delayed closing of the intake valve (enlarged intake valve opening angle).

  Intake side: Electric variable valve timing control
  - — Intake CMP sensor adopted
  - — Electric variable valve timing motor/driver adopted
  - — Electric variable valve timing relay adopted

  Exhaust side: Hydraulic variable valve timing control
  - — Exhaust CMP sensor adopted
- Engine oil variable control has been adopted to reduce the oil pump operation load on the engine.
  - — Engine oil solenoid valve adopted
- With the adoption of fuel pump control, fuel pump consumption has been reduced to improve fuel economy.
  - — Fuel pump control module adopted
- Boost pressure control has been adopted to improve fuel economy/environmental performance/low-speed torque.
  - — Dynamic pressure turbo adopted
- Generator output control has been adopted to improve fuel economy/idling stability.
  - — A current sensor adopted (With i-stop system)

- An exhaust gas recirculation (EGR) system has been adopted to achieve cleaner exhaust emissions and improve fuel economy.
- To improve engine reliability, an ion sensor has been adopted which detects pre-ignition.
- LIN communication has been adopted to the current sensor to realize wiring harness simplification. (With i-stop system)
- i-stop control has been adopted to improve fuel efficiency, and reduce exhaust gas and idling noise. (With i-stop system)

*1 : Resistance (friction force) which occurs when objects slide. The larger the sliding resistance, the greater the energy loss.

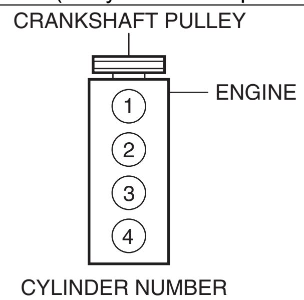
*2 : Energy loss due to resistance in each part during intake/exhaust process is called pumping loss.

*3 : The intake air amount is directly detected by measuring the amount of intake air flow using the MAF sensor.

*4 : The intake air amount is detected indirectly by measuring the intake manifold pressure (pressure between downstream of the turbocharger and intake manifold) using the MAP sensor and boost pressure sensor.

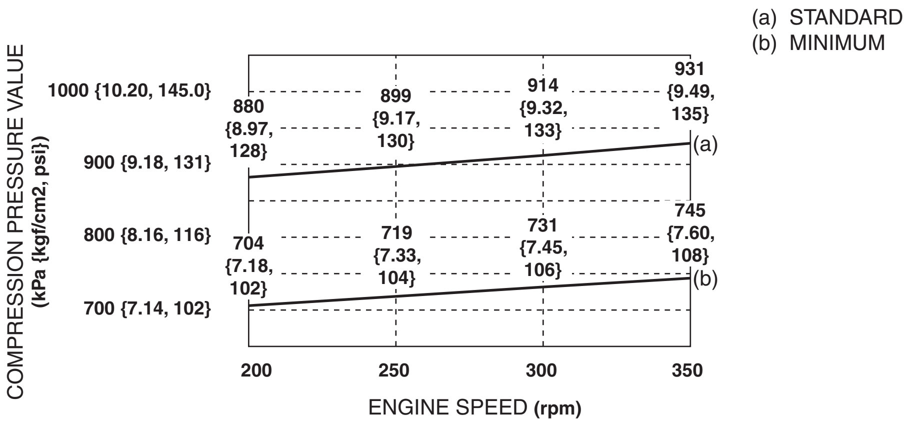
Specification

Item				Specification
MECHANICAL				
Type				Gasoline, 4-cycle
Cylinder arrangement and number				In-line, 4-cylinder
Combustion chamber				Pentroof
Valve system				DOHC, timing chain driven, 16 valves
Displacement			(ml {cc})	2,488 {2,488}
Bore × stroke			(mm {in})	89.0 × 100 {3.50 × 3.94}
Compression ratio				10.5:1
Valve timing	IN	Open	(°)	BTDC 50—ATDC 24
		Close	(°)	ABDC 26—ABDC 100
	EX	Open	(°)	BBDC 50—BBDC 5
		Close	(°)	ATDC 2—ATDC 47
LUBRICATION SYSTEM				
Type				Force-fed type
Oil pressure (reference value) [Oil temperature: 80—90 °C {176—194 °F}, coolant temperature: 80—90 °C {176—194 °F}]			(kPa {kgf/cm^2, psi} [rpm])	Lo: 135—165 {1.38—1.68, 19.6—23.9} [1,500] Hi: 225—275 {2.30—2.80, 32.7—39.8} [4,500]
Oil pump	Type			Vane pump type
Oil filter	Type			Full-flow
	Bypass pressure		(kPa {kgf/cm^2, psi})	140—180 {1.43—1.83, 20.4—26.1}
Oil capacity (approx. quantity)	Oil replacement		(L {US qt, Imp qt})	4.6 {4.9, 4.0}
	Oil and oil filter replacement		(L {US qt, Imp qt})	4.8 {5.1, 4.2}
	Total (dry engine)		(L {US qt, Imp qt})	5.9 {6.2, 5.2}
COOLING SYSTEM				
Type				Water-cooled, Electromotive
Water pump	Type			Centrifugal, V-ribbed belt-driven
Thermostat	Type			Wax type
	Opening temperature		(°C {°F})	Australian specs.: 86.5—89.5 {188—193} Except Australian specs.: 80.5—83.5 {177—182}
	Full-open temperature		(°C {°F})	Australian specs.: 100 {212} Except Australian specs.: 95 {203}
	Full-open lift		(mm {in})	8.5 {0.33} or more
Radiator	Type			Corrugated fin type
Cooling system cap	Valve opening pressure		(kPa {kgf/cm^2, psi})	93.2—122.6 {0.951—1.250, 13.6—17.7}
Cooling fan type	Type			Electric type
	Number of blades			Cooling fan No.1: 7 Cooling fan No.2: 10
	Outer diameter		(mm {in})	330 {13.0}
	Cooling fan motor output		(W)	413
FUEL SYSTEM				

Item			Specification
Fuel injector	Type		High resistance
	Fuel supply method		Top-feed
	Drive types		Electronic type
Fuel pressure		(kPa {kgf/cm^2, psi})	545—695 {5.56—7.08, 79.1—100.0}
Fuel pump	Type		Electric type
Fuel tank	Capacity	(L {US gal, Imp gal})	58 {15, 13}
EMISSION SYSTEM			
Catalyst	Type		WU-TWC (monolith) TWC (monolith)
EVAP control system	Type		Charcoal canister type
PCV system	Type		Closed type
CHARGING SYSTEM			
Battery	Voltage	(V)	12
	Type (with i-stop)		Q-85
	Type and capacity (without i-stop)	(A·h/20HR)	55D23L (55) 75D23L (65)
Generator	Output	(V-A)	12-150
IGNITION SYSTEM			
Ignition system	Type		SEI
	Spark advance		Electronic
	Firing order		1—3—4—2 (all cylinders independent firing) 
Spark plug	Type		PY8V-18-110
STARTING SYSTEM			
Starter	Type		Coaxial reduction
	Output	(kW)	1.4
CONTROL SYSTEM			
i-stop OFF switch			ON/OFF type switch
MAF sensor			Hot film
IAT sensor No.1			Thermistor
IAT sensor No.2			Thermistor
MAP sensor			Piezoresistance
TP sensor			Hall element
APP sensor			Electromagnetic induction action applied to non-contact type
CKP sensor			Magnetic resistance element
Intake CMP sensor			Magnetic resistance element
Exhaust CMP sensor			Magnetic resistance element
ECT sensor			Thermistor
BARO sensor			Piezoelectric element
High fuel pressure sensor			Distortion gauge
Low fuel pressure sensor			Semiconductor strain gauge
KS			Piezoelectric element
Current sensor			Voltage detecting area/Current detecting area/ Temperature detecting area
A/F sensor			Zirconium element
HO2S			Zirconia element
Boost pressure sensor			Piezoresistance
Boost air temperature sensor			Thermistor
Fuel temperature sensor			Thermistor
Exhaust gas pressure sensor			Piezoelectric element

Item	Specification
Engine oil temperature sensor	Thermistor
Engine oil pressure sensor	Semiconductor strain gauge
Wastegate valve position sensor	Hall element
Engine oil level sensor	Piezoelectric element
Power brake unit vacuum sensor	Piezoelectric element
Ion sensor	Ion detection circuit

Compression pressure



ac9uuw00006341

Engine oil

Item	Specifications
Grade	API SM/SN or ILSAC GF-4/GF-5
Viscosity (SAE)	0W-30, 5W-30, 10W-30

Engine coolant capacity (approx. quantity)

Item	Capacity
L.H.D.	8.5 L {9.0 US qt, 7.5 Imp qt}
R.H.D.	8.7 L {9.2 US qt, 7.7 Imp qt}

Fuel type

Fuel	Research Octane Number	Country
Premium unleaded fuel (Conforming to EN 228 and within E10)*1	95 or above	Tahiti, Vanuatu, Lebanon, Libya, Tunisia, Madagascar, Guatemala, Bolivia, Uruguay, Honduras, Nicaragua, Aruba, St. Martin
Regular unleaded fuel (Conforming to Fuel Quality Standards Act 2000)*2	90 or above	Australia, New Zealand, Myanmar, The Philippines, Marshall Islands, USTT, Syria, Jordan, Cameroon, Ivory Coast, Nigeria, Angola, Burundi, Gabon, Ghana, Chile, El Salvador, Costa Rica, Ecuador, Haiti, Colombia, Dominican Republic (L.H.D.), Panama, Peru, B. Virgin, Curacao

*1 : Europe
*2 : Australia