PRODEMAND

2014 Subaru Forester 2.0L Eng 2.0XT Premium

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Print Date: 17/01/2017

ENGINE - SPECS

COMMON SPECS & PROCEDURES

FORESTER COMMON SPECIFICATIONS & PROCEDURES

System		Specification/Procedure
Air Conditioning		
Service		SPECIFICATION
Torque		See Torque Specifications in text or applicable graphics under COMPONENT
Axle Shaft Nut (Front)		162 Ft. Lbs. (22.4 kgf-m, 220 N.m)
Axle Shaft Nut (Rear)		140 Ft. Lbs. (19.4 kgf-m, 190 N.m)
Battery		BATTERY
Brakes		
Bleeding Sequence		RR, LR, RF, LF AIR BLEEDING
Disc Brakes		
Front	FRONT DISC BRAKE ASSEMBLY	
Rear	REAR DISC BRAKE ASSEMBLY	
Torque		See Torque Specifications in text or applicable graphics under
Front	FRONT DISC BRAKE ASSEMBLY	
Rear	REAR DISC BRAKE ASSEMBLY	
Charging		
Generator		GENERATOR
Drive Belts		
Belt Routing & Adjustment		
H4DO	V-BELT	
H4DOTC		V-BELT

Engine Cooling		
H4DO		
General Service Specifications	SPECIFICATION	
Radiator Cap Pressure	14-18 psi (.95-1.25 kg/cm^2)	
Thermostat R & I	THERMOSTAT	
Water Pump R & I	WATER PUMP	
H4DOTC (Turbocharged)		
General Service Specifications		SPECIFICATION
Radiator Cap Pressure		14-18 psi (.95-1.25 kg/cm^2)
Thermostat R & I		THERMOSTAT
Water Pump R & I		WATER PUMP
Engine Mechanical		
Compression (at 200-300 RPM)		
H4DO		152-203 psi (1050-1400 kPa, 11-14 kgf/cm^2)
H4DOTC		142-171 psi (981-1177 kPa, 10-12 kgf/cm^2)
Oil Pressure		At Idle Speed: 7 psi (.5 kg/cm^2) or more At 6000 RPM: 51 psi (3.6 kg/cm^2 or more
Overhaul		
H4DO	PREPARATION FOR OVERHAUL	
H4DOTC	PREPARATION FOR OVERHAUL	
Torque		See Torque Specifications in text or applicable graphics under.
H4DO	ENGINE MECHANICAL (H4DO)	
H4DOTC	ENGINE MECHANICAL (H4DOTC)	
Fluid Specifications		See FLUIDS under MAINTENANCE tab. From within Manager or Service Writer, click the "30/60/90 Interval" or "Maint."

		button.
Flywheel/Flex Plate (Drive Plate) Torque		22.1 Ft. Lbs. (30 N.m) Plus additional 30-35 degrees
Fuel System		
Fuel Pressure Test Procedure		
H4DO	INSPECTION	
H4DOTC	INSPECTION	
Fuel Pressure Specification		49-58 psi (340-400 kPa)
Fuel Filter Location		In-Tank Type as part of Fuel Pump Module
Fuel Filter R & I		
H4DO	FUEL FILTER	
H4DOTC	FUEL FILTER	
Ignition		
Firing Order & Cylinder Identification		FIRING ORDER & CYLINDER IDENTIFICATION
Spark Plug		
H4DO		
Type		NGK: SILZKAR7B11
Gap		0.039-0.043 in. (1.0-1.1 mm)
Torque		12.9 Ft. Lbs. (17.5 N.m)
H4DOTC		
Type	NGK: ILKAR8H6	
Gap	0.020-0.022 in. (0.50-0.55 mm)	
Torque	12.9 Ft. Lbs. (17.5 N.m)	
Starting		
Starter		STARTER
Torque		INSTALLATION
Wheel Alignment		
Adjustment Specifications		
Front		WHEEL ALIGNMENT
Rear		WHEEL ALIGNMENT
Torque		

Front	FRONT SUSPENSION
Rear	REAR SUSPENSION
Wheel & Tire	
Wheel Lug Nut Torque	88.5 Ft. Lbs. (120 N.m)

SPECIFICATION [2.5 L Turbo Engine (FROM '10MY)]

The following shows the comparison between new and existing engines.

	New engine	Existing engine
Displacement	2.5 L	2.5 L
Engine	Longitudinally-positioned, horizontally opposed 4-cylinder	Longitudinally-positioned, horizontally opposed 4-cylinder
Transmission	6MT	5AT, 5MT, 6MT
Bore x stroke mm (in)	99.5 x 79.0 (3.917 x 3.110)	99.5 x 79.0 (3.917 x 3.110)
Total displacement cm^3 (cu in)	2, 457 (149.93)	2, 457 (149.93)
Valve driving method	DOHC + intake/exhaust AVCS	DOHC + exhaust AVCS
Compression ratio	8.4	8.4
Maximum output kW (HP)/rpm	198 (265)/5, 600	182 (243)/6, 000
Maximum torque N.m (kgf-m, ft-lb)/rpm	350 (35.7, 258)/2, 000 to 5, 200	327 (33.3, 241)/3, 600
Designated gasoline	93AKI	93AKI

SPECIFICATION [Connecting Rod]

Refer to "Cylinder Block" for removal and installation procedures of connecting rod.

< Ref. to REMOVAL , Cylinder Block. > < Ref. to INSTALLATION , Cylinder Block. >

SPECIFICATION [Piston]

Refer to "Cylinder Block" for removal and installation procedures of pistons. < Ref. to REMOVAL , Cylinder Block. > < Ref. to INSTALLATION , Cylinder Block. >

SPECIFICATION [General Description]

	Model		2.0 L
	Cylinder arrangement		Horizontally opposed, liquid cooled, 4-cylinder, 4-stroke gasoline engine
	Valve system mechanism		Chain driven, double overhead camshaft, 4-valve/cylinder
	Bore x Stroke	mm (in)	86.0 x 86.0 (3.39 x 3.39)

Engine	Displacement			cm^3 (cu in)	1, 998 (121.92)
	Compression ratio				10.6
	Compression pressure (at 200 - 300 RPM)		kPa (kg/cm^2 , psi)	Standard	1, 350 - 1, 750 (14 - 18, 196 - 254)
	Number of piston rings				Compression ring: 2 Oil ring: 1
	Intake valve timing	Open		Max. retard	ATDC 26°
				Min. advance	BTDC 42°
		Close		Max. retard	ABDC 82°
				Min. advance	ABDC 14°
	Exhaust valve timing	Open		Max. retard	BBDC 11°
				Min. advance	BBDC 66°
		Close		Max. retard	ATDC 55°
				Min. advance	ATDC 0°
	Cam clearance	mm (in)	Intake	Standard	$0.13^{+0.02}_{-0.03}$ ($0.0051^{+0.0008}_{-0.0012}$)
			Exhaust	Standard	0.22±0.02 (0.0087±0.0008)
	Idle RPM (select lever in "P" or "N" range)	RPM	No load	Standard	700±100
			A/C ON	Standard	700 - 835±50
	Ignition order				1 → 3 → 2 → 4
	Ignition timing		BTDC/RPM	Standard	10°±10°/700

NOTE: OS: Oversize US: Undersize

	Bending				mm (in)	Limit	0.020 (0.00079)
			Intake	Valve drive section		Standard	40.77 - 40.87 (1.605 - 1.609)

Camshaft	Cam lobe height	mm (in)	Fuel pump drive section		Standard	41.97 - 42.03 (1.652 - 1.655)
			Exhaust		Standard	40.72 - 40.82 (1.603 - 1.607)
	Cam base circle diameter			mm (in)	Standard	34.0 (1.339)
	Journal outer diameter			mm (in)	Standard	25.946 - 25.963 (1.0215 - 1.0222)
	Thrust clearance			mm (in)	Standard	0.068 - 0.116 (0.0027 - 0.0047)
	Oil clearance			mm (in)	Standard	0.037 - 0.072 (0.0015 - 0.0028)
Cylinder head	Warpage (mating surface with cylinder block)			mm (in)	Limit	0.035 (0.0014)
	Grinding limit				mm (in)	To 98.4 (3.874)
	Height			mm (in)	Standard	98.5 (3.878)
Valve & valve guide	Valve overall length	mm (in)		Intake		103.3 (4.067)
				Exhaust		95.45 (3.758)
	Valve head edge thickness	mm (in)	Intake		Standard	0.8 - 1.2 (0.031 - 0.047)
			Exhaust		Standard	1.0 - 1.4 (0.039 - 0.055)
	Valve stem outer diameter	mm (in)	Intake		Standard	5.455 - 5.470 (0.2148 - 0.2154)
			Exhaust		Standard	5.445 - 5.460 (0.2144 - 0.2150)
						5.500 -

	Valve guide inner diameter		mm (in)	Standard	5.512 (0.2165 - 0.2170)
	Clearance between valve and valve guide	mm (in)	Intake	Standard	0.030 - 0.057 (0.0012 - 0.0022)
			Exhaust	Standard	0.040 - 0.067 (0.0016 - 0.0026)
	Valve guide protrusion amount		mm (in)	Standard	11.4 - 11.8 (0.449 - 0.465)
Valve & valve shim	Valve stem end outer diameter	mm (in)	Intake	Standard	5.455 - 5.470 (0.2148 - 0.2154)
			Exhaust	Standard	5.445 - 5.460 (0.2144 - 0.2150)
	Valve shim inner diameter		mm (in)	Standard	5.500 - 5.560 (0.2165 - 0.2189)
	Clearance between valve and valve shim	mm (in)	Intake	Standard	0.030 - 0.105 (0.0012 - 0.0041)
			Exhaust	Standard	0.040 - 0.115 (0.0016 - 0.0045)
Valve seat	Seating width between valve and valve seat	mm (in)	Intake	Standard	0.8 - 1.6 (0.031 - 0.063)
			Exhaust	Standard	1.1 - 1.7 (0.043 - 0.067)
	Seating angle between valve and valve seat				45°
	Seating position between valve and valve seat				Valve face center

Valve spring	Free length			mm (in)	Standard	44.03 (1.733)
	Tension/spring height	N (kgf, lb)/mm (in)		Set	Standard	182 - 210 (18.56 - 21.41, 40.92 - 47.22)/33.0 (1.299)
				Lift	Standard	440 - 486 (44.87 - 49.56, 98.93 - 109.27)/22.0 (0.866)
Cylinder block & piston	Cylinder block Squareness warpage (Mating surface with cylinder head)			mm (in)	Standard Limit	2.5°, 1.9 mm (0.075 in) 0.025 (0.00098) or less
	Grinding limit of cylinder block				mm (in)	To 204.9 (8.067)
	Height of cylinder block			mm (in)	Standard	205.0 (8.071)
	Inner diameter of cylinder liner	mm (in)	Cylinder bore size mark A		Standard	86.005 - 86.015 (3.3860 - 3.3864)
			Cylinder bore size mark B		Standard	85.995 - 86.005 (3.3856 - 3.3860)
	Cylindricality of cylinder liner			mm (in)	Limit	0.03 (0.0012)
	Out-of-roundness of cylinder liner			mm (in)	Limit	0.010 (0.0004)
	Piston grade point				mm (in)	40.0 (1.57)
		mm (in)	Standard Size	Grade A	Standard	85.985 - 85.995 (3.3852 - 3.3856)
				Grade B	Standard	85.975 - 85.985

	Piston outer diameter					(3.3848 - 3.852)
				0.25 (0.0098) OS	Standard	86.225 - 86.245 (3.3947 - 3.3955)
				0.50 (0.0197) OS	Standard	86.475 - 86.495 (3.4045 - 3.4053)
	Clearance between cylinder liner and piston			mm (in)	Standard	0.010 - 0.030 (0.00039 - 0.00118)
	Inner diameter of cylinder liner boring limit (diameter)			mm (in)		To 86.505 (3.4057)
Piston and piston pin						Piston pin must be fitted into position with thumb at 20°C (68°F).
	Degree of fit					
	Clearance between piston and piston pin			mm (in)	Standard	0.004 - 0.008 (0.0002 - 0.0003)
Piston ring	Closed gap	mm (in)	Compression ring	Top ring	Standard	0.20 - 0.25 (0.0079 - 0.0098)
				Second ring	Standard	0.40 - 0.50 (0.0157 - 0.0197)
			Oil ring (Upper rail and lower rail)		Standard	0.10 - 0.35 (0.0039 - 0.0138)
	Clearance between compression ring and piston			mm (in)	Top ring	Standard	0.040 - 0.080 (0.0016 - 0.0031)
					Second ring	Standard	0.045 - 0.085 (0.0018 - 0.0033)
	Bend or twist per 100 mm (3.94 in) in			mm (in)	Limit	0.10 (0.0039)

	length					
	Thrust clearance			mm (in)	Standard	0.070 - 0.330 (0.0028 - 0.0130)
Connecting rod and connecting rod bearing	Connecting rod bearing thickness (at center)	mm (in)			Standard	1.492 - 1.508 (0.0587 - 0.0594)
				0.03 (0.0012) US	Standard	1.511 - 1.515 (0.0595 - 0.0596)
				0.05 (0.0020) US	Standard	1.521 - 1.525 (0.0599 - 0.0600)
				0.25 (0.0098) US	Standard	1.621 - 1.625 (0.0638 - 0.0640)
	Oil clearance			mm (in)	Standard	0.025 - 0.055 (0.0010 - 0.0022)
Piston pin & connecting rod bushing	Clearance between piston pin and connecting rod bushing			mm (in)	Standard	0.004 - 0.026 (0.0002 - 0.0010)
	Bending			mm (in)	Limit	0.035 (0.0014)
	Crankshaft pin Crankshaft journal	Cylindricality		mm (in)	Limit	0.006 (0.0002)
		Out-of-roundness		mm (in)	Limit	0.049 - 0.726 (0.0019 - 0.0286)
		Out-of-roundness		mm (in)	Limit	0.006 (0.0002)
						49.976 -

Crankshaft and crankshaft bearing	Crankshaft pin outer diameter	Grinding limit (dia.)	mm (in)		Standard size	Standard	50.000 (1.9676 - 1.9685)
					0.03 (0.0012) US	Standard	49.946 - 49.970 (1.9664 - 1.9673)
					0.05 (0.0020) US	Standard	49.926 - 49.950 (1.9656 - 1.9665)
					0.25 (0.0098) US	Standard	49.726 - 49.750 (1.9577 - 1.9587)
	Crankshaft journal outer diameter		mm (in)		Standard size	Standard	67.985 - 68.009 (2.6766 - 2.6775)
					0.03 (0.0012) US	Standard	67.955 - 67.979 (2.6754 - 2.6763)
					0.05 (0.0020) US	Standard	67.935 - 67.959 (2.6746 - 2.6755)
					0.25 (0.0098) US	Standard	67.735 - 67.759 (2.6667 - 2.6677)
				#1, #2, #3, #4	Standard size	Standard	2.495 - 2.513 (0.0982 - 0.0989)
					0.03 (0.0012) US	Standard	2.519 - 2.522 (0.0992 - 0.0993)
					0.05 (0.0020) US	Standard	2.529 - 2.532 (0.0996 - 0.0997)
					0.25 (0.0098) US	Standard	2.629 - 2.632

	Crankshaft bearing thickness (at center)	mm (in)				(0.1035 - 0.1036)
			#5	Standard size	Standard	2.493 - 2.511 (0.0981 - 0.0989)
				0.03 (0.0012) US	Standard	2.517 - 2.520 (0.0991 - 0.0992)
				0.05 (0.0020) US	Standard	2.527 - 2.530 (0.0995 - 0.0996)
				0.25 (0.0098) US	Standard	2.627 - 2.630 (0.1034 - 0.1035)
	Thrust clearance			mm (in)	Standard	0.130 - 0.308 (0.00512 - 0.0121)
	Oil clearance			mm (in)	Standard	0.013 - 0.031 (0.00051 - 0.00122)

NOTE: OS: Oversize US: Undersize

SPECIFICATION [Intake And Exhaust Valve]

Refer to "Cylinder Head" for removal and installation procedures of the intake and exhaust valves. < Ref. to REMOVAL , Cylinder Head. > < Ref. to INSTALLATION , Cylinder Head. >

SPECIFICATION [Crankshaft]

Refer to "Cylinder Block" for removal and installation procedures of the crankshaft. < Ref. to REMOVAL , Cylinder Block. > < Ref. to INSTALLATION , Cylinder Block. >