

1100 Overview of Technical Data

Compression pressure setpoint value	
	min. 16 bar

Engine oil B47D20U1 / B47D20O1 / B47D20T1	
	Filling capacity, engine oil change with oil filter element 5,5 l



Oil quantity between the two markings MIN and MAX of the oil dipstick

1.0 l

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1100 Overview of tightening torques

Engine fixture to engine fixture		
M10	Tightening torque	100Nm
Engine fixture to engine support arm		
Hexagon screws from special tool set	Tightening torque	105Nm
Engine support arm on the assembly stand		
M14 x 95	Tightening torque	130Nm
Special tool 2 455 010 to crankcase		
M10x30	Tightening torque	38Nm
Special tool to cylinder head		
M8	Tightening torque	21,5Nm
Special tool to cylinder head		
M8	Tightening torque	21,5Nm
Standard screw connection 4 Nm		
Oval-head screw	Tightening torque	4Nm
Standard screw connection M10		
M10		38Nm
Standard screw connection M5		
M5		5Nm
Standard screw connection M6		
M6	Tightening torque	8Nm
Standard screw connection M7		
M7		13Nm
Standard screw connection M8		
M8	Tightening torque	19Nm



Standard screw connection hose clamp 5

Hose clamp L12 - L15

Tightening torque

1,25Nm

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1111 Overview of Technical Data

Cylinder bore	
	Diameter of cylinder bore
	84,00 mm ... 84,018 mm
	Permitted irregularity of the cylinder bore
	0.01 mm
	Permitted conicity of the cylinder bore
	0.01 mm

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1111 Overview of tightening torques

Bearing journal of tensioning and guide rail		
M8	Replace bearing journal. Tightening torque	20Nm
Main bearing cap to crankcase		
M10x85 Replace screws.	1. Tightening torque	25Nm
	2. Tightening torque	50Nm
	3. Angle of rotation	60°
	4. Angle of rotation	60°
Oil deflector to crankcase		
M8x14	Tightening torque	19Nm
Oil deflector to crankshaft bearing cap		
M8x14 Replace screws.	Tightening torque	35Nm
	Slacken	180°
	Tightening torque	15Nm
	Angle of rotation	45°
Special tool 11 8 930 to special tool 00 2 300		
M14x35		160Nm
Special tool 11 8 930 to special tool 00 2 320		
M14x35	Tightening torque	160Nm
Special tool 2 413 082 to special tool 00 2 320		
M12x65	Tightening torque	100Nm
Special tool/holder to crankcase		
M10x35		40Nm



1112 Overview of Technical Data

Check for cylinder head watertightness

Temperature of the cylinder head

60 °C

Check for cylinder head watertightness

Testing pressure

max. 3,0 bar

Cleaning the intake ports

Blast duration with walnut granules

Approx. 20 s

Blast duration with pure compressed air for the complete blowing out of walnut granules

Approx. 10 s

Cleaning the intake ports

Operating pressure

6 bar ... 8 bar

Cross deviation from flatness

max. 0,05 mm

Cylinder head flatness

Maximum lengthwise deviation from flatness

0.10 mm

Maximum transverse deviation from flatness

0.05 mm

Longitudinal deviation from flatness

max. 0,10 mm



Selecting the cylinder head gasket

A decision is made to determine which cylinder head gasket must be used based on the measuring result of the measurement of the piston protrusion.

Cylinder head gasket with number of holes 1

0 mm ... 0.90 mm

Cylinder head gasket with number of holes 2

0.91 mm ... 1.03 mm

Cylinder head gasket with number of holes 3

1.04 mm ... 1.18 mm

Valve underprotrusion

0.8 (0.7 - 0.9) mm

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1112 Overview of tightening torques

Bearing journal to cylinder head		
M16x1.5 Replace bearing journal.	Tightening torque	20Nm
Cylinder head bolt to timing case cover		
M8x40	Tightening torque	19Nm
Cylinder head cover to cylinder head		
M6	Tightening torque.	8,5Nm
Cylinder head to crankcase		
M12x1.5 Renew screws.	1. Tightening torque	50Nm
	2. Angle of rotation	120°
	3. Angle of rotation	120°
Cylinder head to special tool		
Special tool	Tightening torque	25Nm
Flange to assembly stand		
M14X30	Tightening torque	135Nm
Flange to assembly stand		
M14X30	Tightening torque	135Nm
Ground to cylinder head		
M6	Tightening torque	8Nm
Special tool to cylinder head		
Special tool	Tightening torque	20Nm
Special tool 00 2 320 to special tool 00 2 300		
M14X95	Tightening torque	130Nm



1113 Overview of Technical Data

Height of the sealing bead	
	2,0 mm ... 2,5 mm

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1113 Overview of tightening torques

Oil drain plug

M12x16
Replace sealing ring.

Tightening torque

25Nm

Oil drain plug

M12x16
Renew the sealing ring.

Tightening torque

25Nm

Oil sump to crankcase

M8x30

Tightening torque

24Nm

M8x110

Tightening torque

24Nm

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1114 Overview of Technical Data

Processing time of liquid sealing compound	
	< 12 min

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1114 Overview of tightening torques

Rear timing case cover to crankcase

M6
Renew screws.

Tightening torque 8Nm

Angle of rotation 1 45°

Angle of rotation 2 45°

Spacer bolt for mounting the acoustic cover

M8x12

Tightening torque 12Nm

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1115 Overview of Technical Data

Differential pressure between ambient pressure and engine internal pressure	
	Nominal value
	0 (-15 - +30) mbar

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1116 Overview of tightening torques

Component carrier to crankcase		
M8x35	Tightening torque	19Nm
	Angle of rotation	45°

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11 21 Crankshaft and Bearings

Tightening Torques

	Type	Thread	Tightening specification	Torque
1AZ Increment wheel on crankshaft	S54	M5 10.9	Replace screws Jointing torque Torque angle	5.0 Nm 45 °
Increment wheel on crankshaft		M5 10.9	Replace screws	13 Nm
Increment wheel on crankshaft		M5 8.8	Replace screws	5.5 Nm

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1121 Overview of Technical Data

Axial play of crankshaft	
	Equipment installation status
	0,090 mm ... 0,273 mm
	Operating condition
	0,11 mm ... 0,314 mm

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Maximum permitted torque of the crankshaft	
	max. 2 Nm



1122 Overview of tightening torques

Flywheel to crankshaft

M12x1.5
Renew screws.

Tightening torque

45Nm

Angle of rotation

45°

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1123 Overview of tightening torques

Vibration damper with belt pulley to crankshaft

M10x65
Renew screws.

Jointing torque

40Nm

Angle of rotation

120°

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1124 Overview of tightening torques

Connecting rod bearing cap to connecting rod

M9x47

Renew screws.

Tightening torque	20Nm
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1. Angle of rotation	70°
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2. Angle of rotation	70°
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1125 Overview of Technical Data

End clearance of the piston rings

Before measuring the end clearance, make sure the cylinder is within the permissible tolerance.

End clearance of the plain rectangular compression ring

0,13 mm ... 0,17 mm

End clearance of the taper faced piston ring

0,0045 mm ... 0,12 mm

End clearance of the oil scraper ring with spiral expander

cannot be measured

Piston diameter

Measure the piston diameter at distance (A) from the lower end of the piston skirt.

Distance (A) to the lower end of the piston skirt

17 mm

Nominal dimension of piston diameter

83,936 mm ... 83,954 mm



Side clearance of piston rings

Clean all components before measuring the side clearance.

Side clearance of the plain rectangular compression ring

0,17 mm ... 0,27 mm

Side clearance of the taper faced piston ring

0.30 mm ... 0.50 mm

Side clearance of the oil scraper ring with spiral expander

0.2 mm ... 0.4 mm



1127 Overview of tightening torques

Gear to counterbalance shaft		
M10 Renew screws.	1. Jointing torque	20Nm
	2. Angle of rotation	180°
Idler gear to crankcase		
M12	Tightening torque	70Nm
Idler gear to crankcase		
M12x1.5	Tightening torque	10Nm
	Angle of rotation	45°
Special tool 2 288 054 to crankshaft		
	Tightening torque	20Nm
Special tool 2 288 054 to crankshaft		
M10	Tightening torque	20Nm



1128 Overview of tightening torques

Belt tensioner for drive belt			
M8x30		Tightening torque	28Nm

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1130 Overview of tightening torques

SWZ2249117		
Screw M6	Tightening torque	10Nm

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1131 Overview of tightening torques

Camshaft carrier to cylinder head		
M7x35	Tightening torque	13Nm
Camshaft sprocket to camshaft		
M7x17.		17Nm
Chain tensioner piston to cylinder head		
22 x 1.5 Replace sealing ring, oil thread.	Tightening torque	70Nm
Coolant line to crankcase		
M6X16	Tightening torque	8Nm
Holder to crankcase		
M8X16	Tightening torque	19Nm
Hydraulic chain tensioner to crankcase		
M6x22	Tightening torque	9Nm
Intake and exhaust camshaft in camshaft support		
M6x31	Tightening torque	10Nm
Preload timing chain		
	Tightening torque	0,6Nm
Pressing the timing chain with special tool 2 354 962		
Spindle The torque must not be exceeded.		20Nm



1141 Overview of tightening torques

Camshaft sprocket to oil vacuum pump		
M8x35 Left-hand thread	Renew screws.	
	Jointing torque	5Nm
	Angle of rotation	90°
Hydraulic valve to crankcase		
M6 x 18	Tightening torque	8Nm
Intake pipe to oil vacuum pump		
M6x25	Tightening torque	8Nm
Oil vacuum pump to crankcaseB47		
M8x35 Renew screw.	Tightening torque	15Nm
	Angle of rotation	45°



1142 Overview of tightening torques

Central piston cooling valve to crankcase		
M6x16	Tightening torque	8Nm
Full-flow oil filter to crankcase		
M6 Observe tightening sequence.	Jointing torque	4Nm
	Tightening torque	10Nm
Oil feed line for the exhaust turbocharger high-pressure stage		
Hollow bolt	Jointing torque	10Nm
	Angle of rotation	70°
Oil feed line on cylinder head		
M6x12	Tightening torque	8Nm
Oil feed line on cylinder head		
M6x12	Tightening torque	8Nm
Oil feed line to bracket		
Torx screw M6x12	Tightening torque	8Nm
Oil feed line to exhaust turbocharger		
Hollow bolt Renew the bolt and sealing rings.	Jointing torque	10Nm
	Angle of rotation	70°
Oil feed line to exhaust turbocharger		
Hollow bolt Renew the bolt and sealing rings.	Jointing torque	10Nm
	Angle of rotation	70°
Oil feed line to exhaust turbocharger		
Hollow bolt Renew sealing rings.	Jointing torque	10Nm
	Angle of rotation	45°



Oil filter cover to oil filter module

O-ring lightly oiled.	Initial tightening torque	25Nm
	Disassembly procedure	180°
	Tightening torque	25Nm

Oil filter cover to oil filter module

O-ring lightly oiled.	Tightening torque	25Nm
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Oil return line to crankcase

M6x12	Tightening torque	8Nm
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Oil return line to crankcase

M6x12 Check gasket. Renew the seal or line if necessary.	Tightening torque	8Nm
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Oil return line to turbocharger

M6x12	Tightening torque	8Nm
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Oil return line to turbocharger

M6x12	Tightening torque	8Nm
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Oil return line to turbocharger

M6x12 Renew gasket.	Tightening torque	8Nm
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Special tool to measure the pressure on the oil filter module

O-ring lightly oiled.	Tightening torque	25Nm
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1143 Overview of tightening torques

Guide tube for oil dipstick on engine		
M8x16	Tightening torque	19Nm

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1151 Overview of Technical Data

Height of the sealing bead	
	2,0 mm ... 2,5 mm

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1151 Overview of tightening torques

Coolant pump/wiring harness to component carrier		
M6x20	Tightening torque	8Nm

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11 52 Fan
Tightening Torques

	Type	Thread	Tightening specification	Torque
1AZ Fan clutch on water pump Coupling nut (left-hand threads)	All			40 Nm
	M54			45 Nm
2AZ Fan to fan clutch	All			10 Nm

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1153 Overview of tightening torques

Connecting branch on crankcase		
M6x25		10Nm
Connecting branch to component carrier		
M6x20	Tightening torque	8Nm
Connecting branch to engine block		
M6x25	Tightening torque	8Nm
Coolant lines for SCR metering module		
M6X16	Tightening torque	8Nm
Coolant thermostat to cylinder head		
M6x30	Tightening torque	8Nm
SCR coolant lines to crankcase end cover		
Hexagon screw M6x16	Tightening torque	8Nm
Thermostat housing to component carrier		
M6	Tightening torque	8Nm



11 61 Intake manifold

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Intake manifold to cylinder head	All	M8		22 Nm
	All	M7		15 Nm
	All	M6		10 Nm
2AZ Sound absorption cover to holder	M60/1 / M60/2 / M62	M6		8 Nm
3AZ Throttle valve to intake manifold	N73	M6x60/ M6x80		8 Nm

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1161 Overview of Technical Data

Cleaning agent	
Universal cleaner must be diluted with water.	Washer fluid
	2 parts water, 1 part universal cleaner

Cleaning the intake plenum	
	Soaking time of the cleaning agent
	1 h

Walnut granules	
	Quantity for each blasting process
	2 l

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1161 Overview of tightening torques

Exhaust-gas recirculation cooler to intake plenum		
	Tightening torque	10Nm
Intake plenum to cylinder head		
M6	Tightening torque	11Nm
Swirl-flap controller to intake plenum		
M6 x 16 Tighten the bolts in alternating order until flush.		4Nm
Swirl-flap controller to intake plenum		
6x20 self-tapping	Tightening torque	6,5Nm



1162 Overview of tightening torques

Heat shield of exhaust manifold

Hexagon screw M8x16

Tightening torque

19Nm

Heat shield to exhaust manifold

M6x12

Tightening torque

10Nm

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1165 Overview of tightening torques

Bypass flap to high-pressure stage exhaust turbocharger		
M6	Tightening torque	8Nm
Connecting pipe to bypass flap		
M6	Tightening torque	8Nm
Connecting pipe with bypass flap to exhaust turbocharger low-pressure stage / high-pressure stage		
M6	Tightening torque	8Nm
Electric changeover valve to intake plenum		
TS6x20	Tightening torque	5Nm
Exhaust turbocharger low-pressure stage to crankcase		
M8X16	Tightening torque	22Nm
Exhaust turbocharger to exhaust manifold		
V-band clamp	Tightening torque	19Nm
Exhaust turbocharger to panel holder for support to crankcase		
Hexagon screw M8x16	Tightening torque	22Nm
High-pressure stage exhaust turbocharger to exhaust manifold		
M8x20	Tightening torque	25Nm
Holder to exhaust turbocharger and crankcase		
M8x16	Tightening torque	22Nm
Holder to exhaust turbocharger and crankcase		
M8x16	Tightening torque	22Nm
Vacuum reservoir to crankcase		
M6X25	Tightening torque	8Nm
Vacuum unit to compressor bypass flap		
Screw	Tightening torque	3,8Nm



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1166 Overview of tightening torques

Vacuum line for oil vacuum pump to crankcase		
M6x22	Tightening torque	10Nm

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1171 Overview of tightening torques

Exhaust gas recirculation module to exhaust manifold		
M8x28		32Nm
Exhaust-gas recirculation cooler to cylinder head		
M8x20 / M8x28	Tightening torque	19Nm
Exhaust-gas recirculation cooler to cylinder head		
M8x20 / M8x28	Tightening torque	5Nm
	Release angle	90°
Exhaust-gas recirculation cooler to cylinder head		
M8x28 / M8x20 Renew screws.	Tightening torque	19Nm
Exhaust-gas recirculation cooler to exhaust manifold		
M8x28 Replace screws	Tightening torque	32Nm
Exhaust-gas recirculation valve to exhaust-gas recirculation cooler		
M6		13Nm



11 78 Emissions-control, Lambda oxygen sensor

Tightening Torques

	Type	Thread	Tightening specification	Torque
1AZ Oxygen control sensor; oxygen monitor sensor	All	M18 x 1.5		50 Nm

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1179 Overview of tightening torques

Heat shield to cylinder head		
M8X16	Tightening torque	10Nm

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11 operating fluid overview

Testing equipment

Connecting hose
Ä = 8 x 13 mm, length = 70 mm

Expendable materials

lubricating grease Longtime PD -1	400 g, Cartridge	83192160340
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[Overview of consumables \(Electronic Parts Catalogue\)](#)

Expendable materials

Copper paste	100 g, Tube	81229400794
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[Overview of consumables \(Electronic Parts Catalogue\)](#)

Engine oil

Technically suitable engine oils for BMW Group engines

[3.0 Technically appropriate engine oils for BMW Group engines](#)

Engine oil

Technically suitable engine oils for BMW Group engines

[3.0 Specified engine oils for Toyota J29](#)

Sealing compound

Sealant Drei Bond 1209	30 ml, Tube	07 58 9 062 376
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Expendable materials

Brake cleaner2.0	500 ml, Spray can	83192365214
	20 , Canister	83192365215

Expendable materials

Exhaust turbocharger additive	20 g, Tube	83192362168
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Expendable materials

Exhaust turbocharger additive, petrol MSP	17 ml, Tube	83192457276
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Expendable materials

High-temperature assembly paste	10 g, Tube	83230309003
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Sealing compound



Loctite No. 270	10 ml, Bottle	83192210337
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[Overview of consumables \(Electronic Parts Catalogue\)](#)

Engine oil

Technically suitable engine oils for Toyota engines	
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[3.0 Technically suitable engine oils for Toyota J29](#)

Sealing compound

Loctite 5970 liquid sealing compound Processing time <10 minutes at room temperature	50 ml, Cartridge	83190404517
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[Overview of consumables \(Electronic Parts Catalogue\)](#)

Expendable materials

Lubricating grease SYNTHESO GLEP 1	100 g, Tube	83239407778
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[Overview of consumables \(Electronic Parts Catalogue\)](#)

