

1100 Overview of Technical Data

Compression pressure setpoint value	
	min. 16 bar

Engine oil B57D30O0/B57D30S0	
	Capacity of engine oil
	6,50 l

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
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		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

1111 Overview of Technical Data

Cylinder bore	
	Diameter of cylinder bore
	84,00 mm ... 84,02 mm
	Permitted irregularity of the cylinder bore
	0,01 mm
	Permitted conicity of the cylinder bore
	0,01 mm

1111 Overview of tightening torques

Main bearing cap to crankcase			
M10x85 Replace screws.	1. tightening torque		25Nm
	2. tightening torque		50Nm
	3. Angle of rotation		60째
	4. Angle of rotation		60째
Oil deflector to crankcase			
M8x14	Tightening torque		19Nm
Oil deflector to crankshaft bearing cap			
M8x14 Replace screws.	Tightening torque		35Nm
	Release		180째
	Tightening torque		15Nm
	Angle of rotation		45째

1112 Overview of Technical Data

Check for cylinder head watertightness	
	Temperature of the cylinder head
	60 Å°C

Check for cylinder head watertightness	
	Testing pressure
	max. 3,0 bar

Cleaning the intake ports	
	Operating pressure
	6 bar ... 8 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

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 ... 0,92 mm

Cylinder head gasket with number of holes 2

0,93 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

1112 Overview of tightening torques

Cylinder head cover to cylinder head			
M6x27		Tightening torque	10Nm
Cylinder head to crankcase			
M12x1.5x200 Renew screw.		Jointing torque	50Nm
Jointing torque and angle of rotation must be observed without fail.		Angle of rotation	120°
For each pass, proceed from screw to screw in the correct order.		Angle of rotation	120°
Cylinder head to crankcase and to timing case cover			
M8x40		Tightening torque	19Nm
Cylinder head to panel for watertightness check			
M10x100		Tightening torque	35Nm
Flange to assembly stand			
M14X30		Tightening torque	135Nm
Ground to cylinder head			
M6		Tightening torque	8Nm
Oil filler neck on cylinder head cover			
TS5x20		Tightening torque	3,6Nm
Top guide rail to cylinder head			
M10x32 Replace screw.		Tightening torque	20Nm

1113 Overview of tightening torques

Oil drain plug			
M12x16 Replace sealing ring.		Tightening torque	25Nm
Oil sump on crankcase and control housing lid			
M8x30		Tightening torque	24Nm
M8x110		Tightening torque	24Nm

1114 Overview of Technical Data

Height of the sealing bead	
	1,5 mm ... 2,0 mm

Processing time of liquid sealing compound	
	< 12 min

1114 Overview of tightening torques

Fuel line holder to timing case cover			
M6x16		Tightening torque	8Nm
Timing case cover to crankcase			
M6x31 Renew screw.		Tightening torque	8Nm
		Angle of rotation	90°
Transmission oil-to-coolant heat exchanger holder to timing case cover			
M6x33		Tightening torque	8Nm

1115 Overview of Technical Data

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

11 21 Crankshaft and Bearings

Tightening Torques

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

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

Maximum permitted torque of the crankshaft	
	max. 2 Nm

Maximum permitted torque of the crankshaft	
	max. 2 Nm

1122 Overview of tightening torques

Flywheel to crankshaft (automatic)			
M12x1.5x25.5 Replace screw.		Tightening torque	120Nm

1123 Overview of tightening torques

Vibration damper with belt pulley to crankshaft		
M10x65 Renew screws.	Jointing torque	40Nm
	Angle of rotation	120°

1124 Overview of tightening torques

Connecting rod bearing cap to connecting rod		
M9x47 Replace screws.	Tightening torque	20Nm
	Angle of rotation	70°

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
	0,15 mm ... 0,25 mm
	End clearance of the taper faced piston ring
	0,7 mm ... 0,9 mm
	End clearance of the oil scraper ring with spiral expander
	0,25 mm ... 0,45 mm

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
	15 mm
	Nominal dimension of piston diameter
	83,943 mm ... 83,957 mm

Side clearance of piston rings

Clean all components before measuring the side clearance.

Side clearance of the plain rectangular compression ring

0,11 mm ... 0,15 mm

Side clearance of the taper faced piston ring

0,07 mm ... 0,11 mm

Side clearance of the oil scraper ring with spiral expander

0,03 mm ... 0,07 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

1128 Overview of tightening torques

Belt tensioner for drive belt		
M8x30	Tightening torque	28Nm

1130 Overview of tightening torques

SWZ2249117		
Screw M6	Tightening torque	10Nm

1131 Overview of tightening torques

Camshaft carrier to cylinder head		
M7x35 Observe tightening sequence.	Tightening torque	13Nm
Camshaft sprocket to intake camshaft		
M7x17.	Tightening torque	17Nm
Chain tensioner piston to cylinder head		
M22x1.5 Grease thread with engine oil.	Tightening torque	70Nm
Guide rail and tensioning rail to crankcase		
M8x15 Renew screw.	Tightening torque	20Nm
Hydraulic chain tensioner to crankcase		
M6x22	Tightening torque	9Nm
Intake camshaft bearing cap and exhaust camshaft bearing cap to camshaft support		
M6x31 Observe tightening sequence.	Tightening torque	9,9Nm
Preload timing chain		
	Tightening torque	0,6Nm

1141 Overview of tightening torques

Hydraulic valve for oil pressure control to crankcase		
M6x18	Tightening torque	8Nm
Intake pipe to oil vacuum pump		
M6x25	Tightening torque	8Nm
Oil vacuum pump to crankcase		
M8x35	Tightening torque	19Nm
Sprocket to oil pump		
M8 Renew screw. Left-hand thread!	Tightening torque	5Nm
	Angle of rotation	90°

1142 Overview of tightening torques

Central piston cooling control valve to crankcase		
M6x16	Tightening torque	8Nm
Central piston cooling shift valve to crankcase		
M6x16	Tightening torque	8Nm
Full-flow oil filter to crankcase		
M6x49.5 Observe tightening sequence.	Jointing torque	4Nm
	Tightening torque	10Nm
Oil feed line to crankcase		
M6x12	Tightening torque	8Nm
Oil feed line to exhaust turbocharger		
Banjo bolt M10x19 Renew gaskets!	Tightening torque	10Nm
	Angle of rotation	45°
Oil filter cover to oil filter module		
O-ring lightly oiled.	Tightening torque	25Nm
Oil return line to crankcase		
M6x12 Renew the sealing ring.	Tightening torque	8Nm
Oil return line to turbocharger		
M6x12	Tightening torque	8Nm
Special tool to measure the pressure on the oil filter module		
O-ring lightly oiled.	Tightening torque	25Nm

1144 Overview of tightening torques

Engine oil coolant heat exchanger to full-flow oil filter		
M6x16 Observe tightening sequence. 2 Perform passes.	Jointing torque	10Nm
	Tightening torque	10Nm

1151 Overview of Technical Data

Height of the sealing bead	
	2,0 mm ... 2.5 mm

1151 Overview of tightening torques

Belt pulley to coolant pump			
M6x16		Tightening torque	8Nm
Component carrier to crankcase			
M8x35		Tightening torque	19Nm
Connecting branch to component carrier			
M6x16		Tightening torque	8Nm
Coolant pump to component carrier			
M6x20		Tightening torque	8Nm
Vacuum unit to coolant pump			
M6x16		Tightening torque	8Nm

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

1153 Overview of tightening torques

Coolant line for low-pressure exhaust-gas recirculation to high-pressure exhaust-gas recirculation valve

M6x18 self-tapping	Tightening torque	11,8Nm
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Coolant lines for SCR metering module on crankcase

M6X16	Tightening torque	8Nm
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Coolant thermostat to crankcase

M6x30	Tightening torque	8Nm
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Low-pressure exhaust-gas recirculation coolant line to cylinder head cover

TS6x20	Tightening torque	5Nm
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Secondary coolant thermostat to crankcase

M6x25	Tightening torque	8Nm
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11 61 Intake manifold

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Intake manifold to cylinder head	alle	M8		22 Nm
	alle	M7		15 Nm
	alle	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

1161 Overview of Technical Data

Clean the intake system	
	Soaking time of the cleaning agent
	1 h

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

Walnut granules	
	Quantity for each blasting process
	2 l

1161 Overview of tightening torques

Intake plenum to exhaust-gas recirculation cooler

Centre collar bolt M6x34.75	Tightening torque	10Nm
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Manifold on cylinder head and exhaust gas recirculation module

Centre collar bolt M6x34.75 Observe tightening sequence.	Jointing torque	5Nm
	Tightening torque	11Nm

Noise damper to exhaust turbocharger

M6x16	Tightening torque	8Nm
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Swirl-flap controller to intake plenum

M6x20	Tightening torque	7Nm
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Swirl-flap controller to intake plenum

6x20 self-tapping	Tightening torque	6,5Nm
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Throttle valve to intake plenum

M6x50	Tightening torque	8Nm
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1162 Overview of tightening torques

Heat protection to exhaust manifold		
Hexagon nut with collar M6	Tightening torque	10Nm
Heat protection to exhaust turbocharger		
M6x12	Tightening torque	11Nm

1165 Overview of tightening torques

Exhaust turbocharger to diesel particulate filter

Clamp
If necessary, renew clamp.

Tightening torque

13Nm

Exhaust turbocharger to exhaust manifold

Clamp
Tighten until both shanks of the clamp are together.

Tightening torque

19Nm

Exhaust turbocharger to panel holder for support to crankcase

Hexagon screw M8x16

Tightening torque

22Nm

1166 Overview of tightening torques

Vacuum line for oil vacuum pump to crankcase		
M6x22	Tightening torque	8Nm

1171 Overview of tightening torques

Exhaust manifold to cylinder head			
M7 Tighten nut from inside to outside.	Tightening torque	13Nm	
Exhaust-gas recirculation cooler to cylinder head			
M8x20	Tightening torque	5Nm	
	Loosen screw.	90°	
Exhaust-gas recirculation cooler to cylinder head			
M8x20	Tightening torque	19Nm	
Exhaust-gas recirculation cooler to exhaust manifold			
M8x28 Replace screws	Tightening torque	32Nm	
Exhaust-gas recirculation pipe for low-pressure exhaust-gas recirculation to exhaust manifold			
M8	Tightening torque	19Nm	
High-pressure exhaust-gas recirculation valve to high-pressure exhaust-gas recirculation cooler			
Oval-head screw with collar M6x18	Tightening torque	10Nm	
Holder left on low pressure exhaust-gas recirculation valve			
Hexagon screw M8x28	Tightening torque	19Nm	
Holder right on low pressure exhaust-gas recirculation valve			
M6x14 screw	Tightening torque	8Nm	
Low pressure exhaust-gas recirculation to diesel particulate filter			
Hexagon screw M8x12	Tightening torque	19Nm	
Low-pressure exhaust-gas recirculation cooler to diesel particulate filter			
Thin nut M8	Tightening torque	19Nm	
Low-pressure exhaust-gas recirculation cooler to exhaust manifold			
M8 hexagon nut	Tightening torque	19Nm	

Low-pressure exhaust-gas recirculation cooler to exhaust-gas recirculation pipe for low-pressure exhaust gas recirculation

V-band clamp Renew V-band clamp.	Tightening torque	3,5Nm
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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

11 operating fluid overview

Testing equipment

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

Loctite 5970 liquid sealing compound	50 ml, Cartridge	83190404517
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[Overview of consumables \(Electronic Parts Catalogue\)](#)

Expendable materials

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

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 \(Electronic Parts Catalogue\)](#)

Expendable materials

Lubricating grease SYNTHESO GLEP 1	100 g, Tube	83299407778
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[Overview of consumables \(Electronic Parts Catalogue\)](#)

Engine oil

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

Engine oil

Technically suitable engine oils for BMW Group engines	
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[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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