

# TOYOTA 3MZ-FE ENGINE SPECIFICATIONS

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The Toyota 3MZ-FE is a 3.3 l (3,310 cc, 201.99 cubic inches) V6, four-stroke cycle water-cooled naturally aspirated internal combustion gasoline engine, manufactured by the Toyota Motor Corporation since 2004. The engine has 6 cylinders in a V arrangement at a bank angle of 60 deg. The 3MZ-FE engine features a lightweight aluminum block with a four-bearing crankshaft and two aluminum heads with two camshafts (DOHC) and four valves per cylinder (2 intake valves and 2 exhaust valves). The Toyota 3MZ-FE engine is equipped with SFI (Sequential Multiport Fuel Injection) system, ETCS-i (Electronic Throttle Control System-intelligent), DIS (Direct Ignition System) with individual coils on each spark plug and VVTi (Variable Valve Timing) system for the intake camshafts. A 92.0 mm (3.62 in) cylinder bore and 83.0 mm (3.27 in) piston stroke give the motor a total of 3,310 cc of displacement. Compression ratio rating is 10.8:1. The Toyota 3MZ-FE engine produced from 210 PS (155 kW; 208 HP) at 5,600 rpm to 234 PS (172 kW; 231 HP) at 5,600 rpm of maximum power and from 288 Nm (29.4 kgm; 212.5 ft-lb) at 4,400 rpm to 328 Nm (33.5 kgm; 242.0 ft-lb) at 3,600 rpm of torque depending on year and vehicle model.

## Engine code identification:

3 - 3-rd generation engine

MZ - Engine family

F - Economy narrow-angle DOHC

E - Multi Point Fuel Injection

## GENERAL TECHNICAL DATA

Engine model ..... 3MZ-FE

Cylinder layout ..... Four stroke, V6

Fuel type ..... Gasoline (petrol)

Year of production ..... No data available

Total displacement ..... 3.3 L, 3,310 cm<sup>3</sup> (201.99 cu in)

Fuel system ..... Sequential multi-point fuel injection (MPFI)

Power adder ..... None

Maximum power ..... From 210 PS (155 kW; 208 HP) at 5,600 rpm  
to 234 PS (172 kW; 231 HP) at 5,600 rpm  
Maximum torque ..... From 288 Nm (29.4 kgm; 212.5 ft-lb) at 4,400 rpm  
to 328 Nm (33.5 kgm; 242.0 ft-lb) at 3,600 rpm  
Firing order ..... 1-2-3-4-5-6  
Dimensions (L x W x H) ..... No data available  
Weight ..... 400 lbs

**CYLINDER BLOCK**

The 3MZ-FE engine has an aluminum cylinder block in a V arrangement at a bank angle of 60 deg.. From the front of the RH bank cylinders are numbered 1-3-5, and from the front of the LH bank cylinders are numbered 2-4-6. This engine's firing order is 1-2-3-4-5-6. The engine has press-fitted cast-iron cylinder liners.

The crankshaft is supported by 4 bearings and integrated with 9 semi counterweights for balance. Oil holes are placed in the center of the crankshaft for supply oil to the connecting rods, bearings, pistons and other components.

Pistons are made of high temperature-resistant aluminum alloy. Piston pins are the full-floating type. The Toyota 3MZ-FE motor has two compression and one oil control rings. The cylinder bore is 87.5 mm (3.44 in), piston stroke is 83 mm (3.27 in) mm and compression ratio rating is 10.5:1.

Cylinder block alloy ..... Aluminum  
Compression ratio ..... 10.8:1  
Cylinder bore ..... 92.0 mm (3.62 in)  
Piston stroke ..... 83.0 mm (3.27 in)  
Number of piston rings (compression / oil) ..... 2 / 1  
Number of main bearings ..... 4  
Cylinder inner diameter (standard) ..... 92.000-92.132 mm (3.6220-3.6272 in)  
Piston skirt diameter (standard) ..... 91.983-91.967 mm (3.6202-3.6207 in)  
Piston compression height: No data available

Piston pin outer diameter: 21.997-22.006 mm (0.8660-0.8664 in)  
 Piston ring side clearance: Top:0.030-0.080 mm (0.0012-0.0031 in)  
 Second: 0.020-0.060 mm (0.0008-0.0024 in), Oil: 0.030-0.110 mm (0.0012-0.0043 in)  
 Piston ring end gap: Top: 0.30-0.95 mm (0.0118-0.0374 in.),  
 Second: 0.500-1.050 mm (0.0197-0.0413 in), Oil: 0.150-1.000 mm (0.0059-0.0394 in)  
 Crankshaft main journal diameter: 61.000 mm (2.4016 in)  
 Crankpin diameter ..... 52.992-53.000 mm (2.0863-2.0866 in)  
 Connecting rod bearing bolts  
 Step 1: 25 Nm; 2.5 kgm; 18 ft-lb  
 Step 2: Turn bolts 90 deg.

## CYLINDER HEAD

The cylinder head is made of aluminum alloy, with a cross-flow type intake and exhaust layout and with pent-roof type combustion chambers. The spark plugs are located in the center of the combustion chambers.

The exhaust camshafts are driven by a single timing belt, and a gear on the exhaust camshaft engages with a gear on the intake camshaft to drive it. The camshaft journal is supported at 5 places between the valve lifters of each cylinder and on the front end of the cylinder head.

Exhaust and intake valves are equipped with irregular pitch springs made of special valve spring carbon steel which are capable of following the cam profile at all engine speeds. The intake valve diameter is 34.0 mm (1.33 in) and the exhaust valve diameter is 27.3 mm (1.07 in).

Adjustment of the valve clearance is done by means of an outer shim type system, in which valve adjusting shims are located above the valve lifters. This permits replacement of the shims without removal of the camshafts.

Block head alloy ..... Aluminium  
 Valve Arrangement ..... DOHC, chain drive  
 Cylinder head height ..... No data available  
 Valves ..... 24 (4 valves per cylinder)

Intake valve timing

(Intake valve timing control-OFF) ..... No data available

Exhaust valve timing ..... No data available

Valve head diameter ..... INTAKE ..... 34.0 mm (1.33 in)

EXHAUST ..... 27.3 mm (1.07 in)

Valve length ..... INTAKE ..... 94.95-95.45 mm (3.7382-3.7579 in)

EXHAUST ..... 94.90-95.40 mm (3.7362-3.7559 in)

Valve stem diameter ..... INTAKE ..... 5.470-5.485 mm (0.2154-0.2159 in)

EXHAUST ..... 5.465-5.480 mm (0.2152-0.2157 in)

Valve spring free length ..... INTAKE ..... 45.50 mm (1.7913 in)

EXHAUST ..... 45.50 mm (1.7913 in)

Camshaft lobe height: INTAKE - 42.980-43.232 mm (1.6921-1.7020 in)

EXHAUST - 42.960-43.110 mm (1.6874-1.6972 in.)

Camshaft journal diameter ..... 26.965 mm (1.0616 in)

Head tightening procedure and torque specs:

Step 1: 54 Nm; 5.4 kgm; 40 ft-lb

Step 2: Turn all bolts 90 deg.

## MAINTENANCE DATA

Valve clearance (Cold)

Intake valve ..... 0.15-0.25 mm (0.006-0.010 in)

Exhaust valve ..... 0.25-0.35 mm (0.010-0.014 in)

Compression pressure

Standard ..... 12.5 kg/m<sup>2</sup> (178 psi) / 300 rpm

Minimum ..... 10.0 kg/m<sup>2</sup> (142 psi) / 300 rpm

Compression differential limit between cylinders ..... 1.0 kg/m<sup>2</sup> (15 psi) / 300 rpm

Oil system

Oil consumption , L/1000 km (qt. per miles) ..... up to 0.5 (1 qt. per 1200 miles)

Recommended engine oil ..... 5W-30

Oil type API ..... SL "Energy-Conserving"

Engine oil capacity (Refill capacity) ..... With filter change 4.7 liters (5.0 US qts,  
4.1 Imp, qts)

Without filter change 4.5 liters (4.8 US qts, 4.0 Imp. qts)

Oil change interval, km (miles) ..... 8,000 (5,000)

Oil Pressure ..... Idle speed: More than 29 kPa

3,000 rpm: More than 294-539 kPa

Ignition system

Spark plug ..... Denso: SK20R11, NGK: IFR6A11

Spark plug gap ..... 1.0-1.1 mm (0.039-0.043 in)

Spark plug tightening torque ..... 25 Nm (2.5 kgm, 18 ft-lb)

Valve clearance adjustment data

Calculate the thickness of new adjusting valve shim so valve clearance comes within  
specified values.

R = Thickness of removed valve shim

N = Thickness of new valve shim

M = Measured valve clearance

Intake:

$N = R + [M - 0.20 \text{ mm (0.008 in)}]$

Exhaust:

$N = R + [M - 0.30 \text{ mm (0.012 in)}]$

Valve shims are available in 17 sizes to range from 2.50 mm (0.0984 in) to 3.30 mm  
(0.1299 in), in steps of 0.05 mm (0.0020 in).

Example (exhaust valve):

R = 2.70 mm

M = 0.52 mm

$N = 2.70 + (0.45 - 0.30) = 2.85 \text{ mm.}$

## VEHICLE APPLICATIONS

Model ..... Years Produced

Toyota Highlander ..... 2004-2007

Toyota Camry Solara ..... 2004-2008

Toyota Sienna ..... 2004-2006  
Toyota Camry (XV30) ..... 2005-2006  
Toyota Highlander Hybrid ..... 2005-2010  
Lexus RX 330 ..... 2004-2006  
Lexus RX 400h ..... 2005-2009  
Lexus ES 330 ..... 2004-2006  
Mitsuoka Orochi ..... 2006-2014