GM Medium Diesel engine

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Overview

Manufacturer
General Motors

Production
2013–present

Layout

Configuration

Straight-3 (2019)
Straight-4 (2013–2019)

Displacement

1.5 L; 90.9 cu in (1,490 cc)
1.6 L; 97.5 cu in (1,598 cc)

Cylinder bore
79.7 mm (3.14 in)

Piston stroke
80.1 mm (3.15 in)

Block material
Aluminium

Head material
Aluminium

Valvetrain
DOHC 4 valves x cyl.

Compression ratio
16.0:1

Combustion

Turbocharger
Twin-turbo (in 2016 Opel Astra K)

Fuel system
Common rail

Fuel type
Diesel

Cooling system
Water-cooled

Output

Power output
95–160 hp (71–119 kW; 96–162 PS)

Torque output
280–356 N?m (207–263 lb?ft)

Emissions

Emissions target standard
Euro 6

Emissions control technology
SCR, AdBlue

Chronology

Predecessor
Family B/Circle L engine

The Medium Diesel Engine (MDE) is a four-cylinder diesel engine developed by Adam Opel AG and branded "1.6 CDTI Ecotec" in most markets. Opel also adds the marketing term "Whisper Diesel" in some markets, claiming relatively low levels of noise, vibration, and harshness. Production commenced in late 2013 at Szentgotthárd, Hungary. The MDE is Opel's first all-aluminum diesel engine and offers a power density of 85 hp (63 kW) per liter 136 PS (100 kW; 134 hp) in its most powerful version. Maximum power and torque have been increased versus the previous-generation 1.7-liter engine, while fuel consumption has been reduced by up to 10 percent compared with a 2.0-liter CDTI engine of similar power output.[1] This new 1.6 CDTI engine will replace the current 1.7-liter and lower-powered 2.0-liter diesel engines in a wide range of Opel models, with more- and less-powerful versions to come. The most powerful version of this engine, delivering 136 PS (100 kW; 134 hp) at 3,500–4,000 rpm and 320 N?m (236 lb?ft) at 2,000 rpm, was first introduced in the 2013 Opel Zafira Tourer,[2] and later in the 2014 Opel Astra J and restyled 2014 Opel Meriva B. In 2014, versions were released with power outputs of 110 and 95 PS (81 and 70 kW; 108 and 94 hp).

The engine's displacement is 1.6 L (1,598 cc) and it has a bore/stroke ratio of 79.7 mm × 80.1 mm (3.14 in × 3.15 in), attaining cylinder pressures of 180 bar (2,600 psi) and a compression ratio of 16.0:1. It uses an aluminum engine block, die-cast aluminum bedplate, and an aluminum cylinder head. A chain driven dual overhead camshaft, employing weight-saving hollow sections and lobes, operates four valves per cylinder with low-friction, hydraulic roller finger followers. The pistons are made from aluminum for reduced reciprocating mass, feature a concave, shallow-bowl profile to facilitate efficient combustion, and are cooled by under-skirt oil spraying. The crankshaft employs four counterweights to minimize mass, and both it and the con-rods are made of forged steel. The engine features multiple improvements to reduce NVH, such as a cam cover made of GRP and fully decoupled from the engine to reduce noise and vibration, while also saving weight compared to aluminum; a composite intake manifold encapsulated in acoustic padding as well as an external plastic shield that both significantly reduce noise emissions; a mechanical crankshaft isolator which reduces radiated noise and torsional vibrations in the accessory drive system; and scissor gears for the timing drive system, incorporating tooth profiles ground with a Low Noise Shifting (LNS) process for optimal noise reduction. More than 150 patented diesel control functions are deployed by the engine's ECU, which was developed in-house by General Motors and jointly engineered in Italy (by GM Powertrain Torino), Germany, and the United States, and will be used in all future GM four-cylinder diesel engines.

Low fuel consumption and Euro 6-standard emissions (effective from September 2015) are also made possible by the use of Opel's "BlueInjection" Selective catalytic reduction (SCR) system, which injects AdBlue, a urea-and-water solution, into the exhaust stream. The solution decomposes into ammonia, which is then stored on a catalyst substrate. When nitrogen oxide (NO x) from the exhaust gases enters the catalyst, it is then selectively reduced to nitrogen and water.

From 2013, this engine replaced the 1.7 L CDTI as well as lower-powered variants of the 2.0 L CDTI Ecotec 110 and 130 PS (81 and 96 kW; 108 and 128 hp) engines in Opel cars, and also superseded the 1.3 L CDTI engines in the Corsa, Meriva and Astra. GM also introduced the MDE engine in the 2017 Chevrolet Cruze and 2018 Chevrolet Equinox sold in the United States.

Section of the Opel 1.6 CDTI ecoFLEX engine from 2013

Opel Astra K uses the B16DTH engine variant of GM Medium Diesel engine

Contents

Applications and usage
The applications of these engines are summarized below:

Variant	Cylinder arrangement	Displacement	Bore and stroke (mm)	Charging	Power hp/rpm	Torque N?m/rpm	Production year
F15DVC	Inline 3	1496	84 x 90	Turbodiesel Direct injection common rail	105/3250	260/ 1500–2500	Opel Astra K 1.5 CDTI 105 HP from 08/2019
F15DVH					122/3500	300/ 1750–2500	Opel Astra K 1.5 CDTI 122 HP from 08/2019
							Opel Insignia B 1.5 CDTI (122 HP) from 03/2020

B16DTC
Inline 4
1598
79,7 x 80,1
95/3500
280/
1500–1750
Opel Meriva B 1.6 CDTI 95 HP
2014–17

B16DTE
Opel Astra K 1.6 CDTI 95 HP
07/2015-06/2018

B16DTL
110/4000
300/
2000–2250
Opel Insignia B 1.6 CDTI (110 HP)
02/2017-10/2019

Opel Mokka 1.6 CDTI 110HP
06/2015-08/2016

Opel Mokka X 1.6 CDTI 110 HP
09/2016-06/2019

300/
1750–2000
Opel Astra J 1.6 CDTI 110 HP
2014–18

B16DTN
Opel Meriva B 1.6 CDTI 110 HP
2014–17

B16DTU
Opel Astra K 1.6 CDTI 110 HP
07/2015-06/2018

D16DTU
Opel Astra K 1.6 CDTI 110 HP
06/2018-07/2019

B16DTJ
120/4000
320/
2000–2250
Opel Insignia A 1.6 CDTI 120 HP
08/2015-02/2017

Opel Zafira Tourer 1.6 CDTI 120 HP
06/2014-11/2018

B16DTH
136/4000
Opel Astra J 1.6 CDTI 136 HP 5p
05/2014-08/2015

Opel Astra J 1.6 CDTI 136 HP Sedan, Sports Tourer e GTC
05/2014-11/2018

Opel Astra K 1.6 CDTI 136 HP
07/2015-06/2018

Opel Insignia A 1.6 CDTI 136 HP
08/2015-02/2017

Opel Insignia B 1.6 CDTI 136 HP
02/2017-02/2020

Opel Meriva 1.6 CDTI 136 HP
02/2014-05/2017

Opel Zafira Tourer 1.6 CDTI 136 HP
06/2013-07/2019

Opel Mokka 1.6 CDTI (136 HP)
04/2015-08/2016

Opel Mokka X 1.6 CDTI (136 HP)
09/2016-06/2019

D16DTH
Opel Astra K 1.6 CDTI (136 HP)
06/2018-07/2019

B16DTR
Biturbodiesel
direct injection
common rail
160/4000
350/
1500–2250
Opel Astra K 1.6 CDTI Biturbo
10/2015-06/2018

D16DTR
150/4000

Opel Astra K 1.6 CDTI Biturbo
06/2018-04/2019

F20DVH
1995
84 x 90
Turbodiesel
Direct injection
common rail
174/3500
381/
1500–2750
Opel Insignia B 2.0
from 03/2020

Timing chain problems
The engine is prone to early timing chain wear and failure, early symptoms include a rattling sound during start up and during operation eventually leading to total engine failiure. This issue has never been addressed by the manufacturer and appears to affect all production years. The timing chain is located at the rear of the engine and as such replacement is significantly harder and expensive than a typical (front) timing chain.[citation needed]

See also

GM Medium Gasoline Engine
GM Small Gasoline Engine
List of GM engines

References

^ "Vauxhall reveals radical new engine strategy". 17 April 2013. Retrieved 17 April 2013.
^ "Vauxhall Zafira Tourer 1.6 diesel". 31 August 2013. Retrieved 31 August 2013.

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