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2007 Engine Introduction

Model: All with 6-Cylinder for 2007

Production: from 9/2006

# OBJECTIVES

After completion of this module you will be able to:

- Describe the additions to the NG6 engine family
- Understand the new engine designations

## New 6-Cylinder Engines for 2007

Previously in 2005, BMW introduced the beginning of a new generation of six cylinder engines with the N52. Now, for the 2007 model year, BMW has 3 new variations of the NG6 engine family.



The first of the new engines is the N54, which will debut in the new 3-series coupe in September 2006. The N54 is turbocharged and uses the second generation of direct injection (DI 2). This engine will power the new 335i coupe in the fall of 2006.

The N52 will eventually be replaced by the new N52KP. The N52 KP engine is an improved and cost optimized version of the N52. The N52 KP will be available in the 328i and xi coupe from September and will replace the N52 in various models.

Finally, the N51 which is a SULEV II compatible engine, will be phased into selected production models from 9/06. The N51 features many of the same features of the previous SULEV engine (M56) including a "Zero Evap" system.

## New Engine Designations

A new engine numbering system has been introduced to enable fast and distinct identification.

The "TU" designation has been dropped together with the associated version number which is now replaced by a simple count number at the end of the engine designation.

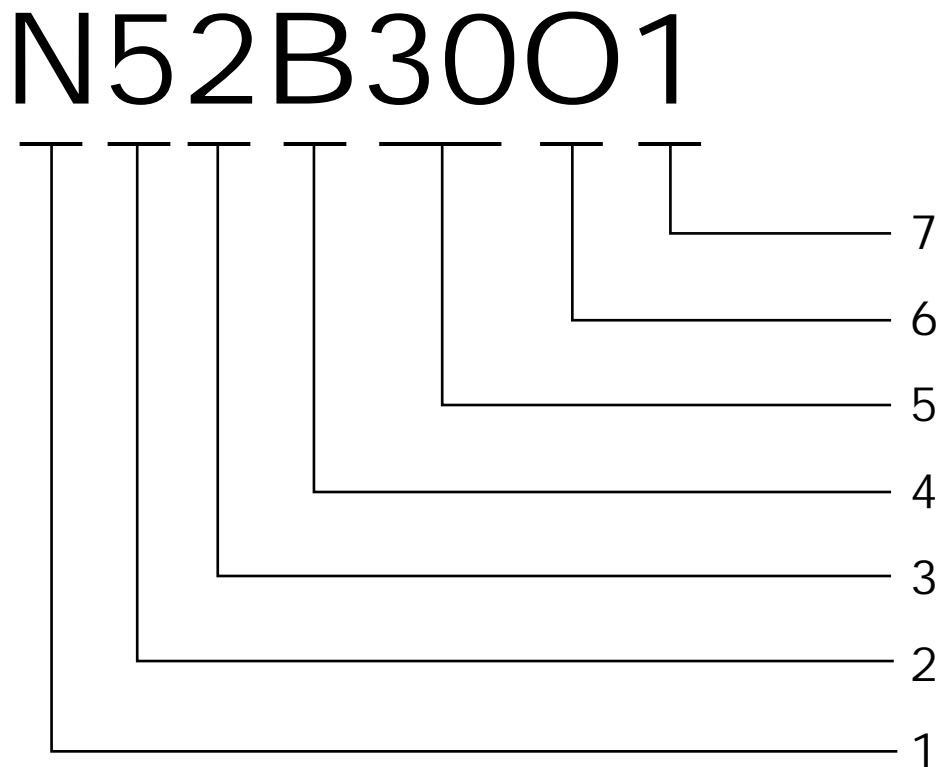
The codes T through K are also new for the various power stages instead of the previous "OL" or "UL" designations.



For example, the new N52KP engine which is a variant of the original N52 engine will now be known as the N52B30O1. This would be instead of the traditional "TU" suffix as in - N52B30TU.

The block stamping (above) is located in the same place as the previous N52 engine.

The chart on the opposing page shows the breakdown of the new engine designations.



Index	Designation	Code	Description
1	Engine Generation	M	BMW Engines up to 2001
		N	BMW Engines from 2001 (New Generation)
		S	BMW M GmbH
		W	External Engines (i.e. Tritec MINI)
2	Engine Type	4	4-cylinder in-line engine
		5	6-cylinder in-line engine
		6	8-cylinder "V" engine
		7	12-cylinder "V" engine
		8	10-cylinder "V" engine
3	Engine System	0	Basic engine
		1	SULEV or PZEV
		2	Valvetronic
		3	Gasoline direct injection
		4	Gasoline direct injection with turbocharger
		5	Double VANOS with Valvetronic
		7	Diesel direct injection with turbocharger
4	Fuel type/ operating mode	B	Gasoline
		D	Diesel
		E	Electric
		G	Gas (natural)
		H	Hydrogen
5	Displacement in 1/10 liter	25	2.5 liter (example)
6	Power output class	T	Top
		O	Upper output class (standard)
		M	Medium output class
		U	Lower output class
		K	Lowest output class
		0	New development
7	Version	1-9	Redesign/facelift version (TU etc.)

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## N54 Overview

The first new member of the NG6 family is the N54 which will be initially available in the new 335i coupe (E92). The N54 continues the tradition of “efficient dynamics” by meeting the customer demand for high performance and the necessary requirements of low fuel consumption and emissions.

The N54 is available as a 3.0 liter engine and features the following:

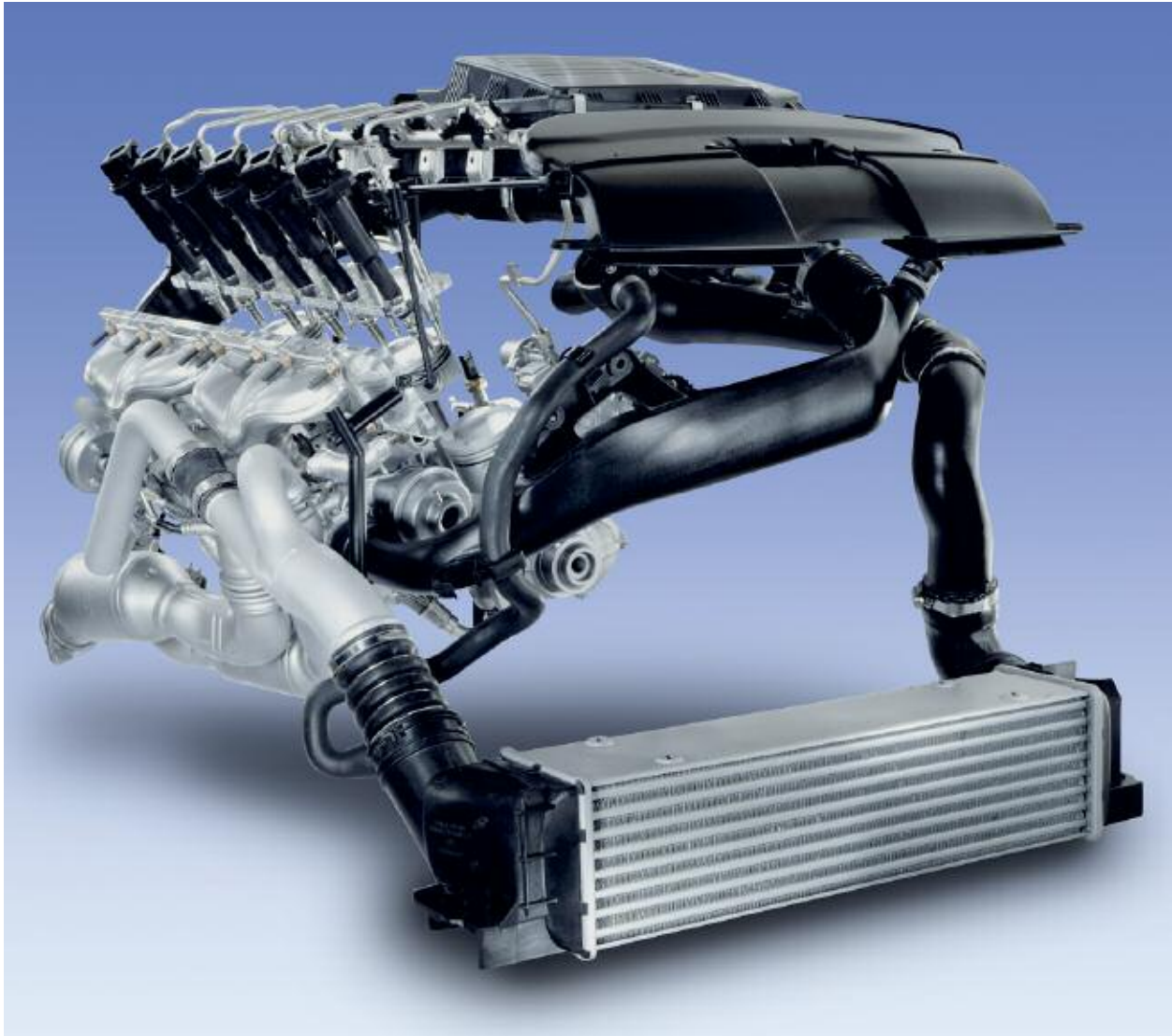
- Exhaust driven turbocharger (Bi-turbo)
- Air to air Intercooler
- 2nd Generation Direct Injection (HPI) with piezo injectors
- New engine management (MSD80)
- Bi-VANOS
- All aluminum crankcase with iron cylinder liners (similar dimensions to N52)
- External oil cooler
- New high output electric water pump (400 W)
- Aluminum cylinder head with plastic valve cover
- Steel crankshaft



As per the new engine designations, the N54 will be officially referred to as the N54B3000. The "O" designates the "upper" output range and the "0" indicates the first generation in this series.

The N54 features the new HPI injection system which is capable of pressures of to 200 bar. This system features the new "piezo" injector technology with "outward" opening injectors.

Also, the N54 benefits from parallel bi-turbocharging with air to air intercoolers.



Overall, the N54 provides the driver with uncompromising response and high torque output in a package that is up to 150 pounds lighter than a V-8 engine. The new technology used in the N54, allows for maximum efficiency and the required low tailpipe emission figures to meet ULEV II guidelines.

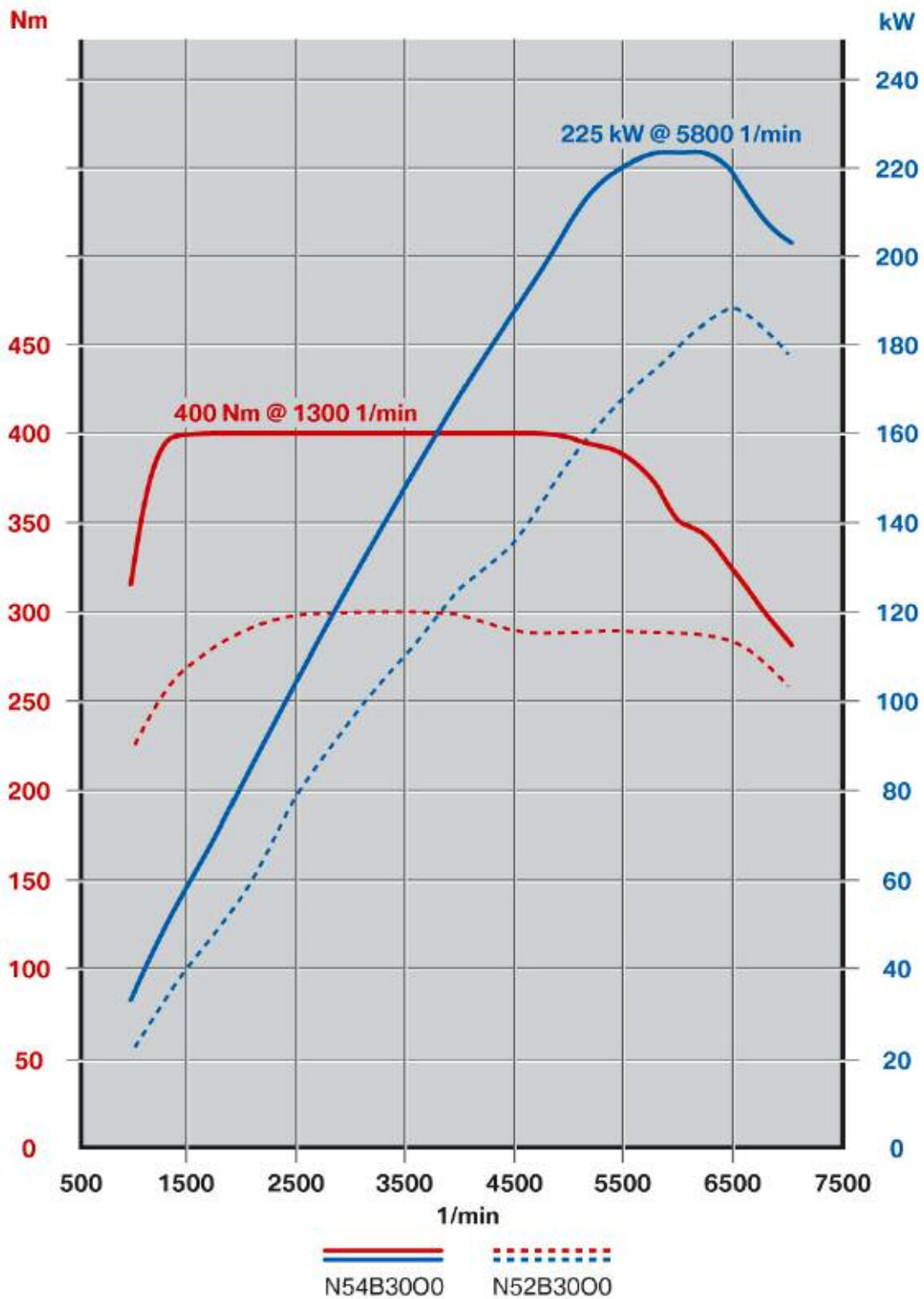


## Technical Data N54

Description	Value
Engine type	Inline 6 cylinder
Displacement (cm <sup>3</sup> )	2979
Stroke/bore (mm)	84/89.6
Cylinder spacing (mm)	91
Crankshaft main bearing diameter (mm)	65
Crankshaft rod journal diameter (mm)	50
Firing order	1-5-3-6-2-4
Power output(kw/bhp) @ RPM	225/300 @ 5800 RPM
Torque (Nm) @RPM	400 @ 1300 - 5000
Maximum engine speed	7000
Power to weight ratio (kg/kW)	0.83
Power output per liter (kW/l)	75.5
Compression ratio	10.2
Valves/cyl	4
Inlet valve diameter (mm)	31.44
Exhaust valve diameter (mm)	28
Engine weight (kg)	187
Knock control	Yes
Engine management	MSD80
Emission compliancy (US)	ULEV 2
Injection system type	HPI (DI 2)



## Power Output Comparison (N52 to N54)



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## N52KP Overview

The enhanced and improved version of the original N52 is referred to as the N52KP or more accurately the N52B30O1. This engine includes cost saving measures as well as various technical improvements. The N52KP will eventually replace the N52 in all vehicle applications. One of the first vehicles to use the N52KP will be the 328i coupe (E92) in September.

The technical highlights of the N52KP include:

- New engine management (MSV80)
- New HFM (digital)
- New throttle - EGAS8 with magnetoresistive position feedback
- Plastic valve cover with integrated crankcase vent valve and oil separation
- Stronger connecting rods
- Exhaust valve stem increased to 6mm
- New electric water pump (2nd generation)
- Lightweight camshafts (hydroformed)



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The N52KP will be available in three versions as follows:

- N52B30O1 - High Output version with 260hp
- N52B30M1 - Medium Output version with 230hp
- N52B30U1 - Possible future application with 215hp

Each of the above engines will have a different specific output for installation into various models. For example, the new E83 LCI (X3 3.0si) will receive the "O" version which has a power output of 260 horsepower at 6600 RPM.



## Technical Data (N52B30M1)

Description	Value
Engine type	Inline 6 cylinder
Displacement (cm <sup>3</sup> )	2996
Stroke/bore (mm)	88/85
Cylinder spacing (mm)	91
Firing order	1-5-3-6-2-4
Power output(kw/bhp) @ RPM	172/230 @ 6250 RPM
Torque (Nm) @RPM	270 @ 3000
Maximum engine speed	7000
Compression ratio	10.7
Valves/cyl	4
Knock control	Yes
Engine management	MSV80
Emission compliancy (US)	ULEV 2
Injection system type	Manifold injection



## N51 Overview

In order to comply with SULEV requirements, the N51 is another variant of the N52 engine. There are various measures to meet the EPA/CARB standards, some of which are familiar from the previous SULEV (M56) engine.

Some of the SULEV measures for the N51 include:

- Near engine catalyst with additional underbody catalyst
- Secondary air system
- Optimized combustion chamber geometry in cylinder head
- Modified piston crown for lower compression
- Plastic valve cover with integrated crankcase vent valve and separator (from N52KP)
- Stainless steel fuel lines with threaded connections
- Radiator with "Prem-air" coating
- Throttle system - EGAS08 carried over from N52KP
- Airbox with Activated carbon filter for EVAP control
- Purge system pipes are made from "optimized" plastic



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