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039

20/12/2010

Technical Bulletin

Torsional Vibration Dampers

GATES REFERENCE :	Various
MAKE :	Various
MODEL :	Various
ENGINE :	Various
ENGINE CODE :	Various



Modern engines today produce more torsional crankshaft vibrations than before; especially on diesel engines (due to making them compliant with Euro 4, 5, 6). These vibrations are partly due to higher forces working on the crankshaft; and result in the crankshaft pulley speed not being constant. These torsional vibrations could lead to excessive bearing wear, accessory belt wear/noise, even crankshaft breakage.

So it is important to dampen these excessive vibrations. One way to do this is by the dual mass flywheel which can be found on the majority of modern engines, but it is also done by the Torsional Vibration Damper (TVD). These TVD pulleys are crankshaft pulleys with a rubber element between the 2 main metal parts (Fig. 1).



Fig. 1

Rubber element



Fig. 2

Cracked rubber

This connecting rubber functions as the damping element. Because of its material (rubber) and its purpose (damping vibrations), it wears out and will need replacement after a certain time (Fig. 2).

There are 2 main types of TVD"s. The "open" type for mainly petrol engines, and the "fully closed" type for mainly diesel engines (Fig. 3).

The drilled hole(s) which can be found in a TVD are made to equilibrate the TVD (Fig. 4).

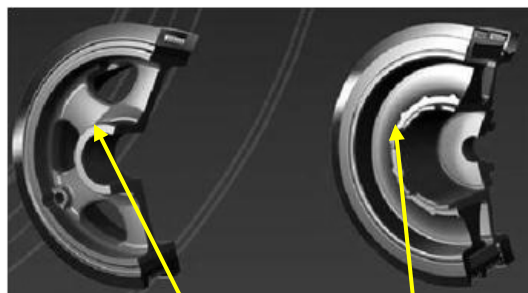


Fig. 3

Open type

Closed type



Fig. 4

Equilibration hole

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A worn/out of order TVD will lead to vibrations, belt noise and excessive wear of all drive components; it can even lead to failure of the overrunning alternator pulley, and consequently the alternator.

Visual checking:

in order to check the condition of a TVD, different options are open.

The following symptoms indicate the TVD should be replaced:

- 1) Cracks in the rubber (Fig. 2)
- 2) Parts of rubber missing (Fig. 5).
- 3) Clear contact marks from metal "indicator" in slotted holes (Fig. 6)
- 4) Some TVD's will show rust particles on the outside as an early warning
- 5) A Micro-V[®] belt running out of the pulley (Fig. 7) could be the result of a faulty TVD
- 6) Draw/paint a line over the TVD (from outside to center), run the engine for a minute (while hitting the gas a few times), switch the engine off and check if the line is broken. If so, the TVD needs replacing!



Fig. 5

Missing rubber



Fig. 6

Damaged slotted hole

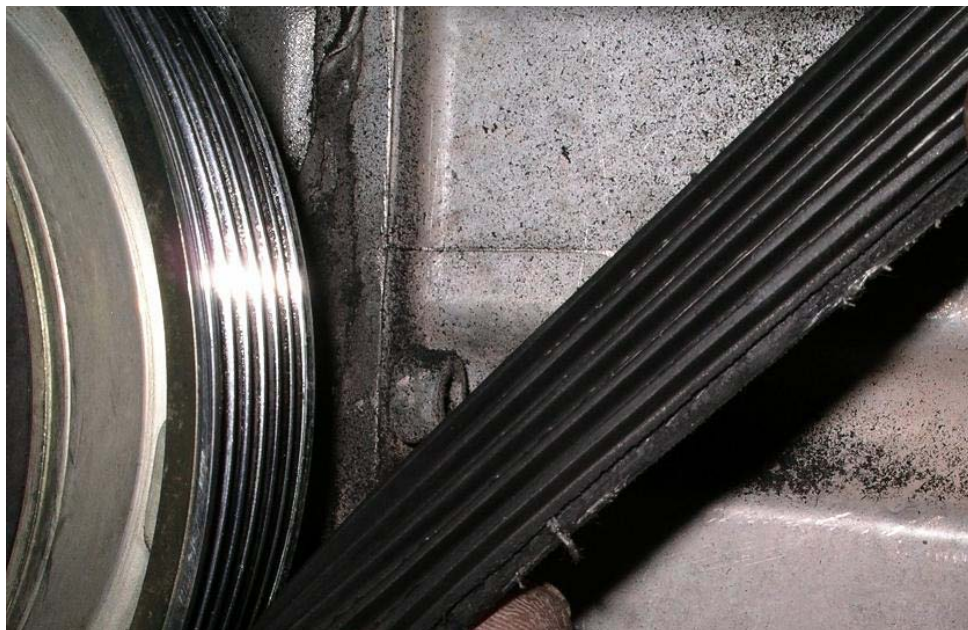


Fig. 7





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Recommendations:

- The TVD should be replaced when the ABDS belt and tensioner are replaced. We recommend to change it no matter what after 120.000KM
- At each service, especially after a car crash, the TVD has to be carefully checked for signs of wear or damage. At least every 60.000 KM! In most cases wear/damage is visible on the backside of the pulley sooner than on the front side.
- The wear will not always show, but TVD or belt noise is proof of a problem.
- In order to guarantee the optimum performance of the TVD, it should be installed according to the manufacturer's recommendations.
- Many TVD's are bolted on the engine with stretch / elastic bolt(s), which need to be replaced after removal, **fitted to the correct torque!!!**

Remarks:

- 1) Idling speed and sporty driving are the worst conditions for TVD's and other drive components.
- 2) Some TVD's should not be used without an accessory belt installed!!!
- 3) Watch out for fake TVDs (Fig.8)! These cheap pulleys are not having any damping function at all, as there is no rubber element inside; only a rubber O-ring on the outside.

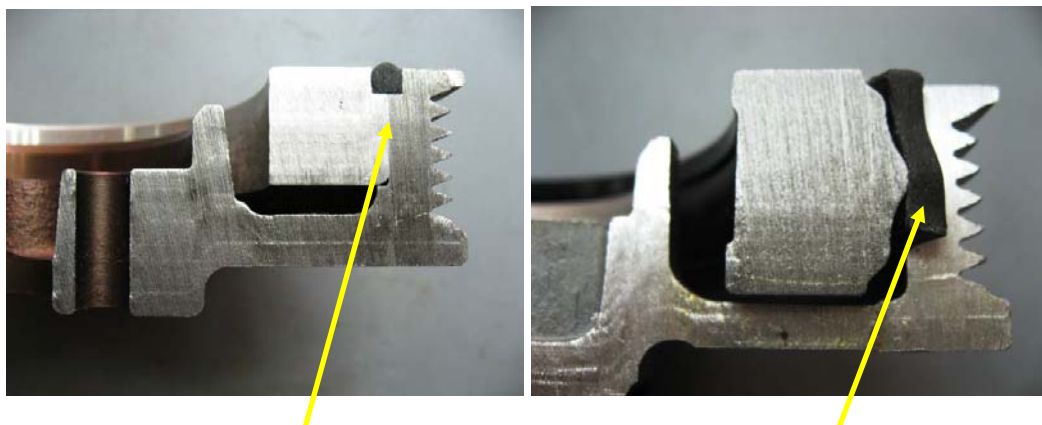


Fig. 8 No damping rubber, only outside O-ring

Rubber damping element

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