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Expiration Date (U.S. and Canada): –			Expiration Date (International): –	
Engine Family	Fuel System	Plant	Build Date	
			From	To
NH-LB, N14, NT	STC - Step Timing Control	Default	01-Jan-1991	31-Dec-9999
NH-LB, N14, NT	CELECT	Default	01-Jan-1991	31-Dec-9999
NH-LB, N14, NT	CELECT Plus	Default	01-Jan-1991	31-Dec-9999
NH-LB, N14, NT	ICON™ Idle Control System	Default	01-Jan-1991	31-Dec-9999
NH-LB, N14, NT	CENTRY Fuel System	Default	01-Jan-1991	31-Dec-9999
Design Application			Market Application	
All			All	

Head Gasket Shim (for Combustion Leak Repairs)

This Thursday Note describes a new Service part released for use in repairing N14 head gasket combustion leaks.

A new service shim (Part Number 4025353) has been released to repair N14 engines head gasket combustion leaks attributed to low liner protrusion and/or worn cylinder liners. This shim is designed to be placed on top of the liner and under the head gasket. Using the shim eliminates the need to replace cylinder liners for a head gasket leak. The shim is made from stainless steel and is 0.002 inch thick. It is currently available at MDC.

Combustion Leak Troubleshooting

No change is being made to troubleshooting procedures or guidelines that have already been presented in previous Thursday Notes and CTN Broadcasts. Refer to the troubleshooting information in the 14Jun2001 Thursday Note entitled "N14 Head Gasket Leak Troubleshooting and Repair Guidelines."

Liner Protrusion Measurement

New liner protrusion measurement guidelines have been implemented along with the shim.

For each pair of cylinders under a common cylinder head (e.g. 1 and 2, 3 and 4, 5 and 6), it is **not** necessary to measure liner protrusion at the crank centerline position between the two liners as

shown in the picture below.

Picture

Liner Protrusion Measurement Locations for Cylinders Under a Common Head

The other significant change is when comparing the liner protrusion values to either the protrusion specification or it's adjacent liner under a common head, the average protrusion for the liner will be used. For example, if the 3 measurements for 1 cylinder are 0.003 inch, 0.004 inch, and 0.0035 inch, the average protrusion for this cylinder is 0.0035 inch. This is the liner protrusion value to use in making repair decisions.

The overall protrusion specification remains 0.004 inch minimum to 0.007 inch maximum. This is a post repair specification. To use the example above, if a liner's average protrusion measures 0.0035, it is out of specification. However, the addition of the 0.002 inch thick shim would bring the overall protrusion to 0.0055 inch, which is well within specification.

Repair Guidelines (Use of Shim)

There are 2 situations in which it is appropriate to use the shim for an engine repair. The first situation is the repair of an engine with clear indications of combustion leak (i.e. torched head gasket grommets, carbon tracking across the gasket plate in the center section, etc.). This is almost **always** accompanied by wear/erosion on the liner flange in a narrow arc on the crank centerline directly between adjacent liners.

Picture

Picture

Repair when one liner in a pair is worn and the other is **not**

- minimum average protrusion (without shim) for which a shim can be placed on a liner is 0.003 inch
- maximum average protrusion (without shim) for which a shim can be placed on a liner is 0.005 inch
- the unworn liner **must** either be taller than the worn or even with it, never lower.
- place a shim **only** on the worn liner unless both liners are less than 0.004 inch average protrusion, then place a shim on the unworn also.

This is subject to the above guidelines.

Examples

- worn liner average protrusion = 0.0035 inch, unworn liner average protrusion = 0.0035 inch. Place a shim on each liner.
- worn liner average protrusion = 0.0055 inch, unworn liner average protrusion = 0.006 inch. No shim because a shim on 0.0055 inch would
- make 0.0075 inch which is above the maximum protrusion specification of 0.007 inch. This repair requires liner replacement.
- worn liner average protrusion = 0.004 inch, unworn liner average protrusion = 0.004 inch. Place a shim on the worn liner **only**.
- worn liner average protrusion = 0.003 inch, unworn liner average protrusion = 0.005 inch.

Place a shim on the worn liner **only**.

The other situation in which it is appropriate to use the shim is the correction of low liner protrusion when there are no indications of wear or erosion.

Repair with shim on unworn liners with low liner protrusion

- minimum average protrusion (without shim) for which a shim can be placed on a liner is 0.003 inch
- maximum average protrusion (without shim) for which a shim can be placed on a liner is 0.005 inch
- if the average protrusion of one liner is less than 0.004 inch, and both liners are within 0.001 inch of each other, put a shim on each liner.
- if the average protrusion of one liner is less than 0.004 inch and there is more than 0.001 inch difference in protrusion between the pair, place a shim **only** on the liner with low protrusion.

Examples

- one liner's average protrusion = 0.003 inch and the other's is 0.0037 inch. Place a shim on both.
- one liner's average protrusion = 0.0035 inch and the other's is 0.005 inch. Place a shim **only** on the liner with low protrusion.
- both liners' average protrusion = 0.0045" inches. No shim needed, both liner protrusions are in specification.

There are some situations in which it is inappropriate to use the shim. The following are examples of when it will be necessary replace liners and/or install sealing rings underneath the liner to meet protrusion specifications:

- the average protrusion of any liner (worn or unworn) is less than 0.003 inch.
- a worn liner has an average protrusion greater than 0.005 inch.
- both liners under a common cylinder head show visible signs of wear/erosion.
- the unworn liner in a worn/unworn pair has an average protrusion that is lower than the average protrusion of the worn liner.

