

SUBJECT: International® I-6 HEUI® Injectors with Split Tip Failures

Although relatively rare, the subject of International I-6 HEUI Injectors with split tip failures must be addressed with your customers as soon as possible to avoid further injector failures or engine damage. The information below has been compiled to better familiarize Service Dealer personnel with split tip failure issues, especially identifying the failure and recommending corrective action.

**Cause**

Without exception, we've found that I-6 HEUI split tip failures are the result of no fuel, low fuel pressure or the most likely cause, air in fuel. Under normal operating conditions, the pressure chamber of the nozzle valve body is completely filled, which provides a hydraulic cushion between the valve and valve body during each valve closure event. OEM engineers tell us any time the valve body pressure chamber is less than completely filled with fuel (i.e., under no fuel, low fuel pressure or air in fuel conditions), resulting in a loss of the hydraulic cushion, there's a risk the valve can strike the valve body violently and the tip can split.

Identifying the Failure

Split tip failures resulting in pieces missing from the tip of the valve body are obvious (refer to top left photo); other times the split may be a hairline crack that requires sharp eyes or the use of a loupe to detect (refer to top right photo). In either case, we recommend your counter staff learn to recognize the failure and recommend appropriate action to your customer before replacing a failed injector, just as we've all learned to identify the cause of a seized hydraulic head in a distributor pump, and to fix the cause of the seizure before a new pump is installed.

Corrective Action

Alliant Power Technical Bulletin APTB 03/04 includes a copy of a Navistar® bulletin issued to address priming I-6 engines when the fuel system is “dry” after engine service to avoid nozzle failures¹. Left unsaid in the bulletin, is that similar failures are just as likely to occur to a running engine that’s operated with low fuel pressure or air in fuel. Furthermore, we’ve observed anecdotally that split tip failures will continue to occur (no matter what brand injectors are installed) until the problem is corrected.

Low Fuel Pressure

Standard diagnostic procedures apply if low fuel pressure (the specification varies with engine models) or excessive fuel inlet restriction (typically maximum 6” Hg at high idle) is measured (i.e., replace fuel filter, clean fuel strainer, check lift pump and overflow valve for proper operation).

Air in Fuel

Air in fuel can be a more confounding problem to diagnose. While air ingestion can occur anywhere in the suction side of the fuel system, here are some common sources:

- **Lift Pump** – If the suction side check valve of the lift pump is defective or held open by debris, fuel will drain back after a prolonged time, resulting in repeated “dry” starts.
- **Loom Clamps** – Chafing at any of the clamps which route the fuel inlet line, particularly the clamp(s) above the bell housing at the rear of the engine, can be sources of air.
- **Fittings** – Fitting points sealed by grommets can also be sources of air.

Warranty

Since a split tip failure is not due to defective material or workmanship, it is excluded from warranty coverage.

In addition to the procedures listed in the Navistar bulletin, when priming an I-6 engine that has a fuel/oil rail with a side fuel inlet connection, we recommend loosening the small fuel pipe plug at the front of the rail to bleed the system at its highest point.

Thanks to Louis Lovieno, D&W Diesel, North Oxford, MA.

For more information visit

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