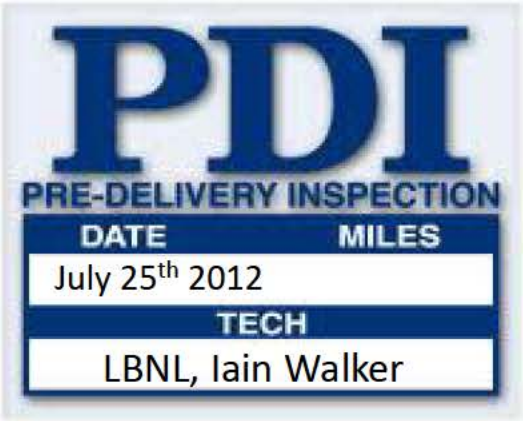
A PDI for your HVAC system



Context

PDI = Pre Delivery Inspection: make sure product delivers

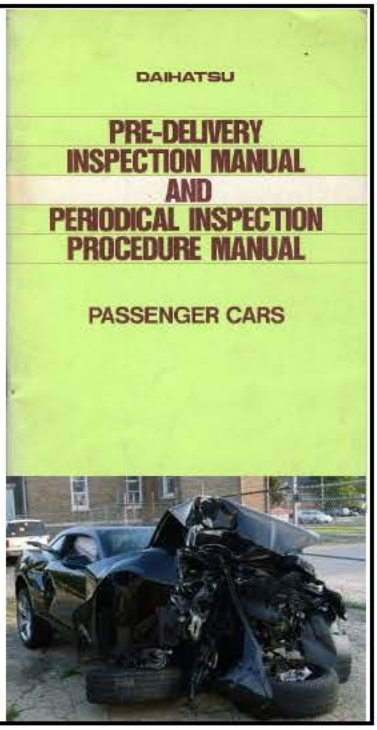
HVAC systems are poorly installed, operated and maintained

- Leads to poor comfort, health, safety and high cost of operation

HVAC industry highly fragmented and resistant to change

Problems hidden from occupants or accepted as normal

Opportunity: to bring HVAC into the last century with Quality Control to deliver what is promised: comfort, health, durability & safety at a reasonable cost



Technical Approach

Develop a PDI for HVAC

PDI focus is on Inspecting Installation – a $10 Chinese sweatshop t-shirt gets a QA/QC sticker, why not a $10k HVAC system?

Develop & require diagnostics that confirm good installations:

- Air flow, duct leakage, refrigerant charge, delivered temperatures, system pressures, filter requirements, fan power, noise
- On board diagnostics (OBD) for flow, pressures, fan power, charge

Make it a warranty requirement, code requirement, permit requirement, etc.

Recommended Guidance

Develop the PDI checklist and label *(include target and system test results)*

- *External Tests*: duct leaks
- *Internal Tests*: OBD for system pressures, air flow, charge, fan power
- *Labels*: Certify tight equipment

Provide training

Make it the law, ***regulate*** & ***require it*** *(the HVAC industry & market in general has a proven record of failure)*

New Construction: see above

Retrofit: may have lower targets for external tests, e.g., higher permitted duct leaks

High Performance homes: may specify higher targets

Emergency replacement: OBD with test port (rest of system not subject to emergency replacement)

Value

To Homeowners: comfort, health, durability, safety and reduce heating and cooling bills by about 25% (about $25 Billion nationally –small but worth it!)

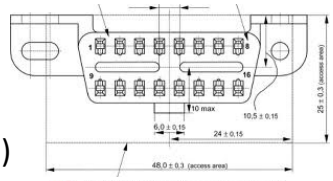
To Contractors: change from low-bid to high profit, reward good contractors, better public image

To Equipment Manufacturers: less warranty claims, better public image

To Society: reduced healthcare costs, 125 million tons less CO2, reduced consumption (2.5 Quads/year)

Market Readiness

- Field tests already exist - *could be improved*
- Manufacturers already have some OBD *– just need more – need consensus on port configuration*
- Some training exists (BPI/RESNET/NATE) *– needs to be tailored to a PDI*
- We know targets for performance
- We know well-installed systems are possible (BA teams good at this)
- Home performance contractors already understand this issue
- EPA has HVAC checklists we can build on




ENERGY STAR Qualified Homes, Version 3 (Rev. 05)
HVAC System Quality Installation Contractor Checklist

Pros and Cons

Pros:

- Increased comfort, health, safety, reliability and durability
- Reduced operating costs and fossil fuel use
- Levels paying field for good contractors and manufacturers
- Better industry image: from laggard to leader

Cons:

- Higher install cost? ….. Questionable: poor correlation between cost and quality for contractors and reduced warranty claims offset OBD costs

References

Everything you have ever heard at a Building America meeting, Affordable Comfort Presentation, ASHRAE Technical Session, ACEEE Summer study talk, or read in DOE & EPA publications, ASHRAE Transactions, conference proceedings, Home Energy magazine, online HVAC forums, etc., etc.