

Demonstration Testing

- Purpose: Assurance that major monitors are able to detect a malfunction and illuminate the MIL with emissions below the malfunction thresholds (e.g., 1.5 x standards)
- Test engine selection:
 - Test 1-3 high-mileage/durability engines per year depending on number of engine families certified:
 - 1-5 engine families => 1 demo engine
 - 6-10 engine families => 2 demo engines
 - 11+ engine families => 3 demo engines



Demonstration Testing (cont'd)

- Testing Requirements:
 - Testing of all major monitors tied to emission thresholds
 - Engine dyno emission testing
 - Single fault testing (one fault at a time)
 - Base engine/emission control system aged/representative of full useful life
 - Install “threshold” component
 - Perform applicable emission test (FTP or ESC) to show that malfunction is detected and MIL is illuminated at/before required emission levels



Demonstration Testing Summary

Diesel

Component	Testing Requirement
Fuel System	high/low pressure @ 1.5xstd high/low quantity @ 1.5xstd advanced/retarded timing @ 1.5xstd
Misfire	2010-2012: no testing 2013+: misfire @ 1.5xstd
EGR	high/low flow @ 1.5xstd slow response @ 1.5xstd cooler performance @ 1.5xstd
Boost Control	under/over boost @ 1.5xstd VGT slow response @ 1.5xstd undercooling @ 1.5xstd
NMHC Catalyst	efficiency @ 2.0xstd or 1.5xstd empty can

Demonstration Testing Summary

Diesel (cont'd)

Component	Testing Requirement
NOx Catalyst	efficiency @ std+ 0.3 or 0.2g/bhp-hr reductant delivery @ std+ 0.3 or 0.2g/bhp-hr empty can
NOx Adsorber	trapping @ std+ 0.3 or 0.2g/bhp-hr empty can
PM Filter	filtering @ 0.05g/bhp-hr or 0.025g/bhp-hr NMHC conversion @ 2.0xstd empty can
VVT System	target error @ 1.5xstd slow response @ 1.5xstd
Exhaust Gas Sensor: A/F Sensor	upstream: performance @ 1.5xstd downstream: performance @ 1.5xNMHC std, NOx std+ 0.3 or 0.2g/bhp-hr, PM 0.05 or 0.025g/bhp-hr
Exhaust Gas Sensor: NOx Sensor	performance @ 1.5xNMHC std, NOx std+ 0.3 or 0.2g/bhp-hr, PM 0.05 or 0.025g/bhp-hr

Demonstration Testing Summary

Gasoline

Component	Testing Requirement
Fuel System	primary feedback rich/lean @ 1.5xstd secondary feedback rich/lean @ 1.5xstd
Misfire	misfire @ 1.5xstd
EGR	high/low flow @ 1.5xstd
Cold Start	each component @ 1.5xstd
Secondary Air	high/low flow @ 1.5xstd
Catalyst	efficiency @ 1.75xstd empty can
VVT System	target error @ 1.5xstd slow response @ 1.5xstd
Exhaust Gas Sensor	performance @ 1.5xstd other @ 1.5xstd

Demonstration Testing (cont'd)

- Submission of test data:
 - For 2010-2012 MY, data required to be submitted within six months after the start of engine production
 - For 2013+ MY, data required to be submitted prior to certification
- Confirmatory Testing: Manufacturer has to make test equipment available to ARB upon request so ARB can run the same tests and confirm the results



Certification

- Engine manufacturer required to submit certification application for review and approval. Application shall include:
 - detailed specifications for all diagnostics in format prescribed in regulation
 - written descriptions of each EI-AECD and NO_x and PM NTE deficiency utilized by the manufacturer
 - a copy of build specs relevant to OBD compliance that are provided to engine purchasers (e.g., MIL specs and DLC specs to coach builders)



Deficiencies

- Allows for certification of OBD system with “non-compliances” provided manufacturers demonstrate a good-faith effort to:
 - meet the OBD requirements in full and
 - come into compliance as expeditiously as possible
- 2010-2012 MY: Unlimited “free” deficiencies
- 2013+ MY:
 - Maximum of two “free” deficiencies
 - Third and subsequent deficiencies subject to fines (\$50 for major monitors, \$25 for other monitors)
- Manufacturers must re-apply for ARB approval of a deficiency each model year



California Environmental Protection Agency

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