

Objectives of Diesel Retrofit Verification

- Emission Reduction Claims are Real
- 3 Levels of PM Reduction Thresholds
 - ◆ Level 1: $\leq 30\%$ PM Reduction < 60%
 - ◆ Level 2: $\leq 60\%$ PM Reduction < 85%
 - ◆ Level 3: PM Reduction $\leq 85\%$ or less than 0.01 g/bhp-hr
- Minimum NOx Reduction

Engine/Application Groups (cont'd)

- Sample On-road Parameters and Values

PARAMETERS		VALUES			
Application	Vehicle speed	high		low	
	Load	high		low	
	Idle	low		high	
	Fuel	low-sulfur		standard	
Engine	PM cert level	0.1	0.25	0.6	unregulated
	Cycle	4-stroke		2-stroke	
	Aspiration	Turbocharged Aftercooled		Turbocharged	Natural

Minimum Durability Testing Periods

Engine Type	Engine Size	Min. Durability Period
On-Road	Light Heavy-duty	5 years or 60,000 miles*
	Medium Heavy-duty	5 years or 100,000 miles*
	Heavy Heavy-duty	5 years or 150,000 miles*
Off-Road (including portable engines) and Stationary	Under 25 Hp	3 years or 1,600 hrs
	Between 25 and 50 Hp	4 years or 2,600 hrs
	Above 50 Hp	5 years or 4,200 hrs
	Emergency Standby Gen-set	1000 hrs

* or equivalent time in hours

Minimum Defects Warranty Periods

Engine Type	Engine Size	Min. Warranty Period
On-Road	Light Heavy-duty	4 years or 40,000 miles
	Medium Heavy-duty	4 years or 65,000 miles
	Heavy Heavy-duty	4 years or 100,000 miles
Off-Road (including portable engines) and Stationary	Under 25 Hp	2 years or 1,100 hours
	Between 25 Hp and 50 Hp	3 years or 1,800 hours
	Above 50 Hp	4 years or 2,800 hours

In-Use Compliance Program

- Manufacturers to Conduct Opacity Test and Visual Inspection of 25% of Retrofit Systems at Two Times:
 - ◆ At First Cleaning (or After One Year)
 - ◆ First Cleaning after 50% of Durability Period (or at 50% of Durability Period)

- If 99% of Retrofit Systems Pass the Opacity Test, then the Systems are in Compliance

In-Use Compliance Program (cont'd)

- If Retrofit Systems failures exceed 1%, Manufacturers are Required to:
 - ◆ Provide an Investigative Report Within 90 days
 - ◆ Propose a Remedy to Resolve the Problems
- ARB will Evaluate the Manufacturer's Report and all Other Relevant Information
- ARB will Determine Whether to Approve the Remedy or Cancel the Verification

Comparison with Other Programs

Elements	ARB	VERT	U.S. EPA
Engine and application	Specific	Defined Test Engine	General
Chassis Testing	NYBC and UDDS	N/A	N/A
Test Cycles	HD Transient FTP and steady-state cycles	ISO 8178 C1 steady-state cycles	HD Transient FTP and steady-state cycles