

UPDATED INFORMATIVE DIGEST

Adoption of New Certification Tests and Standards to Control Emissions from Aggressive Driving and Air-conditioner Usage for Passenger Cars, Light-duty Trucks, and Medium-duty Vehicles under 8,501 Pounds Gross Vehicle Weight Rating

Sections Affected: California Code of Regulations, title 13, sections 1960.1, 2101 and 2062, and the incorporated “California Exhaust Emission Standards and Test Procedures for 1988 and Subsequent Model Passenger Cars, Light-Duty Trucks and Medium-Duty Vehicles” and “California Assembly-Line Test Procedures for 1998 and Subsequent Model-Year Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles”

The California Air Resources Board (ARB or Board) administers emission standards for new motor vehicles that are generally more stringent than the federal emission standards administered by the U.S. Environmental Protection Agency (U.S. EPA). Currently, both the California and federal exhaust emission standards for motor vehicles apply to emissions that occur when the vehicle is operated through a series of narrowly defined operations, collectively known as the Federal Test Procedure, or FTP. Tests conducted in the past several years have shown that the FTP does not accurately reflect various operating conditions, such as aggressive driving and use of the air-conditioner. During these operating conditions, emissions can be substantially higher than those measured during the normal FTP driving cycles. As a result, the ARB and the U.S. EPA, in close coordination with motor vehicle manufacturers, initiated a joint effort to identify additional test cycles that effectively measure emissions during “off-cycle” operation. Staff from the two agencies ultimately agreed upon two supplemental test procedures (collectively the SFTP) — a high-speed, high-acceleration test known as the US06 test, and the SC03 air-conditioner test.

In October 1996, U.S. EPA issued a Final Rule adopting the SFTP and establishing SFTP emission standards that apply to passenger cars, light-duty trucks, and heavy light-duty trucks, to be phased-in starting with the 2000 model year. (61 F.R. 54852 (October 22, 1996).) Under the Federal Clean Air Act, the “Tier 1” emission standards — equivalent to California’s 1994 model-year standards — must remain unchanged at the federal level until the 2004 model year. Thus U.S. EPA set 50,000 and 100,000 mile SFTP standards at levels appropriate for Tier 1 vehicles. U.S. EPA took a “composite” approach in which emissions from the US06 test, SC03 air-conditioner test and the FTP are combined on a weighted basis. The composite emissions of non-methane hydrocarbons (NMHC) and oxides of nitrogen (NOx) from passenger cars must meet a 50,000-mile combined standard of 0.65 grams per mile (g/mi). This standard is numerically identical to the sum of the Tier 1 FTP 50,000 mile standards for NMHC (0.25 g/mi) and NOx (0.4 g/mi). Vehicles certified to the Federal SFTP standards must also separately comply with the preexisting FTP standards.

Following a July 24, 1997 hearing, the ARB has now completed a rulemaking that establishes California standards and test procedures to control emissions from aggressive driving and air-conditioner usage from motor vehicles under 8,501 pounds gross vehicle weight rating.

The supplemental *test procedures* adopted by the Board are in all respects identical to the procedures adopted by U.S. EPA. The establishment of identical test procedures will continue to permit manufacturers to put a vehicle through one set of tests to demonstrate compliance with both the California and Federal standards.

The SFTP emission *standards* adopted by the Board will be phased-in starting with the 2001 model year. Overall, the standards are substantially more stringent than the Federal SFTP standards and will achieve very significant emission reductions. Under the California Low-Emission Vehicle and Clean Fuels program, by the 2001 model year the vast majority of passenger cars and light-duty trucks will be certified to the low-emission vehicle (LEV) level of standards, which limits hydrocarbon emissions to only 30 percent of the Federal Tier 1 level, and NO_x to 50 percent of the Tier 1 level. Thus, without any additional SFTP control strategies, an LEV would be expected to have substantially lower SFTP emissions than a Tier 1 vehicle. There are also technologically feasible control strategies that can significantly further reduce SFTP emissions from LEVs to comply with stringent SFTP standards.

The Board has established one set of 4,000 mile SFTP standards, made up of a US06 and an SC03 element, that apply equally to LEVs, ultra-low-emission vehicles (ULEVs), and super-ultra-low-emission vehicles (SULEVs) in the same weight classifications. The California SFTP standards for Tier 1 vehicles and transitional low-emission vehicles (TLEVs) will be identical to the Federal SFTP Tier 1 standards; under the “non-methane organic gas fleet average” element of the Low-Emission Vehicle and Clean Fuels program, manufacturers have the option to sell small numbers of Tier 1 vehicles and TLEVs by the 2001 model year when these proposed regulations are phased-in. As is the case with the ARB’s FTP exhaust emission standards, there is a set of SFTP emission levels for passenger cars and lighter light-duty trucks, with greater emissions allowed for heavier weight classifications up to and including medium-duty vehicles having a gross vehicle weight rating of 8,500 lbs.

The SFTP standards adopted by the Board for LEVs, ULEVs and SULEVs are based on a series of test programs conducted by ARB staff and the motor vehicle industry from June 1995 to February 1997, and reflect a consensus between staff and industry. The vehicles tested were either LEV prototypes tested by the manufacturers or production vehicles certified to the Tier 1 or TLEV standards and considered to be representative of future LEVs; in both cases the emission control systems were aged to 50,000 miles. ARB staff also tested additional low-mileage (around 4000 miles) vehicles.

The objective of the test programs was to determine US06 and SC03 emission levels from vehicles under two distinct modes: first, in their original configuration, and second, with SFTP emission control optimized using engine calibration techniques. The main control strategy investigated for both the US06 and SC03 cycles was the use of air-fuel ratio “bias,” in which slightly rich air-fuel ratios can reduce NMHC plus NO_x by increasing catalyst NO_x conversion efficiency. Ultimately, the lowest emission levels were achieved with the optimized low-mileage vehicles. They had average NMHC plus NO_x US06 emissions of 0.09 g/mi; this was a 68 percent reduction from average unoptimized emissions. The low-mileage vehicles optimized for the air-

conditioning test had average NMHC plus NOx SC03 emissions of 0.13 g/mi, a 64 percent reduction from the average unoptimized emissions.

The 4,000 mile SFTP standards established by the Board for LEV and ULEV passenger cars are as follows:

US06 (g/mi)		SC03 (g/mi)	
NMHC+NOx	CO	NMHC+NOx	CO
0.14	8.0	0.20	2.7

The NMHC plus NOx values approximate the average emissions of the optimized low-mileage test vehicles, with a 50 percent compliance margin. The compliance margin factor allows for headroom between the vehicle emission levels during certification testing and the emission standards to account for sources of emission variability. The Board chose to establish 4,000 mile standards because these standards can be appropriately based on the impressive emission performance of the low-mileage vehicles tested. Some deterioration in SFTP emissions will be expected over 50,000 and 100,000 miles. However, gross deterioration should be avoided by the existence of 50,000 and 100,000 mile FTP emission standards, and by the use of On-Board Diagnostics II systems. Demonstration of compliance with the SFTP standards will be exempt from assembly-line quality audit testing.

ARB staff conservatively estimates that at least 70 percent of LEVs will comply with the US06 and SC03 standards with only software modifications, typically consisting of a rich-bias calibration. The remaining vehicles will require catalyst hardware modifications, generally either increased precious metal loading or catalyst volume. The ARB staff estimates that, in 2020 new SFTP standards and test procedures will reduce statewide emissions of NMHC plus NOx by 133 tons per day.