



SURFACE VEHICLE RECOMMENDED PRACTICE	J227™	DEC1992
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Electric Vehicle Test Procedure		

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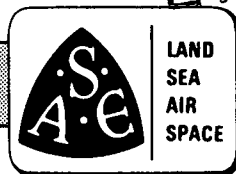
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ELECTRIC VEHICLE TEST PROCEDURE — SAE J227

SAE Recommended Practice

Report of Electric Vehicle Technical Committee approved March 1971.

1. Purpose and Scope—This SAE Recommended Practice establishes uniform reporting procedures and defines terms related to the propulsion, recharge, and service life of electric battery powered vehicles. It applies to those vehicles capable of being operated on public or private roads.

The intent is to provide a uniform procedure for reporting electric vehicle characteristics in engineering discussions, technical papers, and specifications.

2. Terminology—To be developed.

3. Test Conditions—The following test conditions are known to affect the performance of electric vehicles and should, therefore, be recorded.

3.1 Vehicle Identification

3.2 Vehicle Overall Maximum Dimensions (including projected frontal area)

3.3 Curb Weight

3.4 Test Weight

3.5 Gear ratio(s)—If a variable ratio gear box is used.

3.6 Tire Design, Size, and Pressure

3.7 Rolling Radius

3.8 Accessory Equipment Power Consumption

3.9 Environmental Conditions

3.9.1 Ambient temperature

3.9.2 Wind

3.10 Battery Conditions

3.10.1 State of initial charge

3.10.2 Battery temperature at start of test, measured at cell terminal

3.10.3 Previous history

3.10.4 Type of battery and nominal rating at specified discharge rate

3.11 Running Surface (dynamometer wheel or road surface per SAE J688)

3.12 Description of Test Route or Dynamometer Load Program

3.13 Duration of Test

4. Test Procedures

4.1 Range at Continuous Speeds—On-the-Road Vehicles

4.1.1 INTRODUCTION—The purpose of this test is to determine the maximum range of the vehicle under level road, continuous speed conditions.

4.1.2 The vehicle shall be operated in normal fashion; that is, accelerated under its own power to the test speed. A moderate test acceleration is recommended. Range tests shall be run with the standard tire specified and at their normal operating pressures. Data shall be the average of tests in opposite directions on a level hard surface.

4.1.3 Continuous speed is to be determined as the average speed over the distance traveled. A minimum of three different speed tests should be conducted, including one at the recommended maximum cruise speed of the vehicle.

4.1.4 The end of the driving range is reached when the speed of the vehicle falls below 80% of the initial programmed speed. Each range test shall be conducted without interruption.

4.1.5 If any accessory equipment (heater, defroster, vehicle lights) is on and supplied from the main battery, its power consumption shall be stated.

4.1.6 Test data shall be presented in the form of a curve showing range as a function of speed with test points indicated.

4.1.7 A discharge ampere-hour reading shall be taken to satisfy the requirements in paragraph 4.4.2.7.

4.2 Range with a Definite Repeatable Driving Pattern

4.2.1 INTRODUCTION—The purpose of this test is to determine the maximum range of the vehicle operating in a definite repeatable driving cycle on level roads. To meet a range of maximum speed capabilities of electric vehicles and to match approximately the energy consumption and acceleration conditions as they occur in urban and suburban traffic, two driving cycles having different levels and duration of maximum speed are defined. One driving cycle has a maximum speed of 30

mph and is representative of conditions of residential area driving. The other proposed cycle has a maximum speed of 45 mph and is representative of driving in metropolitan traffic inclusive of arterial roads.

4.2.2 TEST CONDITIONS—Range tests shall be run with the standard tire specified and at the manufacturer's recommended operating pressure. In road tests, data shall be the average of test runs in opposite directions on a level, hard surface. Operating conditions shall be reported according to paragraph 3.

On a dynamometer, test runs shall meet the following conditions:

(a) The weight of the vehicle used to set road load shall be the curb weight plus 200 lb.

(b) Road load power shall be set at the maximum speed obtained in the driving cycle. The road load throughout the speed range shall be reported in the test conditions. The vehicle speed (mph) as measured from the dynamometer rolls shall be used as data.

(c) The type of dynamometer used shall be stated, since the road load power requirements are greatly influenced by the ratio of tire diameter to dynamometer drum or roll diameter, the number of tire contact points, and the tire deflection. The recommended method of programming the dynamometer as a function of vehicle speed is to use observed data from on-the-road testing. In this case, the road load points shall be set by matching the electric drive input volt-amperes to equal the observed road load input power over the intended test speed range.

(d) Tests shall be run with the dynamometer flywheel engaged and with the equivalent inertial weight schedule shown in Table 1.

TABLE 1—INERTIAL WEIGHT SCHEDULE

Loaded Vehicle Weight, lb	Equivalent Inertia Weight, lb
Up to 1125	1000
1126–1375	1250
1376–1625	1500
1626–1875	1750
1876–2125	2000
2126–2375	2250
2376–2625	2500
2626–2875	2750
2876–3250	3000
3251–3750	3500

4.2.3 END POINT—The end point of driving range is defined as the point at which the vehicle has ceased to meet the prescribed driving schedule in terms of acceleration or maximum speed.

4.2.4 DEFINITION OF "RESIDENTIAL AREA DRIVING CYCLE"—The vehicle shall be operated according to the schedule of acceleration, constant speed, deceleration, and idle intervals, shown in Table 2, in a repeating manner.

TABLE 2—TEST SCHEDULE FOR RESIDENTIAL DRIVING CYCLE

Mode	Average Acceleration, mph/s	Time, s	Cumulative Time, s
Idle	0	20	20
0–30 mph	2.14	14	34
30 mph constant	0	15	49
30–15 mph	–1.37	11	60
15 mph constant	0	15	75
15–30 mph	1.20	12.5	87.5
30 mph constant	0	46.5	134
30–20 mph	–1.20	8	142
20–0 mph	–2.50	8	150
Repeat cycle			