



24th November 2015

Mr. David Wright
Vehicle Programs and Compliance Division
Environmental Protection Agency
2000 Traverwood,
Ann Arbor, MI 48105

Subject: Request for issuance of a new certificate of Conformity - 2016 MY Model S Dual Motor

Tesla Motors Inc. requests that the CARB issue a new Executive Order for the subject test group.

Attached to this request is the Part 1 Application along with a copy of the EPA certificate of Conformity. Tesla believes that the test group complies with all applicable regulations contained within Title 40

Of the CFR, California Amendments to Subparts B, C, and S, Part 86 and Part 88, Title 40 of the CFR and Title 13 of the California Code of Regulations

Vehicle Category:	PC (0-3750 LVW)
Durability Group:	GTSLEEEEN001
Test Group:	GTSLV00.0L1S
Summary Sheet No:	NA
Durability Group Description:	NA
Durability Vehicle:	NA
OBD Group:	NA
Test Group Description:	ZEV - BATTERY ELECTRIC VEHICLE
Applicable Standards:	CALIFORNIA ZEV AND FEDERAL BIN1 LDV PC
Carlines Covered by Evaporative Family:	0.0L1S Tesla Model S (85kwh, 70KWh, 90kWh)
NA	
Vehicles Tested:	MS213-01 MS212-01

Your early review and issuance of the certificate will be greatly appreciated. If you have any questions, please contact me at our office at (510) 249-8749

Sincerely,

Suraj Nagaraj
Director – Vehicle Homologation

3500 Deer Creek Road, Palo Alto, CA 94304 phone 650-681-5000 fax 650-681-5200

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01.00 COMMUNICATIONS

01.01 ***Mailing information***

01.01.01 ***Certification information***

Tesla Motors Inc
3500 Deer Creek Road
Palo Alto, CA 94304

01.01.02 ***Responsible officials***

02 Mr Suraj Nagaraj (Primary Contact)
Director- Vehicle Homologation
03 Telephone 510-249-8749

Mr James Chen,
VP, Regulatory affairs.
Telephone 202 549 9819

03.00 FACILITIES, EQUIPMENT AND TEST PROCEDURES

See attached range test reports.

03.01 *Procedure to determine mass emissions of the fuel-fired heater*

Not applicable; vehicle not equipped with a fuel fired heater.

03.02 *Battery pre-conditioning procedures*

The lithium ion battery cells are cycled by the battery cell manufacturer before they are assembled into battery packs.

There is no further pre-conditioning necessary.

03.03 *Test Vehicle Description*

Test Group	GTSLV00.0L1S
Evaporative Family	Battery Electric Vehicle
Displacement	0.0L – Electric Motor
Engine Code 1	L1S
Emission Control System	NA
Exhaust	NA (BEV)
Evap.	NA (BEV)
Model	Model S
Transmission Type/Code	AV/1
Shift Schedule	NA
Estimated Test Weight	5000 lbs (85 kWh, 90kWh), 4750 lbs (60kWh), 4500 lbs (70kWh)
GVWR	NA
Road load HP	12.46
Final Drive	9.73
Tires	235/45R19 (Front) 235/45R19 (Rear)

NOTE: For complete vehicle information, see vehicle information submitted in VERIFY database.

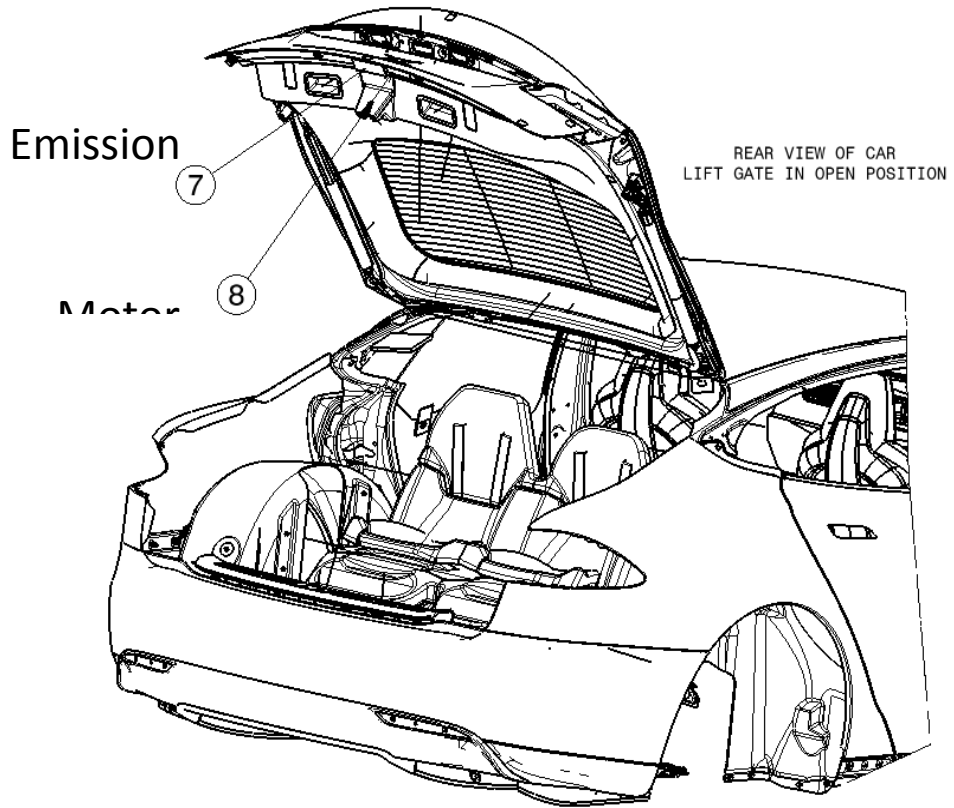
Data Vehicle Selection Justification – This vehicle represents the 33% optioned test weight class, highest total road load, and highest N/V ratio that are expected to be the worst case for emissions.

07.00

LABELS

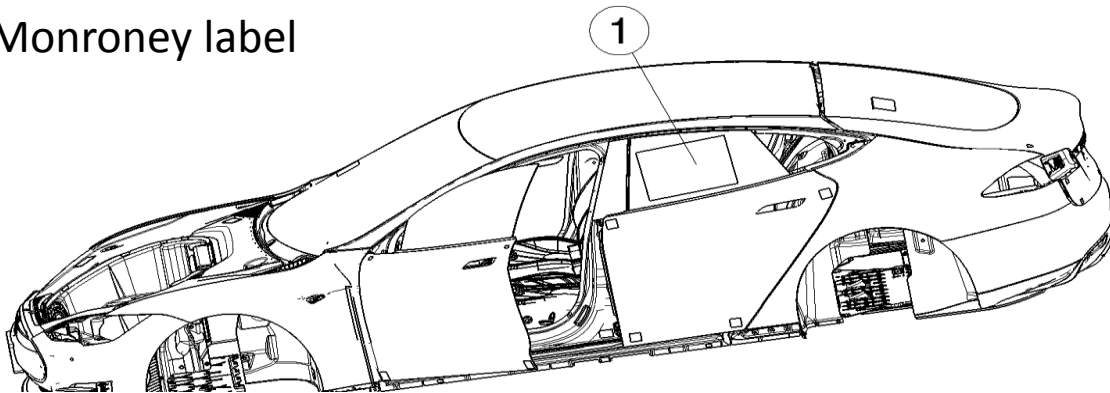
07.01

Label locations



See 07.02

Monroney label



See 07.03

07.02

Emission Control Information label: 2016 Model Year

(Mandated in CFR Title 40, Part 86; §86.1807. Label format agreed with EPA)

VEHICLE EMISSION CONTROL INFORMATION / INFORMATIONS SUR LE CONTRÔLE DES ÉMISSIONS DU VÉHICULE

MODEL/MODÈLE:	2016 TESLA MODEL S	THIS VEHICLE CONFORMS TO U.S. EPA REGULATIONS APPLICABLE TO 2016 MODEL YEAR NEW TIER 2 BIN 1 LIGHT DUTY VEHICLES AND TO CALIFORNIA REGULATIONS APPLICABLE TO 2016 MODEL YEAR NEW ZEV PASSENGER CARS. CE VÉHICULE EST CONFORME AUX NORMES DE L'USEPA APPLICABLES AUX VÉHICULES LÉGERS TIER 2 BIN 1 DE L'ANNÉE-MODÈLE 2016 ET AUX NORMES CALIFORNIENNES APPLICABLES AUX VÉHICULES À ZÉRO ÉMISSIONS DE L'ANNÉE-MODÈLE 2016.
MOTOR/MOTEUR:	3 PHASE AC INDUCTION	
TEST GROUP/GROUPE D'ESSAI:	G1SLV00.0LIS	
EVAPORATIVE FAMILY/FAMILLE DE GAZ D'ÉVAPORATION:	G1SLR0000LIS	

ZERO EMISSION VEHICLE / VÉHICULE À ZÉRO ÉMISSIONS

11020912-00-E

07.03

California Environmental Performance Index label: 2016 Model Year

(Mandated in California Environmental Performance Label Specifications for 2009 and Subsequent Model Passenger Cars, Light-Duty Trucks and Medium-Duty Passenger Cars. Label format agreed with EPA/ CARB)

70kWh

EPA DOT Fuel Economy and Environment **Electric Vehicle**

Fuel Economy
89 MPGe combined city/hwy
 88 city
 90 highway
 38 kW-hrs per 100 miles

Large cars range from 14 to 95 MPGe. The best vehicle rates 119 MPGe.

You save \$5,250 in fuel costs over 5 years compared to the average new vehicle.

Driving Range
 When fully charged, vehicle can travel about...
 0 50 100 150 200 **234** miles

Charge Time: 12 hours (240V)

Annual fuel COST \$750

Fuel Economy & Greenhouse Gas Rating (tailpipe only) **Smog Rating (tailpipe only)**

1 **10** **10** **10**
 Best Best

This vehicle emits 0 grams CO₂ per mile. The best vehicle emits 0 grams per mile (tailpipe only). Producing and distributing fuel also create emissions; learn more at fueleconomy.gov.

fueleconomy.gov
 Calculate personalized estimates and compare vehicles

Smartphone QR Code™
<http://fueleconomy.gov/qr?id=2016TSL001>

07.04 Projected sales information

08.00 GENERAL TECHNICAL DESCRIPTION

08.01 *Description of propulsion system*

The Tesla Model S propulsion system consists of a drive unit and a high voltage battery pack. The drive unit contains a single electric traction motor, a fixed gearbox, and the drive inverter.

The Model S drive unit is connected to the rear wheels via a fixed ratio transmission through the independent suspension-equipped rear axle.

08.02 *Description of motor(s)*

The Tesla motor is a 3-phase AC induction motor utilizing a four-pole, high-frequency design with inverter-controlled magnetic flux. Two versions of the motor are available; the Base motor and a sport motor.

08.03 *Description of batteries*

The battery packs used in the Tesla Model S is one of the largest and technically most advanced lithium-ion battery packs in the world. Using customized automotive grade lithium-ion cells, the Tesla battery achieves unmatched energy density and enables the long range capability of the vehicle. The low-profile flat packaging enables an efficient and functional occupant area. The battery has a replaceable fuse that is accessible with the battery removed from the vehicle and a set of contactors inside the pack that disconnect high voltage from the positive and negative terminals on the battery pack. To disable contactors from closing during vehicle service, the 12V power feed can be disconnected in the vehicle fuse box. The battery control system consists of the Battery Monitoring System (BMS) which controls the contactors, measures pack current and voltages, electrical isolation of the battery from chassis ground and monitors cell brick voltages, module temperatures, and faults from the Battery Monitor Boards (BMBs) installed on each of the many modules. The battery is rated at 400V and is capable of delivering in excess of 1000 Amperes. The battery mass is greater than 500 kg.

08.03.01 *Battery charging capacity*

The battery when fully charged contains approximately 70 kWh of energy based on the type of battery fitted onto the vehicle.

08.03.02 *Self-discharge information*

The self-discharge rate of the battery is likely to be less than 4% per month.

08.03.03 *Description of thermal management system*

The Tesla battery pack contains an integrated cooling system to ensure that the individual cells are maintained at, or close to, their optimum operating temperature. Incorporated in the vehicle system is an inline heating element to raise and a chiller to lower the pack temperature, when required.

08.03.04 *Definition of end-of-life*

The battery pack end-of-life shall be determined by Tesla's local service centers with proper inspection and test methods.

08.03.05 *Description of battery disposal plan*

Tesla Motors' lithium ion battery packs do not contain heavy metals such as lead, cadmium, or mercury. They are exempt from hazardous waste disposal standards in the USA under the Universal Waste Regulations. However, they do contain recyclable materials, and Tesla plans to recycle all battery packs removed from vehicles.

[Tesla highly recommends that all battery packs be taken to local Tesla service facilities and recycled by Tesla or Tesla authorized agencies, so](#) that the battery packs can be recycled in a safe and efficient manner.

If disposing independently, without return to Tesla, then the owner must assume responsibility for recycling in a safe and legal manner. If an owner does assume this responsibility, Tesla recommends consulting with the appropriate local, state or federal authorities to determine the appropriate methods for disposal and recycling. Keep in mind that disposal regulations may vary dependent on location.

For more information on the recycling of Tesla custom battery packs, please call Tesla Customer Service at 1-877-79TESLA (1-877-798-3752).

08.04

Description of controller / inverter

The drive inverter performs several critical functions in the Tesla Model S including torque control, power and torque limit enforcement, and status monitoring. The drive inverter is an integral part of the drive unit.

08.05

Description of transmission

The Tesla Model S transmission is a fixed ratio, mechanical, transversely mounted gearbox with integral final drive unit (transaxle configuration).

The shift lever is mounted to the steering column. The lever has four detents—one reverse, one drive, and two neutral positions. Selecting either forward or reverse position enables drive current to the motor to generate the appropriate torque. There is no physical reverse gear needed.

In addition, the lever has a park button which is used to operate the electrically-actuated park brake.

08.06 **Description of climate control system**

General Specifications:

The Model S climate control is a Dual Zone system with Automatic Temperature control. The modes include Defrost (Panel, Floor and any combination of these three). The system consists of four panel vents, two front row floor vents, defroster vent, second row floor vents, second row console vents with positive air shut off and turning vane manual control.

08.06.01 **Electric cabin heater**

The heater unit incorporating a variable speed electric fan is located in the front of the chassis tub with ducting directing the blown air to defrosting, face level and floor level vents in the passenger compartment. The heater element is of the positive temperature coefficient (PTC) type, drawing HV electrical energy from the battery pack High Voltage

08.06.02 **Fuel-fired heater**

Not applicable

08.06.03 **Air conditioning**

The Model S air conditioner system is an R134a refrigerant consists of a high voltage electric scroll type with integrated inverter with High Voltage Interlock Loop. The compressor Oil is Poly Olefin Ester oil that is non-conducting.

08.06.04 **Climate control system logic**

Remote Climate Control Module printed circuit board activates actuators and responds to evaporator air outlet temperature sensor, PTC heater outlet temperature sensor and air duct temperature sensors, as well as user demands from center display.

08.06.05 **Tamper resistance of climate control system that includes a fuel-fired heater**

Not applicable.

08.07 **Description of regenerative braking system**

Regenerative braking (RGB) occurs when the driver lifts their foot from the accelerator pedal while the vehicle is moving; the experience is analogous to engine braking on a gasoline-powered car with a conventional manual transmission. Because the Tesla Model S is a rear wheel drive vehicle, the system applies torque only to the rear wheels of the vehicle. The friction braking system of the Tesla Model S is independent of RGB.

The amount of RGB torque generated is proportional to accelerator pedal position – full torque when the accelerator pedal is fully released; less as the pedal is depressed, reaching zero torque when the pedal reaches its neutral torque position (a position that is in fact a function of vehicle speed). The max RGB deceleration also varies depending on vehicle speed. The maximum RGB profile is defined as a target total deceleration rate as a function of vehicle speed. The max RGB profile is tailored to everyday driving conditions, which typically exhibit higher deceleration rates at lower speeds.

When the battery pack is near maximum capacity, regenerative braking function will be limited to ensure the maximum capacity of the battery is not exceeded. Any RGB limiting will be ramped in gradually to allow the driver to adapt to the changing RGB performance. When the battery pack is below 0 degrees, RGB will not be allowed because the batteries are not rated to accept charge below this temperature. Any RGB limiting will be ramped in gradually to allow the driver to adapt to the changing RGB performance. . The vehicle notifies the driver of any limits of the regenerative braking function.

08.08 **Description of vehicle electrical supply equipment (charger)**

The Tesla Model S is capable of accepting energy either from a permanent facility installed at the owners location or from many readily available power outlets when 'on the road'.

The dedicated High Power Connector (HPC) can be purchased separately from the vehicle and a certified electrician will confirm the capabilities of the residential supply circuit at the vehicle owner's location. Confirmation of a satisfactory residential electrical

supply will lead to the installation of a hard-wired HPC unit, this will expedite vehicle charging at the most efficient rate. The HPC can supply available current up to a maximum of 80 amps and incorporates electronic systems that communicate with the vehicle control systems to indicate the maximum available current so that the vehicle can determine the amount and rate of charge required.

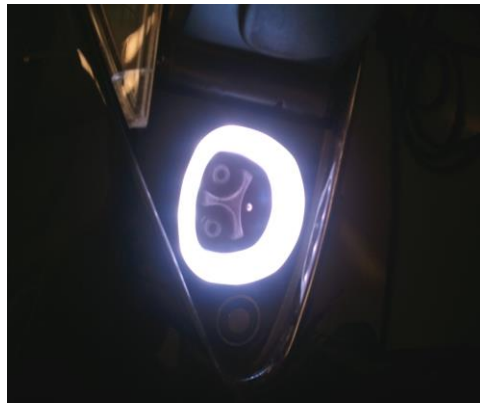
Charging at rates lower than 80A can also be achieved via a mobile connector. The universal mobile connector is included as standard in the purchase of every Model S and is an individual cable that connects the vehicle to any available domestic power outlet and can deliver current to a maximum of 40 amps. The Mobile Connector incorporates the same electronic circuitry as the HPC to communicate with the vehicle and manage the charging process.

The vehicle is also capable of accepting DC current up to 225A from an off-board charger (Supercharger).

08.08.01 ***Proper recharging procedures***

The charging system adjusts automatically to the available AC line voltage, frequency and current, within limits. The charging system in the vehicle works in conjunction with either of the three external charging stations; the permanently installed HPC, the permanently installed supercharger or the portable Mobile Connector.

Anytime the EV Inlet door is opened, the vehicle will prepare to enter CHARGE state. Once the user connects either supply cable to the vehicle, the charging system signals to the vehicle that it is ready to deliver the charge. The vehicle locks the cable onto the vehicle and then indicates that it is ready to accept energy and charging will commence. Failure of any of these steps will result in fault condition and lack of charge.



Prepare to charge state



Charging Indication

If the battery temperature is near or below freezing temperatures, normal charging will not occur. The vehicle will identify this condition and will begin heating the battery coolant and circulating the coolant to raise the battery temperature to enable charge. When the pack temperature rises to a temperature within the allowable charging range, heating will reduce or stop and charging will commence.

- 08.08.02 **Power requirements necessary to recharge vehicle**
If there are two on-board chargers installed in the vehicle it is designed to accept AC current from 110-120V or 208-240V outlets with a supply of up to 80A. If there is a single on-board charger installed in the vehicle, then the AC current will be limited to 40A.
- 08.10 **Other unique features (i.e. solar panels)**
Not applicable; vehicle is not equipped with any such features.
- 08.11 **Description of warning system(s) for maintenance / malfunction**
The Tesla Model S is equipped with a tell-tale lamp located in the instrument pack to indicate battery malfunctions; the lamp illuminates yellow for a minor defect and red for a major fault.

The tell-tale is complemented by more detailed information exhibited on the 17" Center Display. An additional driver aid which indicates the nature of the malfunction as well as a wide range of additional vehicle data, such as when maintenance is needed.
- 08.11.01 **Cut-off terminal voltages for prevention of battery damage**
The control electronics inside of the Drive Unit and Charger are programmed not to allow the unit to drive the voltage of the battery above or below hard voltage limits. If the battery pack is unable to achieve a desired response from these systems and the voltage reaches above or below a set limit, the two contactors inside the battery pack will open, disabling the entire high voltage system in the car.

11.00 **STARTING AND SHIFTING SCHEDULES**

11.01 ***Starting***

The Model S does not have a traditional starter switch and instead has a smart entry system for greater safety and customer convenience. The smart entry system comprises of a smart key, a weight sensor embedded into the driver seat, and the brake pedal. When the driver enters the vehicle with the smart key and sits on the driver's seat, the vehicle controller, attempts to validate the unique key code by reading the key code. If successful interaction between the coded key and vehicle controller occurs, the system deactivates the immobilizer. The vehicle then enters accessory mode analogous to a "ACC" position on a conventional IC engine. In this mode, low voltage (12V) is supplied to the vehicle allowing operation of the radio and other accessories connected to the accessory rail. High Voltage (HV) necessary to enable vehicle propulsion is enabled only by the closing of the contactors, which can only be triggered when the following conditions are both satisfied,

1. Smart key is detected and key code is validated AND
2. Brake pedal is depressed.

By requiring brake pedal activation, along with the appropriate key code, this system ensures the safety of vehicle occupants by not allowing self mobility of the vehicle without the driver providing proper control inputs (i.e., service brake activation) and appropriate driver authorization (i.e., presence of the key code). If either the service brake is not activated or the key code not present, the vehicle controller will not close the connectors and self-mobility is not possible.

If the brake pedal is depressed and the proper key code present, the drive rail will activate and allows the transmission to be shifted out of Park.

11.02 ***Shifting***

Not applicable – the vehicle has a single-speed transmission.

12.00

16.00 **RESERVED**

17.00 **CALIFORNIA REQUIREMENTS**

17.01 ***Statement of compliance***

17.01.01 ***General statement***

The production vehicles which are subject to registration or sale in the State of California will be, in all material respects, substantially the same in construction as test vehicles which are certified by the California Air Research Board; and will meet all the applicable emissions standards which are promulgated by the California Air Research Board in accordance with Section 43101 of the Health and Safety Code.

Tesla attests that the vehicle emission control label complies with the label durability requirements of the "California Motor Vehicle Emission Control and Smog Index Label Specifications", Title 13, CCR, Section 1965.

17.01.02 ***Driveability statement***

This statement is no longer included in the California Exhaust Emission Standards and Test Procedures for 2001 and Subsequent Model Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles (as of January 01 2006); as was the case in previous versions.

17.02 ***Supplemental data and certification review sheets***

See attached

- 17.03 **Engineering evaluation of zero evaporative emissions under any and all operating conditions (for vehicles equipped with fuel-fired heater only)**
Not applicable; vehicle is not equipped with fuel-fired heater.
- 17.04 **Credits**
- 17.04.01 **Description of multi-manufacturer arrangements**
Not applicable; Tesla Motors has no such agreements in place.
- 17.04.02 **Credit calculation**
Tesla Motors, a manufacturer that produces only pure battery electric vehicles is not required to produce a percentage of annual production volume as ZEV's and therefore will earn such credit on all 2013 to 2018, inclusive, model year vehicles. This vehicle is a full function ZEV with a range depending on the battery pack option chosen by the customer. Based on the UDDS of range 330km, 330km and 314km, the 85kWh, 90kWh and 70kWh respectively, all these variants will be classified as a Type III ZEV and Under the table in 13 CCR 1962.1(d)(5)(C), this means 2013 to 2017, they will earn 4 credits per vehicle.
- 17.05 **Vehicle safety**
- 17.05.01 **All information for safe operation of vehicle**
Tesla Motors will submit a copy of the finalised vehicle owner's handbook by separate letter when it becomes available.
- 17.05.02 **Information on safe handling of battery system**
HANDLING
Do not short circuit, puncture, incinerate, crush, immerse, force discharge, or expose the battery pack to temperatures outside the specified maximum storage temperature range of -20°C to 60°C.
The battery pack has a nominal operating voltage of 400 VDC. The battery pack is sealed in a rigid metal case and its exterior is isolated from high voltage. Handling the battery pack is electrically safe provided the enclosure remains closed.
The battery pack contains hermetically sealed lithium ion cells that contain a number of chemicals and materials of construction. Risk of exposure to electrode materials and liquid electrolyte will only occur in cases of mechanical or thermal abuse of the battery pack.
- STORAGE**
Do not store the battery pack in a manner that allows terminals to short circuit. Do not place near heating equipment, nor expose to direct sunlight for long periods. The battery pack should only be stored in approved packaging and stacked no more than two (2) packages high. To maintain service life, the battery pack should be stored at a state of charge (SOC) of 15 to 50%.
- TRANSPORT**
Lithium ion batteries are regulated as Class 9 Miscellaneous dangerous goods (also known as "hazardous materials") pursuant to the International Civil Aviation Organization (ICAO) Technical Instructions for the Safe Transport of Dangerous Goods by Air, International Air Transport Association (IATA) Dangerous Goods Regulations, the International Maritime Dangerous Goods (IMDG) Code, European Agreements concerning the International Carriage of Dangerous Goods by Rail (RID) and Road (ADR), and applicable national regulations such as the USA's hazardous materials regulations (see 49 CFR 173.185). These regulations contain very specific packaging, labelling, marking, and documentation requirements. The regulations also require that individuals involved in the preparation of dangerous goods for transport be trained on how to properly package, label, mark and prepare shipping documents.

17.05.03

Description of emergency procedures

HIGH VOLTAGE EXPOSURE

If one of the Tesla products has been visibly damaged or its enclosure compromised, then practice appropriate high voltage preventative measures until the danger has been assessed (and dissipated if necessary).

FIREFIGHTING MEASURES

If a fire or explosion occurs when the battery pack is charging, shut off power to the charger. In case of burning lithium ion fires, flood the area with water. The water may not extinguish them, but will cool the adjacent batteries and control the spread of the fire. CO₂, dry chemical and foam extinguishers are preferred for small fires, but also may not extinguish burning lithium ion batteries. Burning batteries will burn themselves out. Virtually all fires involving lithium ion batteries can be controlled with water. When water is used, however, hydrogen gas may be a by-product which can form an explosive mixture with air. LITH-X (powdered graphite) or copper powder fire extinguishers, sand, dry ground dolomite or soda ash may also be used. These materials act as smothering agents.

Damaged or opened cells or batteries can result in rapid heating (due to exothermic reaction of constituent materials) and the release of flammable vapors. Water (and other items listed above) disperses heat when applied in sufficient quantity to a fire. Extended heat exposure can lead to ignition of adjacent cells with a potential complete envelopment of the battery pack if not cooled. An extinguished lithium ion battery fire can re-ignite due to the exothermic reaction of constituent materials from broken or damaged cells. To avoid this, remove sources of ignition and cool the burned mass by flooding with (or immersing in) water. Fire-fighters should wear self-contained breathing apparatus. Cells or batteries may flame or leak potentially hazardous organic vapours if exposed to excessive heat, fire or over voltage conditions. These vapours include HF, oxides of carbon, aluminium, lithium, copper, and cobalt. Additionally, volatile phosphorus pentafluoride may form at temperatures above 230° Fahrenheit.

Never cut into the sealed battery pack enclosure due to the high voltage and electrocution risks.

If a decision is made to fight a battery fire aggressively, then large amounts of water should be applied from a safe distance with the intent of flooding the battery pack enclosure as completely as possible. Alternatively, if a decision is made to fight a battery fire defensively, then the fire crew should pull back a safe distance and allow the battery to burn itself out. Fire crews may choose to utilize a water stream or fog pattern to protect exposures or control the path of smoke.

FIRST AID MEASURES

Under normal conditions of use, the constituent battery cells are hermetically sealed. Contents of an open (broken) constituent battery cell can cause skin irritation and/or chemical burns.

If materials from a ruptured or otherwise damaged cell or battery contact skin, flush immediately with water and wash affected area with soap and water. For eye contact, flush with significant amounts of water for 15 minutes and see physician at once. Avoid inhaling any vented gases. If a chemical burn occurs or if irritation persists, seek medical assistance.

Seek immediate medical assistance if an electrical shock or electrocution has occurred (or is suspected).

17.06

Description of fuel-fired heater / fuel tank evaporative system

Not applicable; vehicle is not equipped with fuel-fired heater.

18.00 EMISSION DATA VEHICLE

85 KWH (MS312-01)

CD UDDS Test (Test # CTSL10021419)
AC Recharge Energy: 95.507 kWh
Unadjusted: 330.007. miles
CD FE Equivalent Unadjusted: 110.4 mpg_e
CO2 Composite Adjusted: 0 g/mi (factors into 0 g/mi on FE label)

CD Highway Test (Test # CTSL10021418)
AC Recharge Energy: 95.507 kWh
(AER) Unadjusted: 335.147 miles
CD FE Equivalent Unadjusted: 113.2 mpg_e
CO2 Composite Adjusted: 0 g/mi (factors into 0 g/mi on FE label)

70 KWH (MS312-01)

CD UDDS Test
AC Recharge Energy: 79.126
(AER) Unadjusted: 314.0
CD FE Equivalent Unadjusted: 110.4 mpg_e
CO2 Composite Adjusted: 0 g/mi (factors into 0 g/mi on FE label)

CD Highway Test
AC Recharge Energy: 79.38
(AER) Unadjusted: 315.0
CD FE Equivalent Unadjusted: 113.2 mpg_e
CO2 Composite Adjusted: 0 g/mi (factors into 0 g/mi on FE label)

90 KWH (MS312-01)

CD UDDS Test
AC Recharge Energy: 95.507 kWh
(AER) Unadjusted: 330.007. miles
CD FE Equivalent Unadjusted: 110.4 mpg_e
CO2 Composite Adjusted: 0 g/mi (factors into 0 g/mi on FE label)

CD Highway Test
AC Recharge Energy: 95.507 kWh
Rcda (AER) Unadjusted: 335.147 miles
CD FE Equivalent Unadjusted: 113.2 mpg_e
CO2 Composite Adjusted: 0 g/mi (factors into 0 g/mi on FE label)

2016 MODEL-YEAR AIR RESOURCES BOARD
 SUPPLEMENTAL DATA SHEET
 ZEV-PASSENGER CARS, LIGHT-DUTY TRUCKS AND MEDIUM DUTY VEHICLES
70 kWh

Manufacturer: Tesla Motors Inc Engine Family: GTSLV00.0L1S

Vehicle Class(es): PC LDT1 LDT2 MDV2 MDV3 MDV4 MDV5

Number of ZEV Credits per vehicle: 4

Fuel Type: Electro-chemical Battery Fuel Cell Capacitor Other (specify) _____

Battery Type(s): Lead Acid Nickel Cadmium SBLA Sodium Sulphur

Sodium Nickel Chloride Nickel Metal Lithium Metal Disulfide

Zinc Air Zinc Bromine Lithium Ion Other (specify) _____

Total Battery Weight 536 kg Total Battery Volume .0.355 m³ Battery Specific Energy 140 Wh/kg

Number of batteries or modules per vehicle: 1 (one) Total Battery Voltage: 350 nominal

Charger(s): On-Board Off-board Conductive Inductive

Drive Motor(s): AC Induction DC Brush DC Brushless

Switched Reluctance Other (specify) _____

Number of Drive Motor(s): 1 (one) Rated Motor Power 285 kW @ 7,000 rpm Max rpm 14,000

Drive: FWD RWD 4WD-FT 4WD-PT

Regenerative Braking: No Yes FW RW AW

Driver Controlled Regen Braking: Yes No Coast Regen Braking: Yes No

Air Conditioning: Yes No

Fuel-fired Heater: No Fuel Type: Gas Diesel CNG LNG

LPG Other (specify) _____ Rated Heat Power: _____ kW

Vehicle Models (if coded, see attachments)	Transmission Type; M5, A4 (if applicable)	GVWR kg (lbs)	Curb Weight kg (lbs)	ETW or Test Weight kg (lbs)	DPA / RLHP or Dyno Coefficient a=, b=, c=
70kWh	A1	2590 (5698)	1970 (4349)	2040 (4500)	a=43.62, b=0.1984, c= 0.016085

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2016 MODEL-YEAR AIR RESOURCES BOARD
 SUPPLEMENTAL DATA SHEET
 ZEV-PASSENGER CARS, LIGHT-DUTY TRUCKS AND MEDIUM DUTY VEHICLES
70 kWh

Manufacturer: Tesla Motors Inc.

Engine Family: GTSLV00.0L1S

Range Test Results:								
Vehicle ID	Trans	(check one)		City Range	System AC (Wh/mile)	System DC (Wh/mile)	Vehicle DC (Wh/mile)	
		TW <u> </u> X <u> </u>	ETW <u> </u>					DPA <u> </u> X <u> </u> or Dyno Coefficient
MS312-01	n/a	4500		12.46	314.06	252.90	225.74	
					Highway Range	System AC (Wh/mile)	System DC (Wh/mile)	Vehicle DC (Wh/mile)
					315.09	252.72	225.58	225.58

Battery Test Results: Specific Energy: 140 Wh/kg

Fuel-fired Heater Test Results (emission results in grams / mile): Not applicable

NMHC	CO	NOx
Not applicable	Not applicable	Not applicable

Remarks:

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2015 MODEL-YEAR AIR RESOURCES BOARD
 SUPPLEMENTAL DATA SHEET
 ZEV-PASSENGER CARS, LIGHT-DUTY TRUCKS AND MEDIUM DUTY VEHICLES
85 kWh

Manufacturer: Tesla Motors Inc Engine Family: GTSLV00.0L1S

Vehicle Class(es): PC LDT1 _____ LDT2 _____ MDV2 _____ MDV3 _____ MDV4 _____ MDV5 _____

Number of ZEV Credits per vehicle: 4

Fuel Type: Electro-chemical Battery Fuel Cell _____ Capacitor _____ Other (specify) _____

Battery Type(s): Lead Acid _____ Nickel Cadmium _____ SBLA _____ Sodium Sulphur _____

Sodium Nickel Chloride _____ Nickel Metal _____ Lithium Metal Disulfide _____

Zinc Air _____ Zinc Bromine _____ Lithium Ion Other (specify) _____

Total Battery Weight 595 kg Total Battery Volume .0.355 m³ Battery Specific Energy 144.1 Wh/kg

Number of batteries or modules per vehicle: 1 (one) Total Battery Voltage: 350 nominal

Charger(s): On-Board Off-board _____ Conductive Inductive _____

Drive Motor(s): AC Induction DC Brush _____ DC Brushless _____

Switched Reluctance _____ Other (specify) _____

Number of Drive Motor(s): 1 (one) Rated Motor Power 285 kW @ 7,000 rpm Max rpm 14,000

Drive: FWD _____ RWD 4WD-FT _____ 4WD-PT _____

Regenerative Braking: No _____ Yes FW _____ RW AW _____

Driver Controlled Regen Braking: Yes _____ No Coast Regen Braking: Yes No _____

Air Conditioning: Yes No _____

Fuel-fired Heater: No _____ Fuel Type: Gas _____ Diesel _____ CNG _____ LNG _____

LPG _____ Other (specify) _____ Rated Heat Power: _____ kW

Vehicle Models (if coded, see attachments)	Transmission Type; M5, A4 (if applicable)	GVWR kg (lbs)	Curb Weight kg (lbs)	ETW or Test Weight kg (lbs)	DPA / RLHP or Dyno Coefficient a=, b=, c=
85kWh	A1	2590 (5709)	1947 (4408)	2272 (5000)	a=43.62, b=0.1984, c= 0.016085

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2015 MODEL-YEAR AIR RESOURCES BOARD
 SUPPLEMENTAL DATA SHEET
 ZEV-PASSENGER CARS, LIGHT-DUTY TRUCKS AND MEDIUM DUTY VEHICLES
85 kWh

Manufacturer: Tesla Motors Inc

Engine Family: GTSLV00.0L1S

Range Test Results:							
Vehicle ID	Trans	(check one)		City Range	System AC (Wh/mile)	System DC (Wh/mile)	Vehicle DC (Wh/mile)
		<u> </u> TW <u> X </u> ETW <u> </u>	<u> </u> DPA <u> X </u> RLHP <u> </u> or Dyno Coefficient				
MS312-01	n/a	5000		12.46	330.007	305.38	250.9
				Highway Range	System AC (Wh/mile)	System DC (Wh/mile)	Vehicle DC (Wh/mile)
				335.147	297.73	245.56	245.56

Battery Test Results: Specific Energy: 144.1 * Wh/kg

* Energy discharged at C/3 rate 83000 Wh (taken from Tesla test report) / 595 kg (battery pack total mass)

Fuel-fired Heater Test Results (emission results in grams / mile): Not applicable

<u>NMHC</u>	<u>CO</u>	<u>NOx</u>
Not applicable	Not applicable	Not applicable

Remarks:

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**2016 MODEL-YEAR AIR RESOURCES BOARD
 SUPPLEMENTAL DATA SHEET
 ZEV-PASSENGER CARS, LIGHT-DUTY TRUCKS AND MEDIUM DUTY VEHICLES
 90 kWh**

Manufacturer: Tesla Motors Inc Engine Family: GTSLV00.0L1S

Vehicle Class(es): PC LDT1 _____ LDT2 _____ MDV2 _____ MDV3 _____ MDV4 _____ MDV5 _____

Number of ZEV Credits per vehicle: 4

Fuel Type: Electro-chemical Battery Fuel Cell _____ Capacitor _____ Other (specify) _____

Battery Type(s): Lead Acid _____ Nickel Cadmium _____ SBLA _____ Sodium Sulphur _____

Sodium Nickel Chloride _____ Nickel Metal _____ Lithium Metal Disulfide _____

Zinc Air _____ Zinc Bromine _____ Lithium Ion Other (specify) _____

Total Battery Weight 595 kg Total Battery Volume .0355 m³ Battery Specific Energy 144 Wh/kg

Number of batteries or modules per vehicle: 1 (one) Total Battery Voltage: 350 nominal

Charger(s): On-Board Off-board _____ Conductive Inductive _____

Drive Motor(s): AC Induction DC Brush _____ DC Brushless _____

Switched Reluctance _____ Other (specify) _____

Number of Drive Motor(s): 1 (one) Rated Motor Power 285 kW @ 7,000 rpm Max rpm 14,000

Drive: FWD _____ RWD 4WD-FT _____ 4WD-PT _____

Regenerative Braking: No _____ Yes FW _____ RW AW _____

Driver Controlled Regen Braking: Yes _____ No Coast Regen Braking: Yes No _____

Air Conditioning: Yes No _____

Fuel-fired Heater: No _____ Fuel Type: Gas _____ Diesel _____ CNG _____ LNG _____

LPG _____ Other (specify) _____ Rated Heat Power: _____ kW

Vehicle Models (if coded, see attachments)	Transmission Type; M5, A4 (if applicable)	GVWR kg (lbs)	Curb Weight kg (lbs)	ETW or Test Weight kg (lbs)	DPA / RLHP or Dyno Coefficient a=, b=, c=
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90kWh	A1	2590 (5709)	1947 (4408)	2272 (5000) a=43.62, b=0.1984, c= 0.016085
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2016 MODEL-YEAR AIR RESOURCES BOARD
SUPPLEMENTAL DATA SHEET
ZEV-PASSENGER CARS, LIGHT-DUTY TRUCKS AND MEDIUM DUTY VEHICLES
90 kWh

Manufacturer: Tesla Motors Inc

Engine Family: GTSLV00.0L1S

Range Test Results:							
Vehicle ID	Trans	(check one) TW <u>X</u> ETW	(check one) DPA <u>X</u> RLHP or Dyno Coefficient	City Range	System AC (Wh/mile)	System DC (Wh/mile)	Vehicle DC (Wh/mile)
MS312-01	n/a	5000	12.46	330.007	305.38	250.9	250.9
				Highway Range	System AC (Wh/mile)	System DC (Wh/mile)	Vehicle DC (Wh/mile)
				335.147	297.73	245.56	245.56

Battery Test Results: Specific Energy: 144.1 Wh/kg

Fuel-fired Heater Test Results (emission results in grams / mile): Not applicable

NMHC	CO	NOx
Not applicable	Not applicable	Not applicable

Remarks:
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