B60L  PROPELISION OF ELECTRICALLY-PROPELLED VEHICLES (arrangements or mounting of electrical propulsion units or of plural diverse prime-movers for mutual or common propulsion in vehicles B60K 1/00, B60K 6/20; arrangements or mounting of electrical gearing in vehicles B60K 17/12, B60K 17/14; preventing wheel slip by reducing power in rail vehicles B61C 15/08; dynamo-electric machines H02K; control or regulation of electric motors H02P); SUPPLYING ELECTRIC POWER FOR AUXILIARY EQUIPMENT OF ELECTRICALLY-PROPELLED VEHICLES (electric coupling devices combined with mechanical couplings of vehicles B60D 1/64; electric heating for vehicles B60H 1/00); ELECTRODYNAMIC BRAKE SYSTEMS FOR VEHICLES IN GENERAL (control or regulation of electric motors H02P); MAGNETIC SUSPENSION OR LEVITATION FOR VEHICLES; MONITORING OPERATING VARIABLES OF ELECTRICALLY-PROPELLED VEHICLES; ELECTRIC SAFETY DEVICES FOR ELECTRICALLY-PROPELLED VEHICLES

NOTES
1. This subclass, subject to the above references, covers:
   • feeding of power to auxiliary circuits;
   • current collectors; arrangements thereof on rail or road vehicles or on vehicles in general
   • electrodynamic brake systems;
   • electric propulsion of vehicles; control and regulation therefor
2. In this subclass it is desirable to classify any "additional information" which is of interest for search.

WARNING
In this subclass non-limiting references (in the sense of paragraph 39 of the Guide to the IPC) may still be displayed in the scheme.

1/00 Supplying electric power to auxiliary equipment of vehicles (circuit arrangements for charging batteries H02J 7/00)
1/003 . . (to auxiliary motors, e.g. for pumps, compressors)
1/006 . . (to power outlets)
1/02 . . to electric heating circuits
1/04 . . . fed by the power supply line
1/06 . . . . using only one supply
1/08 . . . . . Methods and devices for control or regulation
1/10 . . . . with provision for using different supplies
1/12 . . . . . Methods and devices for control or regulation
1/14 . . . to electric lighting circuits
1/16 . . . fed by the power supply line
1/20 . . . (Energy regeneration from auxiliary equipment)

3/00 Electric devices on electrically-propelled vehicles for safety purposes; Monitoring operating variables, e.g. speed, deceleration or energy consumption (methods or circuit arrangements for monitoring or controlling batteries or fuel cells B60L 58/00)

WARNING
Group B60L 3/00 is impacted by reclassification into groups B60L 58/00, B60L 58/10, B60L 58/12, B60L 58/13, B60L 58/14, B60L 58/15, B60L 58/16, B60L 58/18, B60L 58/19, B60L 58/20, B60L 58/21, B60L 58/22, B60L 58/24, B60L 58/25, B60L 58/26, B60L 58/27, B60L 58/30, B60L 58/31, B60L 58/32, B60L 58/33, B60L 58/34, and B60L 58/40.

All groups listed in this Warning should be considered in order to perform a complete search.
Current collectors for power supply lines of electrically-propelled vehicles (current collectors in general H01R 41/00)

5/005  .  [without mechanical contact between the collector and the power supply line]
5/002  .  with ice-removing device
5/004  .  using rollers or sliding shoes in contact with trolley wire (B60L 5/40 takes precedence)
5/045  .  [with trolley wire finders]

5/06  .  Structure of the rollers or their carrying means
5/08  .  Structure of the sliding shoes or their carrying means
5/085  .  [with carbon contact members]
5/10  .  Devices preventing the collector from jumping off
5/12  .  Structural features of poles or their bases
5/14  .  Devices for automatic lowering of a jumped-off collector
5/16  .  Devices for lifting and resetting the collector (B60L 5/34 takes precedence)
5/18  .  using bow-type collectors in contact with trolley wire
5/19  .  using arrangements for effecting collector movement transverse to the direction of vehicle motion
5/20  .  Details of contact bow
5/205  .  [with carbon contact members]
5/22  .  Supporting means for the contact bow
5/24  .  Pantographs
5/26  .  Half pantographs, e.g. using counter rocking beams
5/28  .  Devices for lifting and resetting the collector
5/30  .  .  .  using springs
5/32  .  .  .  using fluid pressure
5/34  .  .  .  with devices to enable one vehicle to pass another one using the same power supply line
5/36  .  .  .  with means for collecting current simultaneously from more than one conductor, e.g. from more than one phase
5/38  .  .  .  for collecting current from conductor rails (B60L 5/40 takes precedence)
5/39  .  .  .  from third rail
5/40  .  .  .  for collecting current from lines in slotted conduits
5/42  .  .  .  for collecting current from individual contact pieces connected to the power supply line

Electrodynamic brake systems for vehicles in general

7/003  .  [Dynamic electric braking by short circuiting the motor]
7/006  .  [Dynamic electric braking by reversing current, i.e. plugging]
7/02  .  Dynamic electric resistor braking (B60L 7/22 takes precedence)
7/04  .  .  .  for vehicles propelled by dc motors
7/06  .  .  .  for vehicles propelled by ac motors
7/08  .  .  .  Controlling the braking effect (B60L 7/04, B60L 7/06 take precedence)
7/10  .  Dynamic electric regenerative braking (B60L 7/22 takes precedence)
7/12  .  .  .  for vehicles propelled by dc motors
7/14  .  .  .  for vehicles propelled by ac motors
7/16  .  .  .  for vehicles comprising converters between the power source and the motor
7/18  .  .  .  Controlling the braking effect (B60L 7/12, B60L 7/14, B60L 7/16 take precedence)
7/20  .  Braking by supplying regenerated power to the prime mover of vehicles comprising engine-driven generators
7/22  .  Dynamic electric resistor braking, combined with dynamic electric regenerative braking
7/24  .  .  .  with additional mechanical or electromagnetic braking
Electric propulsion with power supply from forces of nature, e.g. sun or wind

- Converting light into electric energy, e.g. by using photo-voltaic systems
- Converting flow of air into electric energy, e.g. by using wind turbines

Electric propulsion with power supply external to the vehicle (electric propulsion for monorail vehicles, suspension vehicles or rack railways; B60L 13/00; in combination with batteries or fuel cells within the vehicle: B60L 50/53)

WARNING

Group B60L 9/00 is impacted by reclassification into group B60L 50/53.
Groups B60L 9/00 and B60L 50/53 should be considered in order to perform a complete search.

Electric propulsion with power supply external to the vehicle (electric propulsion for monorail vehicles, suspension vehicles or rack railways; B60L 13/00; in combination with batteries or fuel cells within the vehicle: B60L 50/53)

- Suspension of the vehicle-borne motorparts
- Electric propulsion by linear motors
- Magnetic suspension or levitation for vehicles (tracks for Maglev-type trains E01B 25/30; electromagnets per se H01F 7/06; linear motors per se H02K 41/00)

Methods, circuits, or devices for controlling the traction-motor speed of electrically-propelled vehicles

- for control of propulsion for monorail vehicles, suspension vehicles or rack railways; for control of magnetic suspension or levitation for vehicles for propulsion purposes
- for automatic control superimposed on human control to limit the acceleration of the vehicle, e.g. to prevent excessive motor current (electric devices for safety purposes B60L 3/00)
- with circuits controlled by relays or contactors
- with main controller driven by a servomotor (B60L 15/18 takes precedence)
- without contact making and breaking, e.g. using a transducer
Electric propulsion with power supplied within the vehicle (with power supply from force of nature, e.g., sun or wind, B60L 8/00; for monorail vehicles, suspension vehicles or rack railways B60L 13/00)

- using propulsion power supplied by engine-driven generators, e.g., generators driven by combustion engines
- using DC generators and DC motors
- using AC generators and DC motors
- using AC generators and AC motors
- with additional electric power supply (with capacitors charged by engine-driven generators B60L 50/40; with batteries charged by engine-driven generators B60L 50/61)
- with provision for separate direct mechanical propulsion
- using propulsion power generated by humans or animals
- using propulsion power stored mechanically, e.g., in fly-wheels
- using propulsion power supplied by capacitors
- using propulsion power supplied by batteries or fuel cells

**WARNING**

Group B60L 50/50 is impacted by reclassification into groups B60L 50/60, B60L 50/64, B60L 50/70, and B60L 50/75.

All groups listed in this Warning should be considered in order to perform a complete search.

- characterised by AC-motors
- characterised by DC-motors
- in combination with an external power supply, e.g., from overhead contact lines

**WARNING**

Group B60L 50/53 is incomplete pending reclassification of documents from group B60L 9/00.

Groups B60L 9/00 and B60L 50/53 should be considered in order to perform a complete search.

- using power supplied by batteries (in combination with fuel cells B60L 50/75)

**WARNING**

Group B60L 50/60 is incomplete pending reclassification from group B60L 50/50.

All groups listed in this Warning should be considered in order to perform a complete search.

- by batteries charged by engine-driven generators, e.g., series hybrid electric vehicles
- charged by low-power generators primarily intended to support the batteries, e.g., range extenders

**WARNING**

Group B60L 50/64 is incomplete pending reclassification of documents from group B60L 50/50.

Groups B60L 50/50 and B60L 50/64 should be considered in order to perform a complete search.

**WARNING**

Group B60L 50/70 is incomplete pending reclassification from group B60L 50/50.

All groups listed in this Warning should be considered in order to perform a complete search.

- Arrangement of fuel cells within vehicles specially adapted for electric vehicles
- Constructional details of fuel cells specially adapted for electric vehicles

**NOTE**

This group covers adaptation of fuel cell structures of electric vehicles, e.g., integration into control or safety systems, crash-resistant casings or vibration-damping means.

**WARNING**

Group B60L 50/75 is incomplete pending reclassification from groups B60L 50/50 and B60L 58/40.

All groups listed in this Warning should be considered in order to perform a complete search.

- using propulsion power supplied by both fuel cells and batteries

**WARNING**

Group B60L 50/50 is incomplete pending reclassification of documents from group B60L 9/00.

All groups listed in this Warning should be considered in order to perform a complete search.

- charged by low-power generators primarily intended to support the batteries, e.g., range extenders

**WARNING**

Group B60L 50/60 is incomplete pending reclassification from group B60L 50/50.

All groups listed in this Warning should be considered in order to perform a complete search.

- charged by low-power generators primarily intended to support the batteries, e.g., range extenders

**NOTE**

This group covers adaptation of battery structures of electric vehicles, e.g., integration into control or safety systems, crash-resistant casings or vibration-damping means.
53/00  Methods of charging batteries, specially adapted for electric vehicles; Charging stations or on-board charging equipment therefor; Exchange of energy storage elements in electric vehicles

**WARNING**

Group B60L 53/00 is impacted by reclassification into groups B60L 53/50, B60L 53/51, B60L 53/52, B60L 53/53, B60L 53/54, B60L 53/55, B60L 53/56, B60L 53/57, B60L 53/67, and B60L 53/68.

All groups listed in this Warning should be considered in order to perform a complete search.

53/10  . . characterised by the energy transfer between the charging station and the vehicle

**WARNING**

Group B60L 53/10 is incomplete pending reclassification of documents from group B60L 53/60.

Groups B60L 53/60 and B60L 53/10 should be considered in order to perform a complete search.

53/11  . . [DC charging controlled by the charging station, e.g. mode 4]

53/12  . . Inductive energy transfer

**WARNING**

Group B60L 53/12 is impacted by reclassification into groups B60L 53/122, B60L 53/124, and B60L 53/126.

All groups listed in this Warning should be considered in order to perform a complete search.

53/122 . . Circuits or methods for driving the primary coil, e.g. supplying electric power to the coil

**WARNING**

Group B60L 53/122 is incomplete pending reclassification of documents from group B60L 53/12.

Groups B60L 53/12 and B60L 53/122 should be considered in order to perform a complete search.

53/124 . . Detection or removal of foreign bodies

**WARNING**

Group B60L 53/124 is incomplete pending reclassification of documents from group B60L 53/12.

Groups B60L 53/12 and B60L 53/124 should be considered in order to perform a complete search.

53/126  . . Methods for pairing a vehicle and a charging station, e.g. establishing a one-to-one relation between a wireless power transmitter and a wireless power receiver

**WARNING**

Group B60L 53/126 is incomplete pending reclassification of documents from group B60L 53/12.

Groups B60L 53/12 and B60L 53/126 should be considered in order to perform a complete search.

53/14  . . Conductive energy transfer

**WARNING**

Group B60L 53/14 is impacted by reclassification into group B60L 53/18.

Groups B60L 53/14 and B60L 53/18 should be considered in order to perform a complete search.

53/16  . . Connectors, e.g. plugs or sockets, specially adapted for charging electric vehicles

53/18  . . Cables specially adapted for charging electric vehicles

**WARNING**

Group B60L 53/18 is incomplete pending reclassification of documents from group B60L 53/14.

Groups B60L 53/14 and B60L 53/18 should be considered in order to perform a complete search.

53/20  . . characterised by converters located in the vehicle

53/22  . . Constructional details or arrangements of charging converters specially adapted for charging electric vehicles

53/24  . . Using the vehicle's propulsion converter for charging

53/30  . . Constructional details of charging stations

**WARNING**

Group B60L 53/30 is impacted by reclassification into groups B60L 53/302, B60L 53/305, B60L 53/34, B60L 53/67, and B60L 53/68.

Groups B60L 53/30, B60L 53/302, B60L 53/305, B60L 53/34, B60L 53/67, and B60L 53/68 should be considered in order to perform a complete search.

53/302 . . Cooling of charging equipment

**WARNING**

Group B60L 53/302 is incomplete pending reclassification of documents from group B60L 53/30.

Groups B60L 53/30 and B60L 53/302 should be considered in order to perform a complete search.
WARNING

Group B60L 53/305 is incomplete pending reclassification of documents from group B60L 53/30.
Groups B60L 53/30 and B60L 53/305 should be considered in order to perform a complete search.

53/31 . . Charging columns specially adapted for electric vehicles

53/32 . . [by charging in short intervals along the itinerary, e.g. during short stops]

53/34 . . Plug-like or socket-like devices specially adapted for contactless inductive charging of electric vehicles (positioning means for charging devices using inductive energy transfer B60L 53/38)

WARNING

Group B60L 53/34 is incomplete pending reclassification of documents from group B60L 53/30.
Groups B60L 53/30 and B60L 53/34 should be considered in order to perform a complete search.

53/35 . . Means for automatic or assisted adjustment of the relative position of charging devices and vehicles

53/36 . . by positioning the vehicle

53/37 . . using optical position determination, e.g. using cameras

53/38 . . specially adapted for charging by inductive energy transfer

53/39 . . with position-responsive activation of primary coils

53/50 . . Charging stations characterised by energy-storage or power-generation means

WARNING

Groups B60L 53/50 - B60L 53/57 are incomplete pending reclassification of documents from group B60L 53/00.
All groups listed in this Warning should be considered in order to perform a complete search.

53/51 . . Photovoltaic means

53/52 . . Wind-driven generators

53/53 . . Batteries

53/54 . . Fuel cells

53/55 . . Capacitors

53/56 . . Mechanical storage means, e.g. fly wheels

53/57 . . Charging stations without connection to power networks

53/60 . . Monitoring or controlling charging stations

WARNING

Group B60L 53/60 is impacted by reclassification into groups B60L 53/10, B60L 53/62, B60L 53/66, B60L 53/67, and B60L 53/68.
All groups listed in this Warning should be considered in order to perform a complete search.

53/62 . . in response to charging parameters, e.g. current, voltage or electrical charge

WARNING

Group B60L 53/62 is incomplete pending reclassification of documents from groups B60L 53/60.
All groups listed in this Warning should be considered in order to perform a complete search.

53/63 . . in response to network capacity

53/64 . . Optimising energy costs, e.g. responding to electricity rates

53/65 . . involving identification of vehicles or their battery types

53/66 . . Data transfer between charging stations and vehicles

WARNING

Group B60L 53/66 is incomplete pending reclassification of documents from group B60L 53/60.
Groups B60L 53/60 and B60L 53/66 should be considered in order to perform a complete search.

53/665 . . [Methods related to measuring, billing or payment]

53/67 . . Controlling two or more charging stations

WARNING

Group B60L 53/67 is incomplete pending reclassification of documents from groups B60L 53/00, B60L 53/30, and B60L 53/60.
All groups listed in this Warning should be considered in order to perform a complete search.

53/68 . . Off-site monitoring or control, e.g. remote control

WARNING

Group B60L 53/68 is incomplete pending reclassification of documents from groups B60L 53/00, B60L 53/30, and B60L 53/60.
All groups listed in this Warning should be considered in order to perform a complete search.

53/80 . . Exchanging energy storage elements, e.g. removable batteries

WARNING

Group B60L 53/80 is incomplete pending reclassification of documents from groups B60K 1/04 and B60S 5/06.
Groups B60K 1/04, B60S 5/06, and B60L 53/80 should be considered in order to perform a complete search.

55/00 Arrangements for supplying energy stored within a vehicle to a power network, i.e. vehicle-to-grid [V2G] arrangements
Methods or circuit arrangements for monitoring or controlling batteries or fuel cells, specially adapted for electric vehicles

NOTE
This group covers the monitoring of the operating state of batteries or fuel cells in combination with controlling the propulsion in response to the detected variables of the state.

WARNING
Group B60L 58/00 is incomplete pending reclassification of documents from groups B60L 3/00, B60L 3/0046, B60L 3/0053, B60L 50/60, and B60L 50/70. All groups listed in this Warning should be considered in order to perform a complete search.

58/10 . . . for monitoring or controlling batteries

WARNING
Group B60L 58/10 is incomplete pending reclassification of documents from groups B60L 3/00, B60L 3/0046, and B60L 50/60. All groups listed in this Warning should be considered in order to perform a complete search.

58/12 . . . responding to state of charge [SoC]

WARNING
Group B60L 58/12 is incomplete pending reclassification of documents from groups B60L 3/00 and B60L 3/0046. Group B60L 58/12 is also impacted by reclassification into group B60L 58/15. All groups listed in this Warning should be considered in order to perform a complete search.

58/13 . . . Maintaining the SoC within a determined range

WARNING
Group B60L 58/13 is incomplete pending reclassification of documents from groups B60L 3/00 and B60L 3/0046. Group B60L 58/13 is also impacted by reclassification into group B60L 58/15. All groups listed in this Warning should be considered in order to perform a complete search.

58/14 . . . Preventing excessive discharging

WARNING
Group B60L 58/14 is incomplete pending reclassification of documents from groups B60L 3/00 and B60L 3/0046. Group B60L 58/14 is also impacted by reclassification into group B60L 58/15. All groups listed in this Warning should be considered in order to perform a complete search.

58/15 . . . Preventing overcharging

WARNING
Group B60L 58/15 is incomplete pending reclassification of documents from groups B60L 3/00, B60L 3/0046, B60L 58/12, B60L 58/13, and B60L 58/14. All groups listed in this Warning should be considered in order to perform a complete search.

58/16 . . . responding to battery ageing, e.g. to the number of charging cycles or the state of health [SoH]

WARNING
Group B60L 58/16 is incomplete pending reclassification of documents from groups B60L 3/00 and B60L 3/0046. All groups listed in this Warning should be considered in order to perform a complete search.

58/18 . . . of two or more battery modules

WARNING
Group B60L 58/18 is incomplete pending reclassification of documents from groups B60L 3/00 and B60L 3/0046. All groups listed in this Warning should be considered in order to perform a complete search.

58/19 . . . Switching between serial connection and parallel connection of battery modules

WARNING
Group B60L 58/19 is incomplete pending reclassification of documents from groups B60L 3/00 and B60L 3/0046. All groups listed in this Warning should be considered in order to perform a complete search.

58/20 . . . having different nominal voltages

WARNING
Group B60L 58/20 is incomplete pending reclassification of documents from groups B60L 3/00 and B60L 3/0046. All groups listed in this Warning should be considered in order to perform a complete search.

58/21 . . . having the same nominal voltage

WARNING
Group B60L 58/21 is incomplete pending reclassification of documents from groups B60L 3/00 and B60L 3/0046. All groups listed in this Warning should be considered in order to perform a complete search.
Balancing the charge of battery modules

**WARNING**
Group B60L 58/22 is incomplete pending reclassification of documents from groups B60L 3/00 and B60L 3/0046.
All groups listed in this Warning should be considered in order to perform a complete search.

**for controlling the temperature of batteries**

**WARNING**
Group B60L 58/24 is incomplete pending reclassification of documents from groups B60L 3/00 and B60L 3/0046.
All groups listed in this Warning should be considered in order to perform a complete search.

**by controlling the electric load**

**WARNING**
Group B60L 58/25 is incomplete pending reclassification of documents from groups B60L 3/00 and B60L 3/0046.
All groups listed in this Warning should be considered in order to perform a complete search.

**by cooling**

**WARNING**
Group B60L 58/26 is incomplete pending reclassification of documents from groups B60L 3/00 and B60L 3/0046.
All groups listed in this Warning should be considered in order to perform a complete search.

**by heating**

**WARNING**
Group B60L 58/27 is incomplete pending reclassification of documents from groups B60L 3/00 and B60L 3/0046.
All groups listed in this Warning should be considered in order to perform a complete search.

**for starting of fuel cells**

**WARNING**
Group B60L 58/31 is incomplete pending reclassification of documents from groups B60L 3/00 and B60L 3/0053.
All groups listed in this Warning should be considered in order to perform a complete search.

**for controlling the temperature of fuel cells, e.g. by controlling the electric load**

**WARNING**
Group B60L 58/32 is incomplete pending reclassification of documents from groups B60L 3/00 and B60L 3/0053.
All groups listed in this Warning should be considered in order to perform a complete search.

**by cooling**

**WARNING**
Group B60L 58/33 is incomplete pending reclassification of documents from groups B60L 3/00 and B60L 3/0053.
All groups listed in this Warning should be considered in order to perform a complete search.

**by heating**

**WARNING**
Group B60L 58/34 is incomplete pending reclassification of documents from groups B60L 3/00 and B60L 3/0053.
All groups listed in this Warning should be considered in order to perform a complete search.

**for controlling a combination of batteries and fuel cells**

**WARNING**
Group B60L 58/40 is incomplete pending reclassification of documents from groups B60L 3/00, B60L 3/0053, and B60L 50/70.
Group B60L 58/40 is also impacted by reclassification into group B60L 50/75.
All groups listed in this Warning should be considered in order to perform a complete search.

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**Type of vehicles**

- Air crafts
- Bikes
- Vehicles with one wheel only
- Single-axle vehicles
- Buses
- Vehicles specially adapted for children, e.g. toy vehicles
- Microcars, e.g. golf cars
- Personal mobility vehicles
- Rail vehicles
- Trailers
Converter types

- DC to DC converters
- Buck converters
- Boost converters
- AC to AC converters
- without intermediate conversion to DC
- AC to DC converters
- DC to AC converters
- Voltage source inverters
- Current source inverters
- with more than three phases

Electrical machine types; Structures or applications thereof

- Electrical machine types
- Induction machines
- Synchronous machines
- DC brushless machines
- Reluctance machines
- DC electrical machines
- Universal machines
- Electrical machine applications
- with use of more than one motor
- Wheel Hub motors, i.e. integrated in the wheel hub
- Wheel motors, i.e. motor connected to only one wheel
- Structural details of electrical machines
- Clutch motors
- Windings for different functions
- with switched windings
- with more than three phases

Control parameters of input or output; Target parameters

- Vehicle control parameters
- Speed
- Acceleration
- longitudinal
- lateral
- angular
- Yaw angle
- Steering angle
- Vehicle weight
- Door position
- Parking brake position
- Driving direction
- Cabin temperature
- Temperature of vehicle components or parts
- Drive Train control parameters
- related to electric machines
- Speed
- Torque

Driver interactions

- by alarm
- by confirmation, e.g. of the input
- by input of vehicle departure time
- by display
- by enquiring driving style
- by driver identification
- by presence detection
- by lever actuation
- by pedal actuation
- Accelerator pedal thresholds
- by voice

Operating Modes

- Temporary overload
- of combustion engines
of transmissions
of electrical drive trains
of electrical cells or capacitors
of converters
of motors or generators
Drive modes; Transition between modes
Standstill, e.g. zero speed
Coasting mode
Transition between different drive modes
Four wheel or all wheel drive
Engine braking emulation
Auto pilot mode
Stabilising upright position of vehicles, e.g. of single axle vehicles
Control modes
by adaptive correction
by parameter estimation
by self learning
by fuzzy logic
by future state prediction
drive range estimation, e.g. of estimation of available travel distance
Energy consumption estimation
Temperature prediction, e.g. for pre-cooling
Departure time prediction

Problem solutions or means not otherwise provided for
Emission reduction
of exhaust
of noise
acoustic
Structure borne vibrations
electro magnetic [EMI]
Inrush current reduction, i.e. avoiding high currents when connecting the battery
Preventing theft during charging
of electricity
of parts
of vehicles
of data
related to technical updates when adding new parts or software
Means to improve acoustic vehicle detection by humans
Heat storages, e.g. for cabin heating
Heat pumps, e.g. for cabin heating