

# CPC COOPERATIVE PATENT CLASSIFICATION

## B PERFORMING OPERATIONS; TRANSPORTING (NOTES omitted)

### TRANSPORTING

#### B60 VEHICLES IN GENERAL (NOTE omitted)

**B60L PROPULSION 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.

- 3/0007 . {Measures or means for preventing or attenuating collisions}

- 3/0015 . . {Prevention of collisions}
- 3/0023 . {Detecting, eliminating, remedying or compensating for drive train abnormalities, e.g. failures within the drive train}
- 3/003 . . {relating to inverters}
- 3/0038 . . {relating to sensors}
- 3/0046 . . {relating to electric energy storage systems, e.g. batteries or capacitors}

**WARNING**

Group [B60L 3/0046](#) 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](#), and [B60L 58/40](#).

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

- 3/0053 . . {relating to fuel cells}

**WARNING**

Group [B60L 3/0053](#) is impacted by reclassification into groups [B60L 58/00](#), [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.

- 3/0061 . . {relating to electrical machines}
- 3/0069 . . {relating to the isolation, e.g. ground fault or leak current}
- 3/0076 . . {relating to braking}
- 3/0084 . . {relating to control modules}
- 3/0092 . {with use of redundant elements for safety purposes}
- 3/02 . Dead-man's devices
- 3/04 . Cutting off the power supply under fault conditions (protective devices and circuit arrangements in general [H01H](#); [H02H](#))
- 3/06 . Limiting the traction current under mechanical overload conditions
- 3/08 . Means for preventing excessive speed of the vehicle
- 3/10 . Indicating wheel slip {; [Correction of wheel slip](#)}
- 3/102 . . {of individual wheels}
- 3/104 . . {by indirect measurement of vehicle speed}
- 3/106 . . {for maintaining or recovering the adhesion of the drive wheels}
- 3/108 . . . {whilst braking, i.e. ABS}
- 3/12 . Recording operating variables {; [Monitoring of operating variables](#)}

**5/00 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}
- 5/02 . with ice-removing device
- 5/04 . 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

**7/00 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

7/26	. . Controlling the braking effect	15/005	. . {for control of propulsion for vehicles propelled by linear motors}
7/28	. Eddy-current braking	15/007	. {Physical arrangements or structures of drive train converters specially adapted for the propulsion motors of electric vehicles}
<b>8/00</b>	<b>Electric propulsion with power supply from forces of nature, e.g. sun or wind</b>	15/02	. characterised by the form of the current used in the control circuit
8/003	. {Converting light into electric energy, e.g. by using photo-voltaic systems}	15/025	. . {using field orientation; Vector control; Direct Torque Control [DTC]}
8/006	. {Converting flow of air into electric energy, e.g. by using wind turbines}	15/04	. . using dc
<b>9/00</b>	<b>Electric propulsion with power supply external to the vehicle</b> (electric propulsion for monorail vehicles, suspension vehicles or rack railways <a href="#">B60L 13/00</a> ; in combination with batteries or fuel cells within the vehicle <a href="#">B60L 50/53</a> )	15/06	. . using substantially sinusoidal ac
	<b>WARNING</b>	15/08	. . using pulses
	Group <a href="#">B60L 9/00</a> is impacted by reclassification into group <a href="#">B60L 50/53</a> .	15/10	. 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 <a href="#">B60L 3/00</a> )
	Groups <a href="#">B60L 9/00</a> and <a href="#">B60L 50/53</a> should be considered in order to perform a complete search.	15/12	. . with circuits controlled by relays or contactors
9/005	. {Interference suppression}	15/14	. . with main controller driven by a servomotor ( <a href="#">B60L 15/18</a> takes precedence)
9/02	. using dc motors	15/16	. . with main controller driven through a ratchet mechanism ( <a href="#">B60L 15/18</a> takes precedence)
9/04	. . fed from dc supply lines	15/18	. . without contact making and breaking, e.g. using a transducer
9/06	. . . with conversion by metadyne	15/20	. for control of the vehicle or its driving motor to achieve a desired performance, e.g. speed, torque, programmed variation of speed
9/08	. . fed from ac supply lines	15/2009	. . {for braking}
9/10	. . . with rotary converters	15/2018	. . . {for braking on a slope}
9/12	. . . with static converters	15/2027	. . . . {whilst maintaining constant speed}
9/14	. . fed from different kinds of power-supply lines	15/2036	. . {Electric differentials, e.g. for supporting steering vehicles}
9/16	. using ac induction motors	15/2045	. . {for optimising the use of energy}
9/18	. . fed from dc supply lines	15/2054	. . {by controlling transmissions or clutches}
9/20	. . . single-phase motors	15/2063	. . {for creeping}
9/22	. . . polyphase motors	15/2072	. . {for drive off}
9/24	. . fed from ac supply lines	15/2081	. . . {for drive off on a slope}
9/26	. . . single-phase motors	15/209	. . {for overtaking}
9/28	. . . polyphase motors	15/22	. . with sequential operation of interdependent switches, e.g. relays, contactors, programme drum
9/30	. . fed from different kinds of power-supply lines	15/24	. . with main controller driven by a servomotor ( <a href="#">B60L 15/28</a> takes precedence)
9/32	. using ac brush displacement motors	15/26	. . with main controller driven through a ratchet mechanism ( <a href="#">B60L 15/28</a> takes precedence)
<b>13/00</b>	<b>Electric propulsion for monorail vehicles, suspension vehicles or rack railways; Magnetic suspension or levitation for vehicles</b> ({tracks for Maglev-type trains <a href="#">E01B 25/30</a> ; } electromagnets per se <a href="#">H01F 7/06</a> ; linear motors per se <a href="#">H02K 41/00</a> )	15/28	. . without contact making and breaking, e.g. using a transducer
13/003	. {Crossings; Points}	15/30	. . with means to change over to human control
13/006	. {Electric propulsion adapted for monorail vehicles, suspension vehicles or rack railways ( <a href="#">B60L 13/03</a> takes precedence)}	15/32	. Control or regulation of multiple-unit electrically-propelled vehicles
13/03	. Electric propulsion by linear motors	15/34	. . with human control of a setting device
13/035	. . {Suspension of the vehicle-borne motorparts}	15/36	. . . with automatic control superimposed, e.g. to prevent excessive motor current
13/04	. Magnetic suspension or levitation for vehicles	15/38	. . with automatic control
13/06	. . Means to sense or control vehicle position or attitude with respect to railway	15/40	. Adaptation of control equipment on vehicle for remote actuation from a stationary place (devices along the route for controlling devices on rail vehicles <a href="#">B61L 3/00</a> ; central rail-traffic control systems <a href="#">B61L 27/00</a> )
13/08	. . . for the lateral position	15/42	. Adaptation of control equipment on vehicle for actuation from alternative parts of the vehicle or from alternative vehicles of the same vehicle train ( <a href="#">B60L 15/32</a> takes precedence)
13/10	. Combination of electric propulsion and magnetic suspension or levitation		
<b>15/00</b>	<b>Methods, circuits, or devices for controlling the traction-motor speed of electrically-propelled vehicles</b>		
15/002	. {for control of propulsion for monorail vehicles, suspension vehicles or rack railways; for control of magnetic suspension or levitation for vehicles for propulsion purposes}		

**50/00 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](#))

- 50/10 . . using propulsion power supplied by engine-driven generators, e.g. generators driven by combustion engines
- 50/11 . . using DC generators and DC motors
- 50/12 . . using AC generators and DC motors
- 50/13 . . using AC generators and AC motors
- 50/14 . . using DC generators and AC motors
- 50/15 . . 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](#))
- 50/16 . . with provision for separate direct mechanical propulsion
- 50/20 . . using propulsion power generated by humans or animals
- 50/30 . . using propulsion power stored mechanically, e.g. in fly-wheels
- 50/40 . . using propulsion power supplied by capacitors
- 50/50 . . 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.

- 50/51 . . characterised by AC-motors
- 50/52 . . characterised by DC-motors
- 50/53 . . 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.

- 50/60 . . 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.

- 50/61 . . . by batteries charged by engine-driven generators, e.g. series hybrid electric vehicles
- 50/62 . . . charged by low-power generators primarily intended to support the batteries, e.g. range extenders

- 50/64 . . . Constructional details of batteries specially adapted for electric vehicles

**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.

**WARNING**

Group [B60L 50/64](#) is incomplete pending reclassification of documents from groups [B60L 50/50](#) and [H01M 50/20](#).

Groups [B60L 50/50](#), [H01M 50/20](#) and [B60L 50/64](#) should be considered in order to perform a complete search.

- 50/66 . . . {Arrangements of batteries}

- 50/70 . . using power supplied by fuel cells (in combination with batteries [B60L 50/75](#))

**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.

- 50/71 . . . Arrangement of fuel cells within vehicles specially adapted for electric vehicles

- 50/72 . . . 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.

- 50/75 . . using propulsion power supplied by both fuel cells and batteries

**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.

- 50/90 . . using propulsion power supplied by specific means not covered by groups [B60L 50/10](#) - [B60L 50/50](#), e.g. by direct conversion of thermal nuclear energy into electricity

**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.



- 53/305 . . {Communication interfaces}

**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

## 58/00 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.

- 58/22 . . . 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.

- 58/24 . . 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.

- 58/25 . . . 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.

- 58/26 . . . 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.

- 58/27 . . . 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.

- 58/30 . for monitoring or controlling fuel cells

**WARNING**

Group [B60L 58/30](#) is incomplete pending reclassification of documents from groups [B60L 3/00](#), [B60L 3/0053](#), and [B60L 50/70](#).

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

- 58/31 . . 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.

- 58/32 . . 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.

- 58/33 . . . 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.

- 58/34 . . . 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.

- 58/40 . 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 3/0046](#), [B60L 3/0053](#).

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.

**2200/00 Type of vehicles**

- 2200/10 . Air crafts
- 2200/12 . Bikes
- 2200/14 . Vehicles with one wheel only
- 2200/16 . Single-axle vehicles
- 2200/18 . Buses
- 2200/20 . Vehicles specially adapted for children, e.g. toy vehicles
- 2200/22 . Microcars, e.g. golf cars
- 2200/24 . Personal mobility vehicles
- 2200/26 . Rail vehicles
- 2200/28 . Trailers



2200/30	. Trolleys	2240/425	. . . Temperature
2200/32	. Waterborne vessels	2240/427	. . . Voltage
2200/34	. Wheel chairs	2240/429	. . . Current
2200/36	. Vehicles designed to transport cargo, e.g. trucks	2240/44	. . related to combustion engines
2200/40	. Working vehicles	2240/441	. . . Speed
2200/42	. . Fork lift trucks	2240/443	. . . Torque
2200/44	. . Industrial trucks or floor conveyors	2240/445	. . . Temperature
2200/46	. Vehicles with auxiliary ad-on propulsions, e.g. add-on electric motor kits for bicycles	2240/46	. . related to wheels
		2240/461	. . . Speed
<b>2210/00</b>	<b>Converter types</b>	2240/463	. . . Torque
2210/10	. DC to DC converters	2240/465	. . . Slip
2210/12	. . Buck converters	2240/48	. . related to transmissions
2210/14	. . Boost converters	2240/485	. . . Temperature
2210/20	. AC to AC converters	2240/486	. . . Operating parameters
2210/22	. . without intermediate conversion to DC	2240/50	. . related to clutches
2210/30	. AC to DC converters	2240/507	. . . Operating parameters
2210/40	. DC to AC converters	2240/52	. . related to converters
2210/42	. . Voltage source inverters	2240/525	. . . Temperature of converter or components thereof
2210/44	. . Current source inverters	2240/526	. . . Operating parameters
2210/46	. . with more than three phases	2240/527	. . . Voltage
		2240/529	. . . Current
<b>2220/00</b>	<b>Electrical machine types; Structures or applications thereof</b>	2240/54	. . related to batteries
2220/10	. Electrical machine types	2240/545	. . . Temperature
2220/12	. . Induction machines	2240/547	. . . Voltage
2220/14	. . Synchronous machines	2240/549	. . . Current
2220/16	. . DC brushless machines	2240/60	. Navigation input
2220/18	. . Reluctance machines	2240/62	. . Vehicle position
2220/20	. . DC electrical machines	2240/622	. . . by satellite navigation
2220/30	. . Universal machines	2240/625	. . . by GSM
2220/40	. Electrical machine applications	2240/627	. . . by WLAN
2220/42	. . with use of more than one motor	2240/64	. . Road conditions
2220/44	. . Wheel Hub motors, i.e. integrated in the wheel hub	2240/642	. . . Slope of road
2220/46	. . Wheel motors, i.e. motor connected to only one wheel	2240/645	. . . Type of road
2220/50	. Structural details of electrical machines	2240/647	. . . Surface situation of road, e.g. type of paving
2220/52	. . Clutch motors	2240/66	. . Ambient conditions
2220/54	. . Windings for different functions	2240/662	. . . Temperature
2220/56	. . with switched windings	2240/665	. . . Light intensity
2220/58	. . with more than three phases	2240/667	. . . Precipitation
		2240/68	. . Traffic data
<b>2240/00</b>	<b>Control parameters of input or output; Target parameters</b>	2240/70	. Interactions with external data bases, e.g. traffic centres
2240/10	. Vehicle control parameters	2240/72	. . Charging station selection relying on external data
2240/12	. . Speed	2240/80	. Time limits
2240/14	. . Acceleration		
2240/16	. . . longitudinal	<b>2250/00</b>	<b>Driver interactions</b>
2240/18	. . . lateral	2250/10	. by alarm
2240/20	. . . angular	2250/12	. by confirmation, e.g. of the input
2240/22	. . Yaw angle	2250/14	. by input of vehicle departure time
2240/24	. . Steering angle	2250/16	. by display
2240/26	. . Vehicle weight	2250/18	. by enquiring driving style
2240/28	. . Door position	2250/20	. by driver identification
2240/30	. . Parking brake position	2250/22	. by presence detection
2240/32	. . Driving direction	2250/24	. by lever actuation
2240/34	. . Cabin temperature	2250/26	. by pedal actuation
2240/36	. . Temperature of vehicle components or parts	2250/28	. . Accelerator pedal thresholds
2240/40	. Drive Train control parameters	2250/30	. by voice
2240/42	. . related to electric machines		
2240/421	. . . Speed	<b>2260/00</b>	<b>Operating Modes</b>
2240/423	. . . Torque	2260/10	. Temporary overload
		2260/12	. . of combustion engines

## B60L

- 2260/14 . . of transmissions
- 2260/16 . . of electrical drive trains
- 2260/162 . . . of electrical cells or capacitors
- 2260/165 . . . of converters
- 2260/167 . . . of motors or generators
- 2260/20 . Drive modes; Transition between modes
- 2260/22 . . Standstill, e.g. zero speed
- 2260/24 . . Coasting mode
- 2260/26 . . Transition between different drive modes
- 2260/28 . . Four wheel or all wheel drive
- 2260/30 . . Engine braking emulation
- 2260/32 . . Auto pilot mode
- 2260/34 . . Stabilising upright position of vehicles, e.g. of single axle vehicles
- 2260/40 . Control modes
- 2260/42 . . by adaptive correction
- 2260/44 . . by parameter estimation
- 2260/46 . . by self learning
- 2260/48 . . by fuzzy logic
- 2260/50 . . by future state prediction
- 2260/52 . . . drive range estimation, e.g. of estimation of available travel distance
- 2260/54 . . . Energy consumption estimation
- 2260/56 . . . Temperature prediction, e.g. for pre-cooling
- 2260/58 . . . Departure time prediction
- 2270/00 Problem solutions or means not otherwise provided for**
- 2270/10 . Emission reduction
- 2270/12 . . of exhaust
- 2270/14 . . of noise
- 2270/142 . . . acoustic
- 2270/145 . . . Structure borne vibrations
- 2270/147 . . . electro magnetic [EMI]
- 2270/20 . Inrush current reduction, i.e. avoiding high currents when connecting the battery
- 2270/30 . Preventing theft during charging
- 2270/32 . . of electricity
- 2270/34 . . of parts
- 2270/36 . . of vehicles
- 2270/38 . . of data
- 2270/40 . related to technical updates when adding new parts or software
- 2270/42 . Means to improve acoustic vehicle detection by humans
- 2270/44 . Heat storages, e.g. for cabin heating
- 2270/46 . Heat pumps, e.g. for cabin heating