

# 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

- 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
  - electrodynamical brake systems;
  - electric propulsion of vehicles; control and regulation thereof
- 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.

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| <p><b>1/00</b>    <b>Supplying electric power to auxiliary equipment of vehicles</b> (<a href="#">circuit arrangements for charging batteries H02J 7/00</a>)</p> <p>1/003    . {to auxiliary motors, e.g. for pumps, compressors}</p> <p>1/006    . {to power outlets}</p> <p>1/02     . to electric heating circuits</p> <p>1/04     . . fed by the power supply line</p> <p>1/06     . . . using only one supply</p> <p>1/08     . . . . Methods and devices for control or regulation</p> <p>1/10     . . . with provision for using different supplies</p> <p>1/12     . . . . Methods and devices for control or regulation</p> <p>1/14     . to electric lighting circuits</p> <p>1/16     . . fed by the power supply line</p> <p>1/20     . {Energy regeneration from auxiliary equipment}</p> | <p><b>3/00</b>    <b>Electric devices on electrically-propelled vehicles for safety purposes; Monitoring operating variables, e.g. speed, deceleration or energy consumption</b> (methods or circuit arrangements for monitoring or controlling batteries or fuel cells <a href="#">B60L 58/00</a>)</p> <p><b><u>WARNING</u></b></p> <p>Group <a href="#">B60L 3/00</a> is impacted by reclassification into groups <a href="#">B60L 58/00</a>, <a href="#">B60L 58/10</a>, <a href="#">B60L 58/12</a>, <a href="#">B60L 58/13</a>, <a href="#">B60L 58/14</a>, <a href="#">B60L 58/15</a>, <a href="#">B60L 58/16</a>, <a href="#">B60L 58/18</a>, <a href="#">B60L 58/19</a>, <a href="#">B60L 58/20</a>, <a href="#">B60L 58/21</a>, <a href="#">B60L 58/22</a>, <a href="#">B60L 58/24</a>, <a href="#">B60L 58/25</a>, <a href="#">B60L 58/26</a>, <a href="#">B60L 58/27</a>, <a href="#">B60L 58/30</a>, <a href="#">B60L 58/31</a>, <a href="#">B60L 58/32</a>, <a href="#">B60L 58/33</a>, <a href="#">B60L 58/34</a>, and <a href="#">B60L 58/40</a>.</p> <p>All groups listed in this Warning should be considered in order to perform a complete search.</p> <p>3/0007    . {Measures or means for preventing or attenuating collisions}</p> |
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- 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
- 7/28 . Eddy-current braking
- 8/00 Electric propulsion with power supply from forces of nature, e.g. sun or wind**
- 8/003 . {Converting light into electric energy, e.g. by using photo-voltaic systems}
- 8/006 . {Converting flow of air into electric energy, e.g. by using wind turbines}
- 9/00 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.
- 9/005 . {Interference suppression}
- 9/02 . using dc motors
- 9/04 . . fed from dc supply lines
- 9/06 . . . with conversion by metadyne
- 9/08 . . fed from ac supply lines
- 9/10 . . . with rotary converters
- 9/12 . . . with static converters
- 9/14 . . fed from different kinds of power-supply lines
- 9/16 . using ac induction motors
- 9/18 . . fed from dc supply lines
- 9/20 . . . single-phase motors
- 9/22 . . . polyphase motors
- 9/24 . . fed from ac supply lines
- 9/26 . . . single-phase motors
- 9/28 . . . polyphase motors
- 9/30 . . fed from different kinds of power-supply lines
- 9/32 . using ac brush displacement motors
- 13/00 Electric propulsion for monorail vehicles, suspension vehicles or rack railways; 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](#))
- 13/003 . {Crossings; Points}
- 13/006 . {Electric propulsion adapted for monorail vehicles, suspension vehicles or rack railways ([B60L 13/03](#) takes precedence)}
- 13/03 . Electric propulsion by linear motors
- 13/035 . . {Suspension of the vehicle-borne motorparts}
- 13/04 . Magnetic suspension or levitation for vehicles
- 13/06 . . Means to sense or control vehicle position or attitude with respect to railway
- 13/08 . . . for the lateral position
- 13/10 . Combination of electric propulsion and magnetic suspension or levitation
- 15/00 Methods, circuits, or devices for controlling the traction-motor speed of electrically-propelled vehicles**
- 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}
- 15/005 . . {for control of propulsion for vehicles propelled by linear motors}
- 15/007 . {Physical arrangements or structures of drive train converters specially adapted for the propulsion motors of electric vehicles}
- 15/02 . characterised by the form of the current used in the control circuit
- 15/025 . . {using field orientation; Vector control; Direct Torque Control [DTC]}
- 15/04 . . using dc
- 15/06 . . using substantially sinusoidal ac
- 15/08 . . using pulses
- 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 [B60L 3/00](#))
- 15/12 . . with circuits controlled by relays or contactors
- 15/14 . . with main controller driven by a servomotor ([B60L 15/18](#) takes precedence)
- 15/16 . . with main controller driven through a ratchet mechanism ([B60L 15/18](#) takes precedence)
- 15/18 . . without contact making and breaking, e.g. using a transductor
- 15/20 . for control of the vehicle or its driving motor to achieve a desired performance, e.g. speed, torque, programmed variation of speed
- 15/2009 . . {for braking}
- 15/2018 . . . {for braking on a slope}
- 15/2027 . . . . {whilst maintaining constant speed}
- 15/2036 . . {Electric differentials, e.g. for supporting steering of vehicles (arrangement of control devices for differential gearing [B60K 23/02](#))}
- 15/2045 . . {for optimising the use of energy}
- 15/2054 . . {by controlling transmissions or clutches}
- 15/2063 . . {for creeping}
- 15/2072 . . {for drive off}
- 15/2081 . . . {for drive off on a slope}
- 15/209 . . {for overtaking}
- 15/22 . . with sequential operation of interdependent switches, e.g. relays, contactors, programme drum
- 15/24 . . with main controller driven by a servomotor ([B60L 15/28](#) takes precedence)
- 15/26 . . with main controller driven through a ratchet mechanism ([B60L 15/28](#) takes precedence)
- 15/28 . . without contact making and breaking, e.g. using a transductor
- 15/30 . . with means to change over to human control
- 15/32 . Control or regulation of multiple-unit electrically-propelled vehicles
- 15/34 . . with human control of a setting device
- 15/36 . . . with automatic control superimposed, e.g. to prevent excessive motor current
- 15/38 . . with automatic control
- 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 [B61L 3/00](#); central rail-traffic control systems [B61L 27/00](#))
- 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 ([B60L 15/32](#) takes precedence)

- 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 group [B60L 50/50](#). Groups [B60L 50/50](#) 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 group [B60L 50/50](#). Groups [B60L 50/50](#) and [B60L 50/75](#) 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 automatically adjusting 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
- 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 | <p><b>Methods or circuit arrangements for monitoring or controlling batteries or fuel cells, specially adapted for electric vehicles</b></p> <p><b>NOTE</b></p> <p>This group <u>covers</u> 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.</p> <p><b>WARNING</b></p> <p>Group <a href="#">B60L 58/00</a> is incomplete pending reclassification of documents from groups <a href="#">B60L 3/00</a>, <a href="#">B60L 3/0046</a>, <a href="#">B60L 3/0053</a>, <a href="#">B60L 50/60</a>, and <a href="#">B60L 50/70</a>.</p> <p>All groups listed in this Warning should be considered in order to perform a complete search.</p> | 58/15 | <p>. . . Preventing overcharging</p> <p><b>WARNING</b></p> <p>Group <a href="#">B60L 58/15</a> is incomplete pending reclassification of documents from groups <a href="#">B60L 3/00</a>, <a href="#">B60L 3/0046</a>, <a href="#">B60L 58/12</a>, <a href="#">B60L 58/13</a>, and <a href="#">B60L 58/14</a>.</p> <p>All groups listed in this Warning should be considered in order to perform a complete search.</p> |
| 58/10 | <p>. . for monitoring or controlling batteries</p> <p><b>WARNING</b></p> <p>Group <a href="#">B60L 58/10</a> is incomplete pending reclassification of documents from groups <a href="#">B60L 3/00</a>, <a href="#">B60L 3/0046</a>, and <a href="#">B60L 50/60</a>.</p> <p>All groups listed in this Warning should be considered in order to perform a complete search.</p>   | 58/16 | <p>. . responding to battery ageing, e.g. to the number of charging cycles or the state of health [SoH]</p> <p><b>WARNING</b></p> <p>Group <a href="#">B60L 58/16</a> is incomplete pending reclassification of documents from groups <a href="#">B60L 3/00</a> and <a href="#">B60L 3/0046</a>.</p> <p>All groups listed in this Warning should be considered in order to perform a complete search.</p>               |
| 58/12 | <p>. . responding to state of charge [SoC]</p> <p><b>WARNING</b></p> <p>Group <a href="#">B60L 58/12</a> is incomplete pending reclassification of documents from groups <a href="#">B60L 3/00</a> and <a href="#">B60L 3/0046</a>.</p> <p>Group <a href="#">B60L 58/12</a> is also impacted by reclassification into group <a href="#">B60L 58/15</a>.</p> <p>All groups listed in this Warning should be considered in order to perform a complete search.</p>  | 58/18 | <p>. . of two or more battery modules</p> <p><b>WARNING</b></p> <p>Group <a href="#">B60L 58/18</a> is incomplete pending reclassification of documents from groups <a href="#">B60L 3/00</a> and <a href="#">B60L 3/0046</a>.</p> <p>All groups listed in this Warning should be considered in order to perform a complete search.</p>   |
| 58/13 | <p>. . . Maintaining the SoC within a determined range</p> <p><b>WARNING</b></p> <p>Group <a href="#">B60L 58/13</a> is incomplete pending reclassification of documents from groups <a href="#">B60L 3/00</a> and <a href="#">B60L 3/0046</a>.</p> <p>Group <a href="#">B60L 58/13</a> is also impacted by reclassification into group <a href="#">B60L 58/15</a>.</p> <p>All groups listed in this Warning should be considered in order to perform a complete search.</p>  | 58/19 | <p>. . . Switching between serial connection and parallel connection of battery modules</p> <p><b>WARNING</b></p> <p>Group <a href="#">B60L 58/19</a> is incomplete pending reclassification of documents from groups <a href="#">B60L 3/00</a> and <a href="#">B60L 3/0046</a>.</p> <p>All groups listed in this Warning should be considered in order to perform a complete search.</p>                               |
| 58/14 | <p>. . . Preventing excessive discharging</p> <p><b>WARNING</b></p> <p>Group <a href="#">B60L 58/14</a> is incomplete pending reclassification of documents from groups <a href="#">B60L 3/00</a> and <a href="#">B60L 3/0046</a>.</p> <p>Group <a href="#">B60L 58/14</a> is also impacted by reclassification into group <a href="#">B60L 58/15</a>.</p> <p>All groups listed in this Warning should be considered in order to perform a complete search.</p>   | 58/20 | <p>. . . having different nominal voltages</p> <p><b>WARNING</b></p> <p>Group <a href="#">B60L 58/20</a> is incomplete pending reclassification of documents from groups <a href="#">B60L 3/00</a> and <a href="#">B60L 3/0046</a>.</p> <p>All groups listed in this Warning should be considered in order to perform a complete search.</p>  |
| 58/14 | <p>. . . Preventing excessive discharging</p> <p><b>WARNING</b></p> <p>Group <a href="#">B60L 58/14</a> is incomplete pending reclassification of documents from groups <a href="#">B60L 3/00</a> and <a href="#">B60L 3/0046</a>.</p> <p>Group <a href="#">B60L 58/14</a> is also impacted by reclassification into group <a href="#">B60L 58/15</a>.</p> <p>All groups listed in this Warning should be considered in order to perform a complete search.</p>   | 58/21 | <p>. . . having the same nominal voltage</p> <p><b>WARNING</b></p> <p>Group <a href="#">B60L 58/21</a> is incomplete pending reclassification of documents from groups <a href="#">B60L 3/00</a> and <a href="#">B60L 3/0046</a>.</p> <p>All groups listed in this Warning should be considered in order to perform a complete search.</p>  |

- 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](#), and [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



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

## B60L

- 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