Electric Vehicles and Amendment 1 (2020)

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- Brief introduction to EVs
- Why an amendment so soon?
- Main changes
- What does this change?
- So what now?

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EVs in brief

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Electric Vehicles (EV)

- Early adopter phase
- Exponential increase
- Barriers to Adoption
  - Charging (how, when, where)
  - Cost (vehicle and per mile)
  - Choice
  - Performance

135 types of electric vehicles

273,500 registered electric cars

8,800 registered electric vans

31,011 EVCPs

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March 2020

	2020	2019	% change	Mkt share -20	Mkt share -19
Diesel	44,796	117,689	-61.9%	17.6%	25.7%
Petrol	153,025	305,163	-49.9%	60.1%	66.6%
BEV	11,694	3,932	197.4%	4.6%	0.9%
PHEV	6,818	4,941	38.0%	2.7%	1.1%
HEV	15,265	16,429	-7.1%	6.0%	3.6%
MHEV diesel	10,229	2,999	241.1%	4.0%	0.7%
MHEV petrol	12,857	6,901	86.3%	5.0%	1.5%
TOTAL	**254,684**	**458,054**	**-44.4%**		

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Electric Vehicles Charge Point incentives

- Workplace Charging Scheme
  - Grant of 75% of installation up to £350 per chargepoint
  - **(40 chargepoints)**
- Electric Vehicle Homecharge scheme
  - Grant of 75% of installation up to £350 per chargepoint
- Benefit in Kind Tax:
  - as low as 0% from 1st April 2020
  - Increasing to 1% by 2021 and 2% by 2022

Office for Low Emission Vehicles

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Electric Vehicles

Rapidly Changing World

What's the biggest selling EV?

Lets see!

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Electric Vehicles

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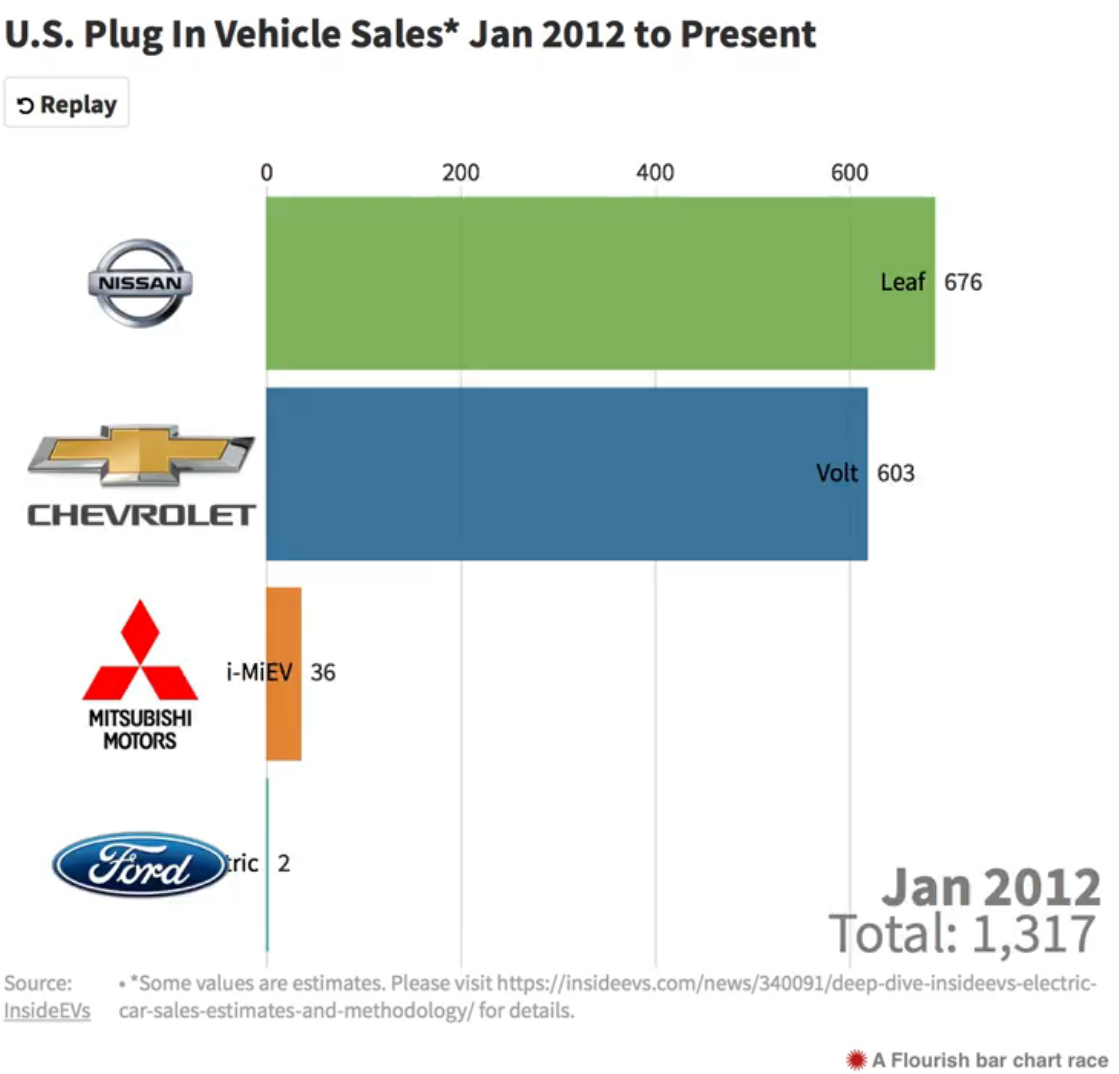
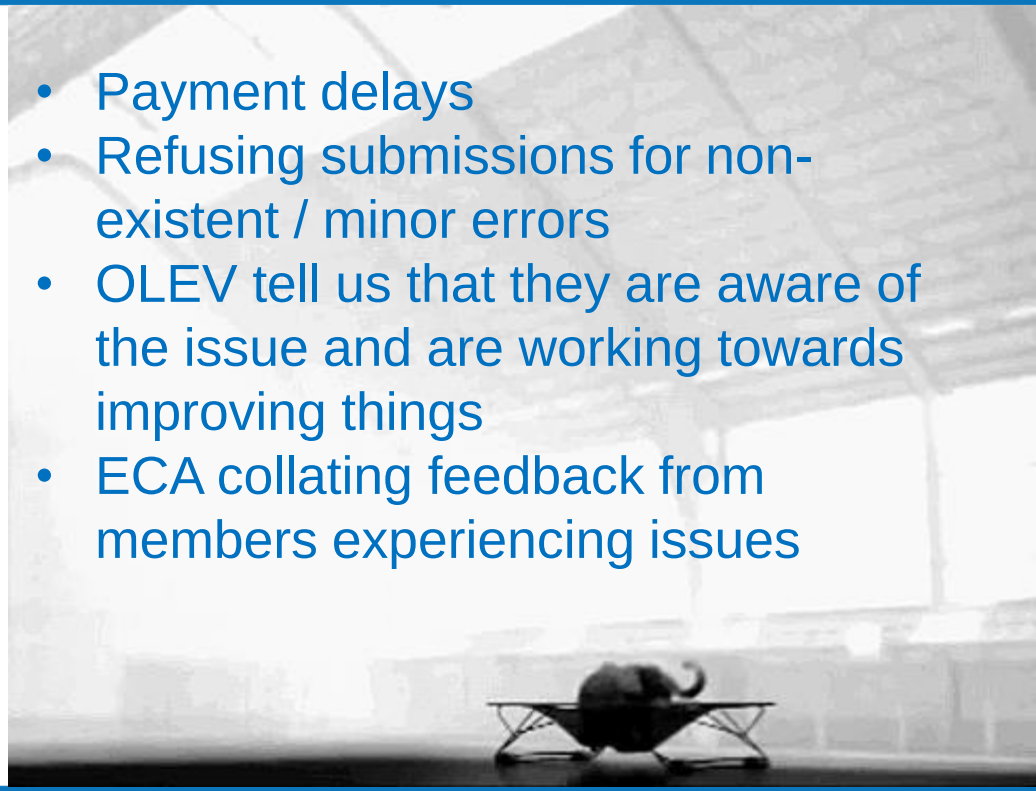


Electric Vehicles Charge Point incentives

Office for Low Emission Vehicles

- Payment delays
- Refusing submissions for non-existent / minor errors
- OLEV tell us that they are aware of the issue and are working towards improving things
- ECA collating feedback from members experiencing issues



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Further Legislative drivers

Ban on new ICE vehicles
-set at ~~2040~~
-Now 2035
-Possibly earlier still if possible!

-Disruptive technologies
-Changes to work patterns
-Increasing use of public transport

- **UK adoption of EPBD**
- **Future homes Standard**
  - **Building regs Parts L**
  - **Mandating of Chargepoints:**
    - **new builds**
    - **existing buildings undergoing extensive renovations**

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Know the requirements

- Establish the proposed EV and its charging requirements prior to design and installation
- Ensure there is supply capability-
  - end users responsibility- but you're likely best suited to assist with this
- Adequacy of existing supply intake equipment such as Distribution Network Operator's (DNO's) cut out, metering, meter tails, etc.
- Important for the owner of the proposed vehicle and the charging solution provider to talk in the early stages

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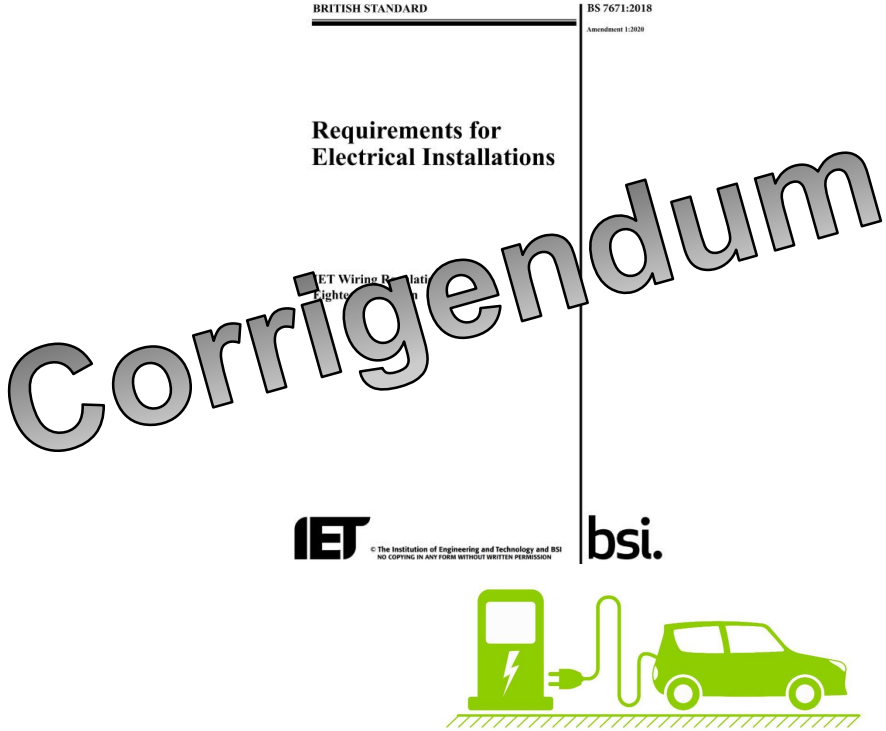
Release of Amendment 1

- Solely relates to Section 722
- Allows for advances in EV charging technologies not available before
- Gives new options for the electrical contractor to deploy EVCPs
- Free to view and save electronically
- £5 to download and print



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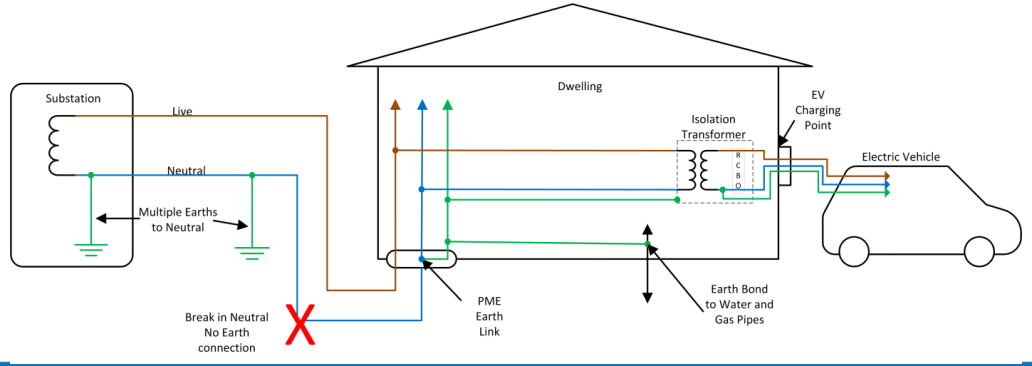
Original options- Separation or Isolation transformer

1. Adopt a protective measure which didn't exist: (722.411.4.1 (iii))
   - 'Unicorn Device'
   - Monitors voltage between CPC and earth- <70V
   - Now available. Requires an earth reference…Earth electrode

2. Using an isolation transformer for electrical separation (722.413.1.2)
   - Expensive
   - Heavy and cumbersome



3. TT

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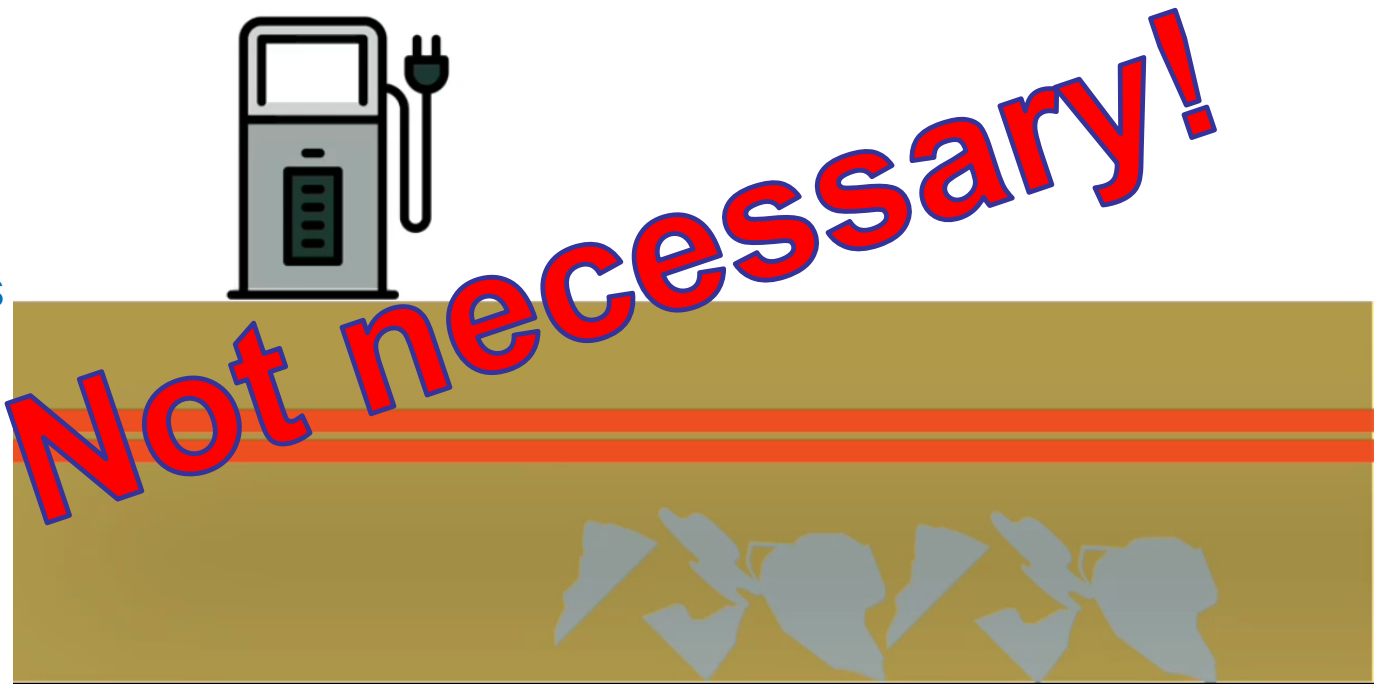
Original options- TT and potential issues

- Onerous
- Potentially dangerous due to unmapped underground services
- Insurance limitations (often groundworks limited to 1m depth)



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New option through regulation 722.411.4.1(iv)

MAIN CHANGE

- Protection against electric shock in a **single phase** installation provided by a single device which:
  - Electrically disconnects vehicle from the live conductors of the supply **and** from protective earth
  - Within 5 seconds, if the supply voltage at the charging point (L-N) >253V or <207V rms (+/- 10%)
  - Closing or resetting of device can only occur if the voltage (L-N) is between 207 V - 253 V.
  - Equivalent functionality may be incorporated in an EVCE

NO GROUNDWORKS REQUIRED

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722.411.4.1(iii)- Amended

The original ‘unicorn device’

- Now specifically protects against a **broken PEN conductor** in the LV network.
- Must be selected in accordance with Table 537.4
- Can only be closed or rest if the voltage between the **CPC and Earth** does not exceed 70 V rms
- Equivalent functionality may be incorporated into an EVCP

- This device needs a reference to Earth through a suitable measurement earth electrode or through reference point derived from line conductors of 3 phase system- detailed in Annex 722, item A722.4

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722.411.4.1(v)- Future Proof Regulation

- Protection against electric shock is provided by the use of an alternative device to those in (iii) or (iv) which does not result in a lesser degree of safety than using (iii) or (iv).
    - This allows for new devices to be developed which satisfy the safety criteria of amendment 1, without requiring a change in the wiring regulations

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Additional changes

- **722.311- Maximum demand and diversity**, this has been updated:
  - *Load curtailment, including load reduction or disconnection, either automatically or manually, may be taken into account when determining maximum demand of the installation or part thereof.*
  - Load control, smart charging capabilities etc can be considered in the design of the circuit
  - The reference to diversity has been removed

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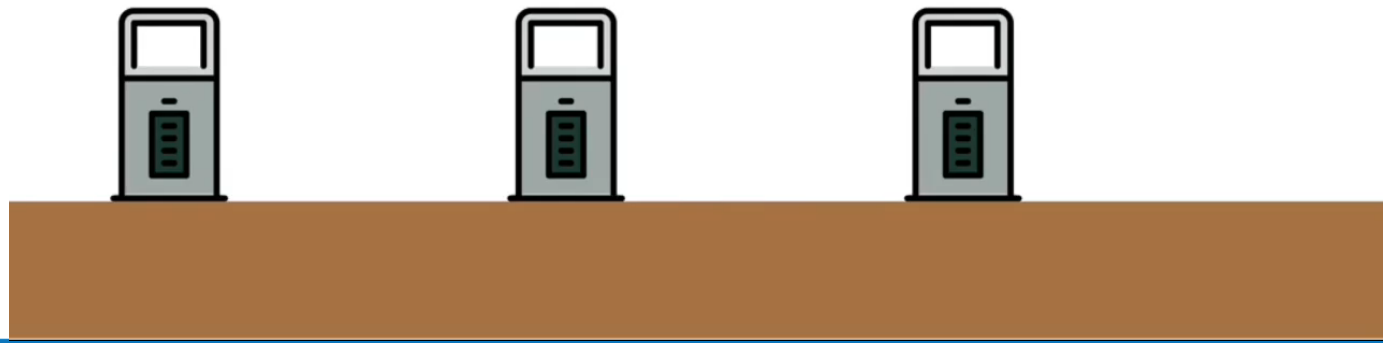
Multiple Chargepoint load control



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Domestic scenario load control

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Additional changes- Impact

- **722.512.2.203 Impact (AG)**
  Equipment installed in public areas and car park sites shall be protected against mechanical damage (impact of high severity AG3). Protection of the equipment shall be afforded by one or more of the following:
  - the position or location shall be selected to avoid damage by any reasonably foreseeable impact
  - local or general mechanical protection shall be provided
  - equipment shall be installed that complies with a minimum degree of protection against external mechanical impact of IK08 in accordance with the requirements of BS EN 62262.

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Additional changes

- **RCDs**
  - **722.531.2.101** This is now 722.531.3.101 and has been rewritten for clarity
  - Except where provided by the charging equipment, protection against DC fault currents shall be provided by:
    - Type B RCD, or
    - Type A or Type F RCD in conjunction with an RDC-DD

(Residual direct current detecting device)

■ **Type B** - Electric vehicle chargers, PV supplies.

RCD can detect & respond for type F, PLUS smooth DC residual current.

■ **Type F** - Equipment with frequency controlled speed drives RCD can detect & respons as for type A, PLUS high frequency residual current.

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Additional changes

- Annex A722 (informative) a number of formulae have been re-arranged, to reflect a more coherent way of understanding ‘taught’ formulae.
- Including the Neutral Current of a three-phase installation

$$I_m = \sqrt{[I_{L1} - 0.5(I_{L2} + I_{L3})]^2 + [0.866(I_{L2} - I_{L3})]^2}$$

$$I_m = \sqrt{I_{L1}^2 + I_{L2}^2 + I_{L3}^2 - I_{L1}I_{L2} - I_{L1}I_3 - I_{L2}}$$ L3

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Additional info-DNO Notification

Previous practise:

<7kW install and notify within 28 days

>7kW prior approval needed

New guidance:

If Max demand of property <13.8kVA then notify within 1 calendar month

If Max demand of property > 13.8 kVA or if there is an issue with adequacy or safety of existing service equipment, contact DNO **first**

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So what does this mean?

- Installations for EVCPs can be a lot simpler
- No need for TT installations and worrying about under ground services, differing earthing systems or ground rods effecting zones of influence
- The original options from BS7671:2018 are still available (inc. TT)
- New technologies can come in without need for altering regulations
  - (as long as they satisfy the safety criteria)
- Original regulations apply for 3 phase (balance within 70 V rms per phase)
- EV infrastructure will play a key part of electrical contracting works

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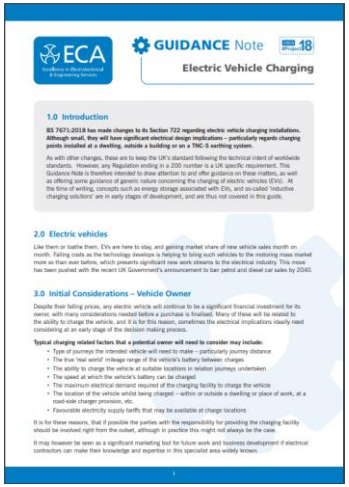
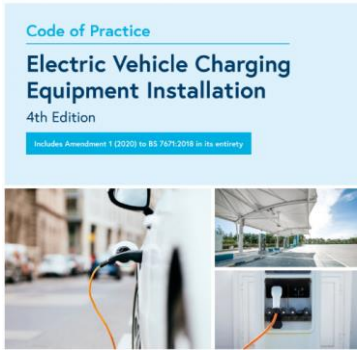
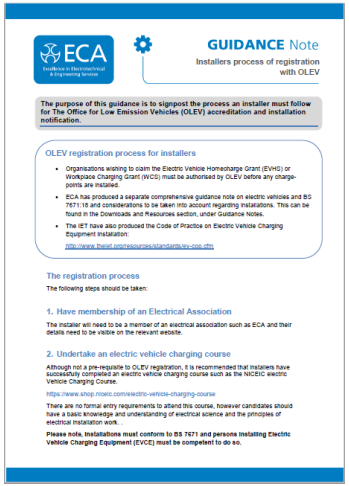
EV installation guidance



Updated version



4th Edition
Now available



- **OLEV funding requires:**
  - **EV training**
    - E.g. Certsure
    - Learning lounge Eve
    - or C&G 2919
  - **+ Manufacturers training**
    - For **each** EVCP type to be installed

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