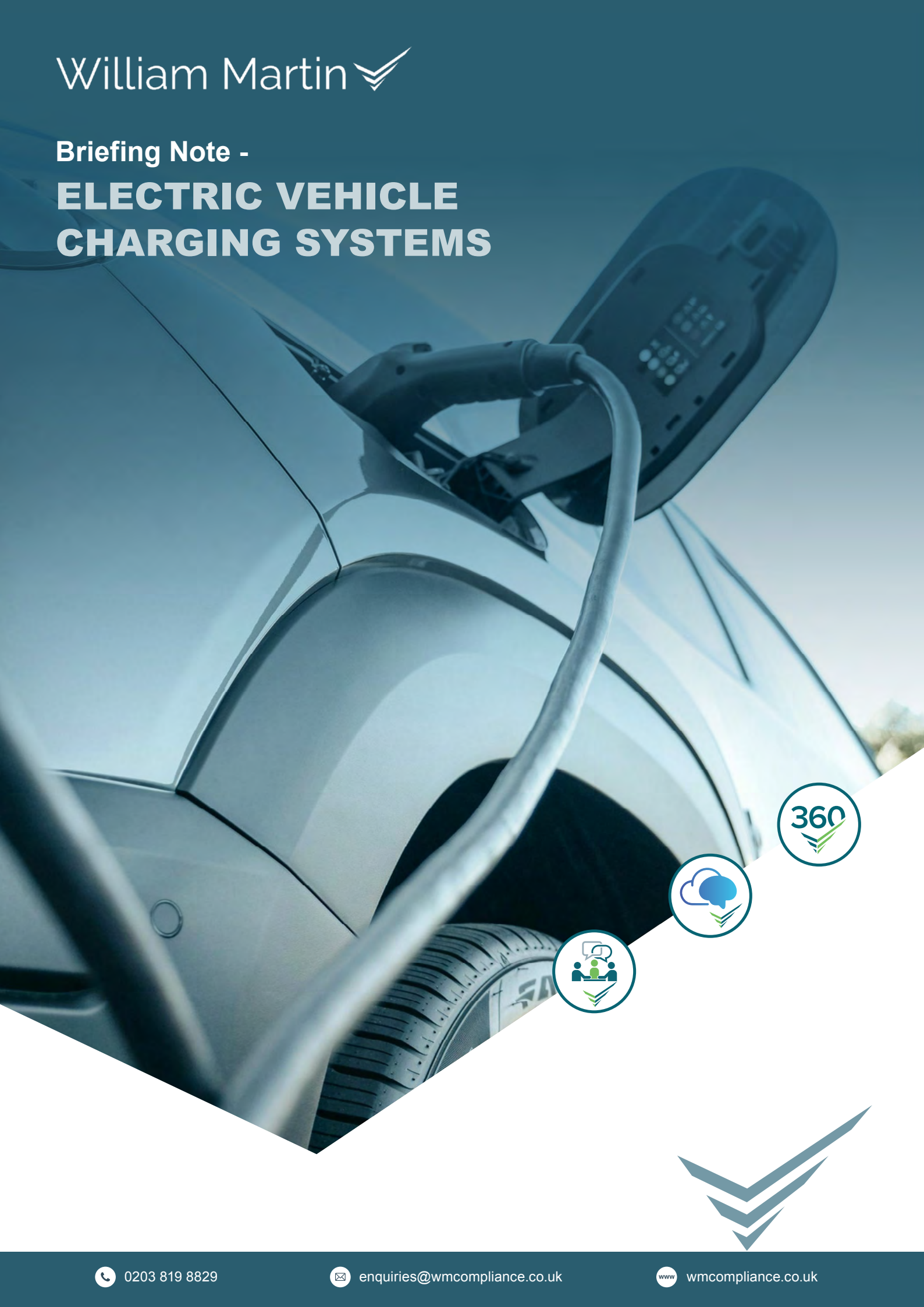


Briefing Note -

# ELECTRIC VEHICLE CHARGING SYSTEMS



## Introduction

In this Briefing Note we consider the safety requirements for the installation and maintenance of electric vehicle charging equipment.

There is increasing focus on environmental impacts, the use of alternative fuels to petrol and diesel engines, and in response, the UK Government has schemes to promote the use of renewable energies. Furthermore, many towns and city centres are intending to introduce Ultra Low Emission Zones (ULEZ) to reduce atmospheric pollution.

## Electric Vehicle Charging Equipment (EVCE)

With the increase in the number of electric and hybrid vehicles has come a proportionate increase in the number of charging points available on sites, especially shopping centres and retail parks. Charging points present a number of hazards as they are designed to be used by the public whilst presenting a minimal risk of fire or electrocution.



Provision of Electric Vehicle Charging Equipment is covered by the Provision and Use of Work Equipment Regulations 1998 and the Electricity at Work Regulation 1989 – due to the risk of electrocution. Both the Electricity at Work Regs and the IEE Regulations BS 7671 indicate that the charge points need to be checked, maintained and tested on a regular basis to ensure that all reasonably practical precautions have been taken to ensure the health and safety of users.

New installations should be in accordance with the IET Code of Practice for Electric Vehicle Charging Equipment Installation (4th Edition). The updated edition is particularly important as it aligns with the BS 7671:2018 Requirements for Electrical Installations (IET Wiring Regulations, 18th Edition). Clients should be aware of unauthorised charging/use of extension leads which can be a cause of vehicle fires (not the charge point). Therefore, the charging points should be suitably located where the potential secondary damage caused by fire is low.

### Types of Electric Vehicle Charging Points

There are three main types of Electric Vehicle (EV) charging point, each defined by power output and hence how quickly they can charge an electric vehicle. While vehicle connector types can be conceived as a problem, most electric vehicles are supplied with multiple cables allowing connection with a wide range of EV charging points:

### Slow Charge (up to 3kW)



Slow charging an EV utilises a standard BS1363 13A socket outlet found in any UK household or business premises. These charging points use approximately 3kW of power and can fully charge an EV in around 6-8 hours.

- Almost every EV can be charged using a slow charger.
- Low cost of installation.
- Charging overnight utilises low electricity tariffs.
- Cuts CO2 emissions.

### Fast Charge (7-22kW)



With a charge current of around 32A (7kW), using a fast charger reduces charging time to around 2-4 hours. These types of charger are commonly found at charging points found on public streets and those within service stations. Although not all electric vehicles are capable of being charged at 32 amps, most models can be connected to them using the correct connector and will automatically draw either 13 or 32 amps depending on their charge capability.

- Widely available.
- Quick charge time.

### Rapid Charge (up to 50kW)



Rapid chargers supply AC or DC current from a dedicated charge point using a tethered, non-removable cable, similar to a traditional fuel pump. Rated at around 50kW, charging an EV to 80% capacity typically takes under 30 minutes. Similar to fast charging, not all electric vehicles can use a rapid charger, but will draw a current dependent on their individual charge capability. Although extremely convenient being able to charge in such a short period of time, repeated rapid charging can have an adverse effect on battery life.

- Extremely quick charge time.

## Testing and Maintenance

Regardless of whether the charging point is owned and managed outright by the client, or leased and managed by a specialist company, any existing charging point should be treated like any other electrical item, and the following checks should be completed:

- Visual inspection of enclosures, barriers, outlets, connectors and trailing leads.
- Five year testing to the current IEE Regulations BS 7671, with annual checks to include but not limited to:
  - ◆ Earth Fault Loop impedance and bonding.
  - ◆ Operation of Residual Current Devices (RCD) and other automatic devices installed for electrical safety.

- ◆ Functional testing.
- ◆ Provision of a certificate of compliance to current IEE Regulation BS 7671.

Clients should also carry out preventative checks at least every six months, (although this is not mandatory):

- Check the condition of the earth system including mechanical connections and signs of corrosion.
- Check, record and clear any fault logs.
- Check the condition of the seals and replace as necessary.
- Visually check all connections for the effects of thermal cycling and tighten the connection as necessary.
- Solvent clean and remove oxidisation from the outlets and connectors.
- Wipe clean the external surfaces, check for damage and replace as necessary.
- Clean within the feeder pillar as necessary.
- Check for signs of deterioration of the weather proofing.
- Lubricate hinges, locks and other mechanical parts.
- Provision of a maintenance report indicating any repairs that may be required to the equipment.
- Free from vandalism, accidental damage, wilful misuse or tree root damage.

The annual checks are in the form of a Portable Appliance Test, and this should be carried out by a qualified electrician using the specialist equipment available from suppliers. This equipment carries out a range of tests without needing to open the charging station to ensure the system is all in good working order.

All new installations must provide the check certification upon completion of the installation (including the selection of RCD device) plus details of the competent contractor and their risk assessment and method statement covering ongoing maintenance work.



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