

SAFE PEOPLE | SAFE PLACES | SAFE SYSTEMS



Guardian

ELECTRICAL COMPLIANCE

ELECTRICAL VEHICLE SUPPLY EQUIPMENT (EVSE)

Does your electrical system have
the required capacity to charge
vehicles?

Is a feasibility study required?



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INTRODUCTION

MAINS POWER ANALYSIS - WHAT IS IT?

Mains power analysis is a method of monitoring the power consumed by your electrical system, and includes inspecting the balancing of phases, measuring harmonic distortion, and power factor. These tests are vital when designing or adding to an existing electrical installation. More recently, Guardian has undertaken mains power analysis for various blue-chip clients. The current trend across businesses is to install Electrical Vehicle Supply Equipment (EVSE) and in consequence, there is the need to understand the impact on electrical systems given EV charging equipment consumes vast amounts of power - hence the uptick in mains power analysis.

Before any installation work is done, you first need to identify -

- **How many EVSE charge points will suit the current supply capacity?**
- **What will the repercussions be for my electrical installation?**

Typically, engineers use the same phase when installing EVSE, usually the most convenient option, which, in time, will lead to a range of issues, the most noticeable being an imbalance in phases. If this is the case, phase one could be drawing more power than the other two phases resulting in an unbalanced supply. An imbalance will create extensive energy losses, costs for which the client would be liable. Additionally, without mains power analysis testing you will have similar issues with harmonic distortion and power factor.

An electrical system that isn't running or performing efficiently will not only result in more power consumed than necessary but with less output. It's worth noting that depending on the contract you have in place, exceeding the maximum supply may result in high out-of-contract prices from your energy supplier and steep penalty notices.

Regulation 132.16 of the BS7671, states that -

“No addition or alteration, temporary or permanent, shall be made to an existing installation, unless it has been ascertained that the rating and the condition of any existing equipment, including the distributor, will be adequate for the altered circumstances...”

Before any additions or changes are made to your electrical system, undertaking Mains Power Analysis is crucial in ensuring that the existing power supply is adequate.

ELECTRIC VEHICLE SUPPLY EQUIPMENT (EVSE) AND THE PATH TO NET ZERO

Since the launch of the Electrical Vehicle (EV) and its now mainstream availability, the end of 2022 saw EV sales had taken up 10% of the global vehicle market, and as time passes the market is set for more major growth. In tandem, with the increased demand for EVs, there is an equal need for EVSE in the public, private and commercial sectors.

COP26 saw the introduction of “**A2Z - Accelerating to Zero**”, the commitment to a zero-emission vehicles transition aligned with the Paris Agreement. This declaration assists in the acceleration towards Net Zero, a strategy for decarbonising all sectors within the UK economy by 2050. Businesses now benefit from financial incentives to make the switch to electric vehicles, such as government-funded grants and large discounts when purchasing electric vehicles.



EVSE CHARGING FEASIBILITY

CURRENT ISSUES WITHIN THE EVSE INSTALLATION INDUSTRY

As the demand for electric vehicles soars, the requirement for charging equipment will follow concurrently. By 2030 80% of new cars and 70% of new vans sold in Great Britain are set to be zero emission, it is estimated there will be over 2 million electric vehicles on UK roads. The EVSE installation industry is still establishing itself in the UK market, particularly within the commercial sector and as we know with any innovative product or service, specific regulatory guidelines tend to follow at a later date.

Remember - It is the Dutyholder's responsibility, not the installers, to undertake power mains analysis before changes are made to an existing electrical system.

EXAMPLE

A standard 7kW EVSE (fast charger) requires around 32amps to charge at full capacity. If a Dutyholder on site wants 10 vehicle chargers installed for its fleet of electric vehicles, it will need to pull over 320amps from the current installation to fast-charge.

The use of a mains analysis report before installation will provide the Dutyholder with all the requisite data before an EVSE installation project is started.

Included in a Mains Analysis Report -

- The spare capacity within an installation
- Size of the transformer, and current rating of the main switch
- Detailed 7-day load analysis, giving an accurate reading of power consumption at any given time or date
- Balancing of Phases
- Harmonic Distortion
- Power Factor

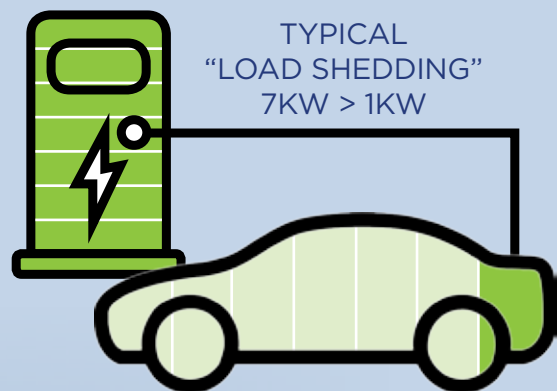
THE LOOPHOLE - LOAD SHEDDING

Installation companies will often disregard the requirement for a mains analysis, substituting it with load shedding.

Load shedding comes into operation when an installation capacity doesn't meet the requirements in which the charging units installed, need to work at full power, thus shedding the reduced load equally across all EVSE units.

For example, if a 7kW charger is pulling a reduced capacity of 1kW from the mains supply as it's at capacity, then charging time is increased. A standard electric vehicle will take 8 hours to fully charge on a 7kW unit, but if the unit is only pulling 1kW, it could take over 40 hours to reach a 100% charge.

Load shedding results in minimal charging power across charging units and increased charging times, rendering the concept impractical.



EXAMPLE

A multisite client recently had 10 x 22kW fast chargers installed without confirming the spare capacity within the installation. The Dutyholder couldn't understand why these chargers weren't charging efficiently. Guardian recommended a mains analysis to investigate further.

As the results came in, it became clear that there were a multitude of concerns. The existing transformer wasn't of adequate size, and the sub-distribution in terms of over-current protection and conductor size was underrated. This meant that using all units at full capacity, would overload their network with two possible outcomes - One, the protective device would operate and shut off the incoming supply, halting all production; or two, it would cause a devastating fire.

CASE STUDY Greencore

THE CLIENT - GREENCORE

Established in 1991, following the privatisation of Irish Sugar, Greencore now has over 16 manufacturing sites and 18 distribution centres across the UK. With a net income in 2021 of £25.7 million. They are known as the world's largest sandwich manufacturer. Employing over 13,000 people, Greencore supplies a wide range of chilled, frozen, and ambient foods to some of the most well-known retailers and food service customers in the UK.

Greencore was in search of an electrical safety company to assist them in achieving electrical compliance, they needed a business that shared the same values and high-quality work ethic, going above and beyond for the customer always.

GUARDIAN & GREENCORE

Specialising in fixed wire inspection and testing, Guardian Electrical Compliance was established in 2010. With over 120 years of collective experience in the electrical safety sector, Guardian was created with the vision to improve electrical safety standards for all Dutyholders, delivering blue-chip clients high-quality testing services to help them achieve electrical compliance to satisfy the Electricity at Work Regulations 1989.

In 2011, with identical well-established values and a passion for high-quality deliverance, Greencore agreed that Guardian Electrical were best suited to assist them in completing their fixed wire inspection and testing programme at their site in York. Now, Guardian delivers an array of electrical safety services, including fixed wire inspection and testing, remedial work, electrical equipment testing and emergency light testing at over 30 Greencore sites.



ISSUES FACED BY GREENCORE

Regional Facilities Manager, John Hughes who deals with the 17 Greencore "Direct to Store" sites within the group, originally contacted Guardian in 2021. John wanted to know if Guardian were able to conduct mains analysis at various sites within his division. He needed to know what spare capacity he would have on each installation if they were to have multiple EVSE units installed at each site. Installation of EVSE was crucial as they were moving over to a carbon-neutral fleet, and John needed to ensure that each site had sufficient spare capacity to power the EVSE units safely.

Greencore were already overseeing a project on feasibility but required further data. John wanted to know exactly how much spare capacity each installation had, which would enable him to work out the exact number of EVSE units they were able to install within each site. The 17 sites ranged in size, from small 10-van depots to large 80-van depots, with no two being the same. The existing electrical reports John held for each site were soon identified as a major concern, as the paperwork was often outdated. As the installations had been altered and upgraded over the years, much of the paperwork was not updated, therefore did not reflect the current electrical system.

I was impressed by the professionalism and expertise of Guardian Electrical in conducting mains analysis for several Greencore sites that I oversee. Guardian Electrical is a leader in electrical safety and has been providing reliable fixed-wire testing for more than 30 Greencore sites across the UK. When I needed to assess the spare capacity and efficiency of the electrical systems at my sites, I contacted Matt Gilmore, one of Guardian's Technical Contract Managers. He was very helpful and designed a customised program of works for me. Mains analysis was not a common service that Guardian offered, but they were willing to take on the challenge and deliver high-quality results.

Regional Facilities Manager, John Hughes

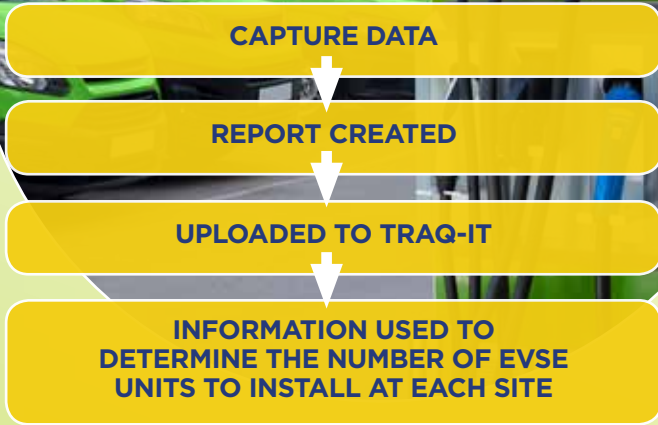
CASE STUDY Greencore

GUARDIAN PROPOSAL & TESTING METHODOLOGY

Guardian's Technical Contracts Manager, Matt Gilmore suggested that we capture a week's worth of data for each Greencore site, this data included current usage and power consumption. At the end of the week, a report would then be created for each site, detailing the balancing of phases, harmonic distortion, power factor correction and most importantly, the installations consumption and capacity. The transformer and main switch would be reviewed, which meant a supply capacity could be added to the report with ease.

Upon completion of the analysis on-site, John was emailed the report and a copy was also uploaded to his TraQ-it website. TraQ-it is Guardian's own unique reporting website which enables any duty holder to access any of their electrical safety records in one place, at any time. Greencore's TraQ-it website now includes their mains analysis reports as well as any other electrical reports they have had completed previously.

GUARDIAN'S EVSE FEASIBILITY PROCESS



OUTCOME

Out of the 17 sites John looks after, Guardian were able to undertake mains analysis at 15 in total. Once the results were made available on TraQ-it, individual reports could then be downloaded instantly, giving John a detailed overview of each Greencore site tested.



The data provided gave John the ability to make informed choices on the number of EVSE that each site could have installed. The largest site John looked after was over 160,000 sqft, which held a spare capacity of 850amps, giving him the option to have 26 units installed if needed.

However, one of John's smallest sites held a spare capacity of 17amps, this would not be enough to power just one 32amp EVSE unit, meaning upgrades would be needed. Although this wasn't an ideal scenario for John, in terms of electrical safety, it further confirms the importance of mains analysis testing.

John, the Dutyholder, has now been given a full mains analysis report for each of the sites he is responsible for, which are stored on his TraQ-it site, free to view and download at any time he requires. John can now assess each site individually and produce an EVSE installation plan based on accurate data, thus minimising any potential dangers or issues in the future.

"Matt performed the mains analysis himself over a week, using advanced equipment and techniques. He measured the power factor, harmonic distortion and balancing of phases, which are all important factors for optimising the electrical system. He then compiled detailed reports with the data he collected and uploaded them to my online account on TraQ-it. This made it easy for me to access all my electrical records anytime and anywhere, especially when I had to visit multiple sites in a day."

John Hughes
Regional Facilities Manager,

"I am very grateful to Matt and Guardian Electrical for their excellent service and support. They went above and beyond my expectations and provided me with valuable information that will help me improve the electrical performance and safety at my sites."

John Hughes
Regional Facilities Manager

TRAQ-IT® - STAYING IN CONTROL



CONTROLLED RECORD KEEPING

Guardian's unique interactive website features include instant reporting, exporting capabilities, hierarchical permission levels, search and filter functionality. Its multi-site capability allows customers to view the electrical status of individual buildings.

TraQ-it ensures records are current, accurate and consolidated with a version history of all changes.



Upon completion of each stage of the programme, electrical testing data, electrical dangers notifications and network drawings are returned to the TraQ-it Department for quality assurance prior to uploading on your personalised site, all free of charge.

To view a short video about TraQ-it, please scan the QR code



SOME OF OUR CLIENTS USING TRAQ-IT®



Guardian
ELECTRICAL COMPLIANCE

SAFE PEOPLE | SAFE PLACES | SAFE SYSTEMS

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