

Power Quality Survey Service Schedule

Support... Planned and contracted maintenance services

To ensure that data centre or building services are always operating to their full potential Workspace Technology recommends the deployment of regular planned preventative maintenance programmes which are backed up with emergency callout for unplanned failures.

To compliment our data centre planned preventative maintenance services we also recommend an annual Power Quality Survey which is detailed within this service schedule.

Power Quality Survey

Workspace Technology offers a comprehensive Power Quality Survey service which is designed to help:-

- Identify and quantify harmonic related problems
- To investigate 'flicker', 'sag' and other phenomena
- Confirm electricity supply voltage levels
- To identify Power Factor levels
- Check loads before planned changes to distribution
- To record the data needed to assess G5/4-1 compliance

Depending on the specific site requirements a 'snapshot' survey can be completed. Other circumstances may require recording equipment to be left in place for a week or more.

Power Quality Survey reports provide customers with a clearly laid out summary of load, power factor and harmonic data findings. When quality issues are identified the report will include recommendations to correct problems.

The implementation of survey recommendations will help customers reduce energy bills and can prolong life and prevent premature failure of equipment.

Electrical Quality Technical Overview

Harmonics

Harmonics is a term that is used to describe both electrical voltage and current distortion. Distortion is caused by loads drawing their current through semiconductors which have a 'non-linear' characteristic.

Examples of non-linear loads include:

servers, network equipment, high-frequency lighting, switch-mode power supplies, variable-speed drives, Uninterruptable Power Supplies and three phase rectifiers. All of this equipment is present within data centre environments.

Why are harmonics a problem?

Harmonic Current causes overheating of conductors and their insulation, overheating of transformers with increased losses, overloaded Neutral conductors, Neutral to Earth potential, overheating of capacitors and ultimately premature ageing or failure of equipment. Additionally, exporting excessive harmonic distortion to the supply networks may well fall foul of the enforced requirements of G5/4-1.

Harmonic Voltage - causes linear loads to draw non-linear current resulting in current distortion effects, torque pulsation in motors, capacitor dielectric failure, insulation breakdown, server and network equipment power supply failure, electronic lighting failure, malfunction of sensitive electronic equipment and, again, excessive distortion in distribution supply networks.

An understanding of Harmonic distortion levels will enable Workspace Technology to make recommendations for appropriate corrective actions.

Power Factor

Power Factor (p.f.) of a circuit is the ratio of useful power (kW) against apparent power (kVA). It is a measure of how efficiently the electrical supply is being utilized. The lower the p.f., the greater the energy efficiency of the system.

$$\text{Power Factor} = \frac{\text{Kilowatts (kW)}}{\text{Kilovar Amperes (kVA)}}$$

Low Power Factors can incur penalties from electricity supply companies. Additionally poor Power Factor increases power system costs in the following ways:

- The data centre consumes more power
- System charges passed on by the electricity supplier increase
- Reduces the life of connected equipment

A understanding of the data centre Power Factor will enable Workspace Technology to make recommendations on corrective actions.

Voltage Sags/Swells

A sag or swell is a decrease or increase in the rms value of the voltage ranging from a half cycle to a few seconds. The largest cause of problems from the utility side is voltage sags. Sags or swells can occur within a plant at the point of use and may be unrelated to the quality of power at the service entrance. These types of disturbances can lead to problems with data centre equipment that is unprotected by UPS equipment.

An understanding of voltage quality will provide supportive information for any ongoing reviews with the electricity supplier.

Voltage Level

Typically the actual supply voltage received in the UK will vary between 207V and 253V. The optimum voltage for your electrical equipment is 220V.

The identification of voltage levels will determine if your site would benefit from the deployment of voltage optimisation energy saving equipment.

G5/4-1 Regulations

G5/4 is a harmonic regulation to ensure that levels of harmonic current in the public electricity supply system do not give rise to problems for connected users.

Where the G5/4 recommended voltage distortion levels are exceeded, the electricity supplier will require mitigation measures.

Survey Schedule of Works

Frequency Yearly (or following any major infrastructure changes).

Item	Service Detail
1	Agree point of connection for analyser equipment. To ensure G5/4 compliance, measurements must be taken at the "Point of Common Coupling".
2	Install recording equipment. Measurements are normally taken over a seven day period to cover peak distortion periods (Saturday and Sunday evening), unless the process will not operate over these periods.
3	Disconnect recording equipment.
4	Download information and produce analysis report based on recorded findings
5	Produced formal Electrical Quality Report.

Additional Data Centre Services

Workspace Technology offers a range of data centre audit and survey services. These services may be specified as a result of a Data Centre Audit or as part of a comprehensive Data Centre planned preventative maintenance and support package.

Service	Details
Electrical Thermal Imaging Survey	Detailed thermal imaging survey of data centre electrical systems and equipment. This survey will help identify unseen faults on electrical systems which can cause expensive business downtime, damage, loss of data or risk from fire.
Data Centre Audit	The Data Centre Audit service is designed to provide a comprehensive review of the existing data centre or server room facility. This review is designed to help identify both good and bad practice and help clients reduce the risk of downtime.
Power Usage Effectiveness (PUE) Assessment	The PUE Assessment enables I.T and data centre managers to accurately benchmark the Power Usage Effectiveness** (PUE), Data Centre Infrastructure Efficiency** (DCiE) and usage of the server room environment through direct analysis of power and energy consumption.
Airflow & Room Thermal Imaging Survey	The Airflow and Thermal Imaging Survey enables data centre managers to identify problems with cooling capacity and airflow efficiency. The survey includes the following: <ul style="list-style-type: none"> • Room assessment and layout plan • Thermal imaging photos of each aisle and photographic images of each cabinet • Air velocity pressure survey (airflow through each 600x600 vented floor tile) • Temperature and humidity check at low, medium and high levels on each aisle • Flow & return temperature and humidity check on the air conditioning units

Further details on audit services can be found in individual audit and survey schedules.

Notes On Audit Schedule

All work mentioned in the schedule is carried out subject to Workspace Technology's Terms and Conditions of sale.

The audit schedules shown are based on a standard and will not be applicable to every installation for every item listed. Consequently each task has to be qualified by the term; "if it is safe so to do", "if applicable" , "if possible" and "if appropriate".

It is possible that your specific installation may have additional or specialised equipment not mentioned in this schedule. In that case, the specific equipment would be the subject of addenda to the main contract.

Tasks mentioned in the schedule may also be omitted if Workspace Technology's engineers or its appointed agents deem that it is unsafe to carry out that task or that it may jeopardise the security of electrical supply.

