

Standards for Subcontractors

HS-MCS-D-001

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General Health & Safety requirements

It is clearly understood that there will be a number of different classes of subcontractor working on behalf of Eon Control Solutions ranging from small companies with few employees to large multi-national organisations. However, whilst there may be variations in the level of detail or complexity required in management systems and work method statements, no variation in reasonable standards of health and safety performance will be permitted.

In order to assist our subcontractors in delivering these standards, the following section provides an outline of the safety management arrangements that Eon Control Solutions will expect subcontractors working on our behalf to demonstrate. Later sections will cover issues like plant, machinery and site management.

1.1 Health & Safety management

Throughout the progress of the work, subcontractors must comply with their duties under the Health and Safety at Work etc. act 1974 and the Management of Health and Safety at Work Regulations 1999.

Subcontractors will be responsible for ensuring the standards outlined in this document are met throughout their engagement with Eon Control Solutions. This responsibility extends to the activities of any appointed sub-subcontractors under their control. Subcontractors are reminded that further sub-contracting of works to a secondary tier of sub-contractor is strictly prohibited without the written permission of the Eon Control Solutions.

Eon Control Solutions reserves the authority to stop any subcontractor working if, in their opinion, this is necessary in the interests of health and safety. Eon Control Solutions will not accept liability for any loss incurred by a subcontractor due to the stoppage of work if that subcontractor has infringed contract requirements, operational safety rules, health and safety legislation or the standards outlined in this document.

1.2 Pre-qualification

Regulations impose a duty on Eon Control Solutions to make reasonable enquiries regarding the suitability, competency and knowledge base of our subcontractors, so that we can ensure they meet their statutory obligations.

Eon Control Solutions will only work with registered companies that have been awarded approved subcontractor status as a result of a detailed health and safety assessment. In order for any company to progress to 'approved status' a Health and Safety Competency Questionnaire must be completed for pre-qualification assessment.

Each subcontractor will be informed of their assessment results and notified of any outstanding requirements to be implemented in order to improve this status as required.

We require each subcontractor to commit to the minimum safety standards and conditions as set out within this document. A signature is requested within the questionnaire to confirm this commitment.

1.3 Health & Safety policy

The Health and Safety at Work Act requires companies employing more than five staff to maintain a documented health and safety policy. A copy of the subcontractor's health and safety policy will be requested as part of the pre-qualification process. Health & safety policies should be understood and acted upon by all employees within the subcontracting company. A copy of Eon's Health and Safety Policy is located in **Appendix 1 (Page 17)** of this document.

1.4 Health & Safety management systems

As part of the pre-qualification process subcontractors will be required to provide details of effective arrangements for the management of Health & Safety. Management system assessment will be made subjectively in relation to contract scope and levels of associated risk.

All management systems must take into account relevant aspects of health & safety, particularly the use of sub-subcontractors and protection of third parties (e.g. members of the public). Systems should also include;

- Clearly defined duties and responsibilities of management and supervisors
- Details of how you intend to comply with your health & safety policy
- Arrangements for dealing with common hazards
- Periodic reviews of the management system

For small companies, as an absolute minimum Eon Control Solutions would expect documentary evidence of roles and responsibilities, insurance cover, certificates of competence, risk assessments and safe working method statements to be made available.

1.5 Competence and training

Subcontractors must ensure that their personnel and any sub-subcontractor under their control have the correct authorisation, competence and training for the tasks that they are undertaking. Demonstration of competence forms a key element of the pre-qualification process.

We require that competence be supported, as a minimum, by a valid, current CSCS, CPSC or CISRS card. The following requirements also apply:

- Anyone involved in surveying, demolition and/or refurbishment work" must have undertaken an asbestos awareness course
- Crane operators must hold specific crane's CPCS certification.
- Slinger/signallers must hold CPCS certification.
- Mobile towers must be erected by a trained scaffolder or operative with PASMA certification.
- Subcontractors operating mobile towers must be aware of requirements for the safe use of towers (Manufacturers" instructions must be available on site).
- All scaffolders must hold appropriate certification, under the CITB Scaffolders Registration Schemes (CISRS) and comply with NASC Guidance SG4:15.
- Drivers must hold the appropriate license for specific type of vehicle e.g. HGV
- Electrical technicians must hold NICEIC or ECA certification
- All operators of plant and equipment that are covered by CPCS/IPAF schemes must hold appropriate certification for specific type of machine e.g. MEWPs.
- All supervisors must demonstrate sufficient levels of competence and retain an appropriate level of training in relation to the work being undertaken. For example; CITB Site Supervisors Safety Training Scheme (SSSTS), a relevant CSCS/ECS skills card and suitable First Aid qualification.
- All managers must demonstrate sufficient levels of competence and retain an appropriate level of training in relation to the work being undertaken. For example; CITB Site Managers Safety Training Scheme (SMSTS), a relevant manager's CSCS/ECS skills card and suitable First Aid qualification.

Subcontractors must also provide sufficient resources to satisfy necessary safety appointments, including first aiders, fire/emergency co-ordination and/or appointed person/supervisors for lifting operations, as identified prior to award of the sub-contract. If it is found that a particular individual does not hold proof of competence, the subcontractor will be responsible for providing verification of the individual's suitability.

1.6 Risk assessment and method statements (RAMS)

The Management of Health and Safety at Work Regulations requires all employers and self-employed persons to carry out a suitable and sufficient assessment of the health and safety risks to workers for work activities undertaken and to record this.

Eon Control Solutions requires its subcontractors to provide comprehensive, robust risk assessments that clearly identify how each of their activities will ensure hazards and their associated risks are removed or reduced as far as possible.

Subcontractors must assess the health and safety risks associated with their work activities and identify suitable and effective control measures to be used to combat these risks.

A method statement is required to describe the sequence of carrying out a work activity and to detail how control measures will be implemented. The method statement therefore needs to be written in conjunction with, and refer to, the relevant risk assessment(s). It may also require further supporting documentation e.g. COSHH assessments, technical drawing.

Eon Control Solutions expect that:

- Site specific risk assessments and method statements (RAMS) must be completed and forwarded to Eon Control Solutions 7 days prior to work commencing. This will allow Eon Control Solutions to review and disseminate RAMS to applicable parties (Clients, Principal Contractors) for approval.
- All site operatives must read and understand the RAMS prior to work commencing.
- The agreed method of work must be adhered to at all times, failure may result in work being stopped and operatives being removed from site.
- RAMS should be reviewed and revised as necessary to accommodate any changes in methods of working, plant, equipment, materials or site conditions.
- Revised RAMS must be forwarded to Eon Control Solutions for review and approval prior to work commencing.

Although Eon Control Solutions reviews subcontractor RAMS prior to the commencement of work, it shall be noted that the responsibility to eliminate or reduce risks to as low as reasonably practicable rests with the subcontractor.

Where RAMS are reviewed and deemed to be insufficient or incomplete (either in content, clarity, depth or scope of information), they must be amended and re-submitted for review and approval prior to work commencing.

1.7 Communication & meetings

Subcontractors must ensure that everyone working on their behalf, including agency workers, understands the agreed safe methods of work and risks involved, prior to any work being permitted to start. Subcontractors will encourage feedback and comments on safety matters, attend safety meetings and assist with safety monitoring programmes as required.

The subcontractor's Site Manager is responsible for ensuring that the following meetings are attended by subcontractor's representatives (at their own cost):

- Pre-start meetings to agree site set-up requirements, the availability of subcontractor's risk assessments/method statements, site safety and environmental controls and waste management
- Progress meetings to review the on-going suitability and adequacy of the above
- Safety meetings to discuss issues related to the site

- Meetings to discuss and review specific safety and environmental procedures e.g. evacuation arrangements to reflect changing hazards

1.8 Toolbox talks

Subcontractors will ensure that safety toolbox talks are held on site. The subcontractor's supervisor should select a suitable topic and address the workforce on the general safety requirements of that subject. A record of each tool-box talk, listing those who attended, should be maintained and forwarded to Eon Control Solutions for review.

Where toolbox talks are administered by Eon Control Solutions, subcontractors are reminded attendance is a mandatory requirement.

1.9 Permits to work

Where hazardous elements of an operation are undertaken, a permit to work system may be put in place. This will be identified within the relevant Method Statement and Risk Assessment.

Examples of high-risk activities that require a Permit-to-Work include (but are not limited to):

- Working in a confined space
- Working at height
- Live electrical works
- Hot works

Once the client has agreed the safe system of work, the subcontractor obtains a Permit-to-Work from either Eon Control Solutions or the client (or their representative) prior to starting the work activity on a daily basis.

Once issued, the subcontractor is responsible for ensuring the scope of the activity is as expressed within the Permit and for ensuring all safety control measures are maintained for the duration.

The subcontractor must present the Permit at the end of each day to either Eon Control Solutions or the client (or their representative) for review and sign off.

Permits-to-Work will generally be issued by the client in respect of the following works carried out on customer's premises, in the event that a project requires Eon Control Solutions to provide electrical Permit-to-Work this shall apply for the following tasks:

- Switching off any switch fuse, distribution board, or mains circuit board that may affect critical systems, the safety of client's staff or any other person working on or visiting the premises.
- Work on live electrical apparatus.
- Work on electrical distribution systems that need the installed safety systems/barriers defeated or removed.
- Work on electrical distribution systems that expose personnel to shock hazards.
- Work on remote and automatically controlled low voltage switch-gear.
- Work on any earthing system whilst the supply is still live.

All Permits to Work for work on electrical equipment shall be issued by an Authorised Person (Electrical Services) in accordance with Eon Control Solutions procedures for Permit-to-Work or by the clients/principal contractor's authorised person. A Permit-to-Work is not required for the following work if it is carried out by a competent person (electrical services) or authorised subcontractor;

- Isolation of electrical distribution systems and equipment to make them safe
- Replacement of electrical outlets, fittings equipment and fuses that have been made safe
- Installation of new electrical fittings, outlets and equipment

1.10 Accident, incident & near miss reporting

As soon as is reasonably practicable (within 24 hours), subcontractors must report any accidents, incidents or near misses to Eon Control Solutions at the earliest opportunity regardless of how small or insignificant.

Subcontractors must also provide a copy of the Accident Book entry and/or subsequent investigation, in order for Eon Control Solutions to accurately record and manage accidents effectively and to assist in future prevention.

Where a subcontractor does not provide their own accident book, they will be required to follow Eon Control Solutions Accident Reporting procedure. Notwithstanding the requirements of the Data Protection Act 2018, subcontractors are reminded of their duty to co-operate with reasonable requirements of the Principal Contractor under the CDM Regulations 2015.

Where there is a reportable injury or disease, subcontractors will inform the Health and Safety Executive (HSE) directly, as required under the Reportable Injuries, Diseases and Dangerous Occurrences Regulations (RIDDOR) 2013.

The subcontractor will also provide the Senior Manager with the following information:

- A copy of the Accident Book entry
- Copies of any witness statements
- The results of an in-depth accident investigation undertaken by the subcontractor
- A copy of the completed F2508 form issued to the HSE
- Copies of any further information or evidence e.g. photographic evidence

Subcontractors are required to keep Eon Control Solutions informed of the subsequent development of long-term injuries, diseases and dangerous occurrences.

Subcontractors must co-operate fully with any on-going accident investigation undertaken by the representatives of Eon Control Solutions or the HSE, and assist in implementing subsequent remedial actions or preventive measures as required.

Eon Control Solutions must also be notified of any other significant incident e.g. trespass, violent acts, vandalism or near miss that potentially could have caused harm.

Near Miss reporting is actively encouraged within Eon Control Solutions and forms part of a subcontractor's periodic performance review. Near Miss reporting cards are available on request.

1.11 Monitoring, auditing & review

Regular internal audits are undertaken by Eon Control Solutions Managers and the Health and Safety Team as part of our subcontractor monitoring programme.

Subcontractors must co-operate fully with any arrangements made by Eon Control Solutions

Subcontractors have a legal duty to carry out regular inspections of certain work equipment under their control e.g. working platforms, mechanical plant, lifting equipment. Where subcontractors undertake their own inspection regime, Eon Control Solutions will require a copy of inspection reports as and when they are completed.

Eon Control Solutions maintains a system to measure and record subcontractor performance. The system assists Eon Control Solutions to periodically review performance and breaches in compliance in order to optimise resources and agree future resource allocation.

2 Operational standards

Eon Control Solutions is committed to maintaining high standards of health & safety management. These standards apply to our own staff and subcontractors working on our behalf.

Company guidelines on work sites and methods of working are not intended to outline requirements in all situations. They are, however, intended to provide some basic standards that subcontractors are expected to meet.

2.1 Site induction

Subcontractors are responsible for ensuring they comply with 'site signing in' procedures and receive a site induction prior to commencing work.

2.2 Drugs & alcohol

Our Drugs and Alcohol Policy implements control measures to prevent personnel, as far as possible from:

- Carrying out safety-critical work when affected by drugs or excess alcohol
- Consuming drugs or alcohol at work.

Any worker found under the influence or in the possession of Drugs and Alcohol whilst at work will be immediately removed from site, pending a full investigation.

2.3 Smoking

Smoking on site is only permitted in designated areas. Any worker found smoking outside the boundaries of the designated smoking area will be immediately removed from site, pending a full investigation.

2.4 Access & egress

Designated safe access/egress routes must be provided to all work areas/work platforms. These must be maintained free from obstructions at all times to ensure:

- Safe movement of personnel in the event of an evacuation
- Elimination of trip hazards

2.5 Safety rules

As a minimum requirement the following health and safety rules must be observed by all persons whilst working on behalf of Eon Control Solutions:

Ensure

- That you wear the correct PPE at all times whilst on site
- That you observe all H&S signs and notices displayed
- That you keep to the pedestrian access routes

Do not

- Access the site until you have attended an appropriate induction
- Consume food or drink on the site, unless it is within the welfare facilities provided
- Attend site under the influence of alcohol or drugs

- Smoke on site except within authorised areas
- Remove any guardrail or cover to any hole unless you have been given express permission from your supervisor. Ensure protection measures are replaced on completion of your work activities
- Undertake any work unless your supervisor has briefed you on the key aspects of the safe system of work
- Burn any materials on site
- Use radios, Walkman's, MP3 players, iPods or similar on site

Anyone found contravening safety rules may be subject to further action and exclusion from site.

2.6 Asbestos

All subcontractors must have undertaken appropriate asbestos awareness training. Prior to work commencing work all subcontractors are reminded to review the asbestos information for any building.

If at any time a subcontractor suspects any suspicious material of containing asbestos, they should cease work in that area immediately, vacate and prevent others from entering the area and report it to the client/principal contractor and Eon Control Solutions.

2.7 Plant & equipment

Subcontractors are responsible for the safe use and maintenance of all plant and equipment provided on site for use by their workforce. Provision and Use of Work Equipment Regulations (PUWER) requires that equipment provided for use at work is:

- Suitable for the intended use
- Safe for use, maintained in a safe condition and inspected to ensure it is correctly installed and does not subsequently deteriorate
- Used only by people who have received adequate information, instruction and training
- Accompanied by suitable health and safety measures, such as protective devices and controls. These will normally include emergency stop devices, adequate means of isolation from sources of energy, clearly visible markings and warning devices
- Used in accordance with specific requirements for mobile work equipment

Wherever practical electrically powered equipment will be reduced to 110V. Where this is not practical, equipment will be operated in conjunction with a Residual Current Device (RCD). All portable electrical equipment will be subject to an appropriate Portable Appliance Testing regime.

2.8 Electrical work

Subcontractors are reminded the Electricity at Work Regulations 1989 requires every employer to comply with the provisions of the Regulations in so far as they relate to matters which are within their control and in particular:

- All systems shall at all times be of such construction as may be necessary to prevent danger, so far as is reasonably practicable
- All systems shall be maintained, so far as is reasonably practicable, so as to prevent danger
- Every work activity, including operation, use and maintenance of a system and work near a system, shall be carried out in such a manner as not to give rise, so far as is reasonably practicable, to danger
- Any equipment provided under these Regulations for the purpose of protecting persons at work on or near electrical equipment shall be suitable for the use for which it is provided, and be maintained in a condition suitable for that use, and be properly used

Note: Any proceedings against Eon Control Solutions or individuals in relation to The Electricity at Work Regulations 1989 will be regarded as being criminal. All subcontractors who are employed by Eon Control Solutions must comply with the Electricity at Work Regulations 1989 and with IET Wiring Regulations - BS7671:2018 (18th Edition).

Subcontractors carrying out the testing and/or repair of electrical equipment associated with Building Management System (BMS), or associated connections must have appropriate technical knowledge, training and information to enable them to work safely. General guidelines for competence are set out below:

- Practical experience in working with electricity relating to the testing of BMS and an adequate knowledge of hazards.
- Knowledge of current safety standards and a clear, understanding of the precautions required to avoid danger.
- The ability to recognise whether it is safe for work to continue, particularly in respect of unfamiliar equipment and unfamiliar locations.

All electrical work carried out including work carried out by authorised subcontractors shall be subject to risk assessment. The results of risk assessments for work on electrical equipment shall be documented and shall include detailed method statements that record:

- The steps that will be taken to ensure and verify that there is adequate means of access/egress, adequate lighting and adequate safe work space at all electrical equipment on which work is being performed.
- The means by which the electrical equipment to be worked on shall be disconnected from every source of electrical energy.
- The steps that will be taken to ensure that electrical equipment to be worked on has been made dead.
- The precautions that will be taken to prevent electrical equipment, which has been made dead becoming electrically charged during work.
- The personal safety equipment and tools that are required to prevent injury and death.
- The steps that will be taken to ensure that electrical equipment is re-instated in a safe manner.

Subcontractors shall ensure before any work is carried out on electrical equipment that may give rise to danger that there is;

- Adequate working space, access/egress and lighting.
- All necessary steps shall be taken to protect against inadvertent contact with other live parts nearby. This shall be done wherever practicable by the erection of physical barriers and/or the use of temporary insulation.
- No employee shall work on electrical equipment if they are unsure of the requirements of the safe working procedures set out in the safety method statement for the work.
- Before disconnecting or isolating any electrical equipment, the circuit to be worked on, or near, shall be identified. Electrical equipment shall wherever practicable be physically identified. Wherever possible this process should be aided by the use of appropriate drawings, diagrams and other written information. Labelling on circuits and equipment may be used to assist in the identification process, it must however never be assumed that labelling is correct.
- Once the circuit or equipment to be worked on or near has been identified it shall be disconnected from every source of electrical energy.
- Adequate precautions shall be taken to prevent electrical equipment, which has been made dead, from becoming electrically charged during that work. Wherever practicable this should be carried out by locking off all isolators. Where such facilities are not available, the removal of fuses or links is permissible.

- Fuses or links shall be labelled and kept in safe keeping away from the isolator by Competent Person. Under no circumstances must the fuses or links be left unattended by or near the isolator.
- Once isolated a notice or label shall be put at the place of disconnection identifying the distribution board references of the circuits been worked on. This should be supplemented by 'danger' notices adjacent to the place of work indicating nearby apparatus that is still energised.
- It is the duty of all employees to be aware of the Health and Safety Policy that is relevant to their work as well as observing any additional rules and regulations on health and safety provided by the client.
- Having isolated the circuit, equipment and all parts to ensure that they are dead, even if the isolation has been achieved automatically through an interlocking system. If it is a three-phase system or equipment with more than one supply, prove that all supply conductors are dead. The device used for proving dead shall itself be proved immediately before and after testing.
- For High Voltage and stored energy equipment. To ensure that the risk to personnel is minimised, even if the above precautions fail, conductors should be earthed using properly designed earthing devices or earthing leads, usually applied to all points where the circuit or equipment is isolated from the supply. Additional earths at the point of work may also be necessary if this is remote from the point of isolation, but these should be applied only after proving dead at the point of work. The earthing conductors and their connections should be suitable for the energy that may flow in the event of a failure of the above precautions. Earthing low voltage equipment is particularly desirable if there is a risk of re-energisation. In other low voltage equipment, however, it may be physically impractical to apply earths, or the risk of short circuit from introducing an earth near adjacent live parts may outweigh the benefit of earthing the apparatus being worked on.

2.9 Working at height

Where working at height cannot be avoided, subcontractors must consider their method of working in line with the hierarchy of control prior to putting operatives to work. The mode of access to carry out the work is most important and consideration should be given to access arrangements that do not put operatives at unnecessary risk.

Any subcontractor undertaking work at height must be appropriately trained and provide Eon Control Solutions with a detailed risk assessment, method statement and where required, an emergency rescue plan.

Where mechanical means of access is not an option subcontractors must provide safe access for employees working at height. This can be done by the provision of safe scaffold access such as:

- Fixed tube and fitting scaffolding
- Mobile scaffold towers

Collective fall protection must be considered at all times. On floors above ground level and at roof level fixed guard rail edge protection is to be provided comprising double guard rails and toe boards as minimum. These must also be provided around service riser and lift shaft openings.

Where operatives are working at leading edges, suitable fixed distance barriers are to be erected with appropriate signage to protect other operatives. Leading edge operatives must be provided with suitable fall, protection/fall arrest arrangements.

Fall protection arrangements are a last resort and should only be considered where other safe access arrangements cannot be provided e.g. MEWPS or suitable scaffold access arrangements.

Where operatives are working from a running line using a harness the running line must be tested to ensure it is fit for the loads intended, i.e. if used for fall restraint or fall arrest. When operatives are working from a harness the fall protection must be fit for the task

Subcontractors in the safety net rigging and fall arrest industry must be members of the Fall Arrest Safety Equipment Training (FASET) association.

Ladders and Stepladders should only be used for short duration work (30 minutes max) if agreed with by the Client.

2.10 Scaffolding

All subcontractors appointed to conduct scaffolding work must adhere to the Construction Design and Management Regulations 2015, Work at Height Regulations 2005 and the National Access and Scaffolding Confederation guidance. Scaffolding subcontractors must be members of the National Access and Scaffolding Confederation (NASC).

2.11 Crane lifting operations

All project crane lifting operations are subject to specific safe lifting requirements in accordance with the Lifting Operations and Lifting Equipment Regulations (LOLER) and BS7121. All subcontractors appointed to conduct crane lifting operations must appoint a trained Appointed Person (CPCS). They shall be responsible for the effective planning and control of their lifting operations.

2.12 Lighting

Subcontractors are responsible for ensuring the provision of adequate standards of lighting (Task Lighting) required for the safe undertaking of their operations (20-50 Lux).

2.13 Housekeeping

Subcontractors shall be responsible for maintaining an acceptable standard of site cleanliness within their area of works

- All rubbish and debris shall be cleared from the work site on a regular daily basis in progress with the work.
- No excess rubbish or debris will be permitted to be left on site at the end of the working shift.

2.14 Fire prevention

Each subcontractor is required to provide suitable and sufficient resources to ensure the prevention of fire. Where additional emergency arrangements are required, due to the work being undertaken, subcontractors must incorporate these provisions into their Method Statement and/or Risk Assessment(s).

Subcontractors must liaise with Site Management to ensure their emergency arrangements do not conflict with arrangements already in place.

Where Eon Control Solutions act as Principal Subcontractor all fire arrangements will be defined within the project's Fire/Emergency Plan (e.g. Hot Work Permits, Fire Detection and Suppression, Evacuation and Assembly Procedures). The main aspects of the Project Fire/Emergency Plan shall be addressed in the site safety induction.

2.15 COSHH

Working with hazardous substances is regulated by the Control of Substances Hazardous to Health Regulations. Any work activity involving a hazardous substance must be undertaken in line with a specific risk assessment known as a COSHH assessment prior to the operation taking place. Subcontractors should consider the following control measures for hazardous substances in hierarchical order

- Elimination
- Substitution
- Isolation
- Ventilation
- Personal Protective Equipment

Where the use of the hazardous substance cannot be avoided then employers must undertake the COSHH assessment specific to the operation. Due consideration must be given not only to the operatives undertaking the operation but to others who may be within the vicinity of the hazardous operations.

The assessment itself must be based on the information contained within the hazard data sheet relating to the hazardous substance to be used. All employees involved with the use of hazardous substances must be briefed on the contents of the COSHH assessment prior to undertaking the operation.

Any subcontractor using Hazardous substances must include the appropriate COSHH Assessment as part of an overall fully detailed health and safety method statement.

All subcontractors using COSHH materials must ensure the COSHH assessment and Material Safety Data Sheet are stored on site for the duration of time the hazardous substance is stored on site.

2.16 Confined spaces

Where there is a necessity for subcontractors to work within a confined space (i.e. any place including any chamber, tank, vat, silo, pit, trench, sewer, flue, well or similar space in which, by virtue of its enclosed nature, there arises a reasonably foreseeable significant risk), these works must be carried out under the conditions specified within a job specific confined space entry permit. Subcontractors should take due note of the main hazards within confined spaces:

- Oxygen deficiency / displacement – Asphyxiation
- Oxygen enrichment - explosion & fire
- Toxic atmospheres - poisoning/asphyxiation

Any subcontractor undertaking confined space entry work must be appropriately trained and provide Eon Control Solutions with a fully detailed health and safety method statement and emergency rescue plan.

2.17 PPE

Method Statements and Risk Assessments must state what Personal Protective Equipment (PPE) is required to support each work activity and the appropriate PPE must be worn for the work undertaken at all times.

The subcontractors site supervisor and/or manager is responsible for ensuring that personnel under their control are issued with the appropriate PPE and that it is suitably cleaned and maintained.

Minimum mandatory requirements for all construction site personnel are as follows;

Personal protective equipment	Standards
Safety Helmet	EN 397:2012 – Type 1
Hi Vis Vest / Jacket	EN471:2013 – Class 2
Gloves (protection level appropriate for the work)	EN 388:2016 – 4.X.4.2.E (Typically)
Safety Glasses / Spectacles	EN 166:2001 - 1 Optical Class, F Frame strength (Typically)
Safety Shoes/boots	EN345: EN ISO 20345-2011 S1-P or S3

Where additional PPE is necessary, the subcontractor’s method statement will identify the requirements.

All subcontractors are required to ensure that any additional requirements are fully adhered to as and when it is necessary to do so. This will include all dress code requirements e.g. no shorts or vests will be permitted.

2.18 Calibration Equipment & Handtools

To maintain the highest standards of precision and accuracy in our operations, it is imperative that all subcontractors comply with specific requirements regarding the calibration of equipment. Subcontractors are mandated to ensure that all measurement and testing instruments utilised in their processes are calibrated regularly in accordance with industry standards and applicable regulations. Calibration should be performed by accredited calibration laboratories, and a traceable record of calibration activities, including dates, results, and any adjustments made, must be maintained. Subcontractors are responsible for keeping calibration certificates readily available for inspection upon request. Additionally, any deviations from the specified calibration intervals or tolerances must be promptly reported to our organisation for review and approval. Compliance with these calibration requirements is fundamental to guaranteeing the reliability and accuracy of data, fostering quality assurance, and upholding our commitment to delivering products and services of the highest quality.

For the seamless execution of projects and to uphold safety standards, it is essential that all subcontractors adhere to specific requirements concerning the use and maintenance of hand tools. Subcontractors are expected to ensure that all hand tools utilised in their work are of high quality, well-maintained, and suitable for the tasks at hand. Regular inspections should be conducted to identify and promptly replace any damaged or worn-out tools. Subcontractors must provide proper training to their personnel on the correct usage of hand tools, emphasising safety protocols and ergonomic considerations. Tools should be stored securely, easily accessible, and kept in a clean and organized manner. Any hand tools with specific calibration requirements must be calibrated regularly by accredited facilities, and records of these calibrations should be maintained. Compliance with these requirements not only contributes to the efficiency and safety of the work but also aligns with our commitment to delivering projects of the highest quality.

2.19 Supervision

Supervision levels will be determined according to the levels of risk involved and the competence of those undertaking the works. Eon Control Solutions and the subcontractor will agree supervision

levels prior to award of the sub-contract and requirements will be identified within method statements and risk assessments.

Subcontractors who Eon Control Solutions employ must seek written authorisation from Eon Control Solutions when employing agency workers and/or subcontracting works to a secondary tier of sub-contractor, before they can commence on site. Any breach of this may result in suspension of the Contractor from future works.

Subcontractors must be able to declare and demonstrate the level of health and safety training undertaken by their supervisors and/or managers, which should respectively reflect their responsibilities. Subcontractors must provide sufficient resources to satisfy necessary safety appointments, including first aiders, fire/emergency co-ordination and appointed person/supervisors for lifting operations, as identified prior to award of the sub-contract.

2.20 Protection of third parties

Protection of third parties (e.g. the public) is of paramount concern and all arrangements must take into consideration the reduced level of awareness amongst third parties. Any provisions for protecting the third parties defined in the Construction Phase Plan, Fire/Emergency Plan must be adopted by all personnel alike.

Subcontractors must include adequate precautions for third parties and others throughout the duration of the works. Arrangements in respect of the third parties shall be clearly defined within the subcontractor's method statements.

2.21 Misconduct

Eon Control Solutions operate a site misconduct procedure when acting as Principal Contractor. The procedure allows for warnings to be issued and recorded. Implementation of this procedure and authorisation for issuing warnings is at the discretion of the Eon Control Solutions Site Manager.

Any individual who receives a warning for misconduct will be required to leave site with immediate effect. Where warnings are issued, the subcontractor will be required to reply in writing that action has been taken to prevent recurrence of the breach.

3 Other requirements

All subcontractors working on behalf of Eon Control Solutions shall conform to the organisations Quality and Environment, Energy and Anti-slavery policies.

3.1 Quality

Eon Control Solutions is committed to consistently meet our customers' needs and enhance their satisfaction. This is a fundamental part of our values and principals and key to the way we do business. All subcontractors working on behalf of Eon Control Solutions shall commit to conform to the organisations Quality Policy. A copy of Eon Control Solutions Quality Policy is located in **Appendix 2** of this document.

3.2 Environment

Environmental protection is also a fundamental part of Eon Control Solutions values and principals. Care of the environment is key to the way we do business. All subcontractors working on behalf of Eon Control Solutions shall commit to conform to the organisation's Environmental Policy. A copy of Control Solutions Environmental Policy is located in **Appendix 3** of this document.

3.3 Energy

All subcontractors working on behalf of Eon Control Solutions shall commit to conform to the organisations Energy Policy, procedures and energy management system. Eon Control Solutions is committed to reducing energy consumption in all aspects of our business both clients facing and within our own office environments. Eon Control Solutions is actively assessing energy usage across our offices and sites with a view to reducing consumption and emissions. We require the commitment of our subcontractors in realising this aim and would ask that all possible efforts are made to reduce unnecessary energy usage while working on Eon Control Solutions sites.

This will be achieved by:

- Ensuring lights are turned off when leaving un-occupied areas
- Use of electrical equipment is kept to a minimum
- Maintenance and cleaning activities shall be carried out in a safe but energy efficient manner ensuring all plant if left operating in an efficient way
- In case the work involves activities that are energy / CO₂, intensive then subcontractors shall, upon the request of Eon Control Solutions, submit greenhouse gases / energy efficiency management plans.

In carrying these out the benefits will be:

- Cutting costs
- Reduction in greenhouse gases
- Improving sustainability
- Increasing innovation

These efforts will assist Eon Control Solutions in reaching our commitment to achieve their energy and carbon reduction objectives. A copy of Eon's Energy Policy is located in **Appendix 4** of this document.

3.4 Modern Day Slavery

Eon Control Solutions is committed to supporting international efforts to promote ethical principles and practices related to the prevention of the exploitation and abuse associated with modern day slavery and human trafficking as defined in the modern-day slavery act 2015. This states that every business in the UK with a total annual turnover of £36m or more, which applies to Eon Control Solutions, will be required to produce a statement, which must be posted on their website, of steps the organisation has taken during the financial year to ensure that slavery and human trafficking is not taking place both within their business and their supply chain.

Eon Control Solutions expects commitment to these principals from all organisations that we have associations with, and will not support or do business with any company knowingly involved in any act of slavery or human trafficking. A copy of Eon Control Solutions Slavery & Human Trafficking Policy is located in **Appendix 5** of this document.

4 Appendix

4.1 Appendix 1 (H&S Policy Statement)

GROUP HEALTH & SAFETY POLICY STATEMENT

E.ON Control Solutions Limited recognises and accepts its responsibility as an employer for providing a safe and healthy working environment on premises and property under its control in accordance with the requirements of the Health and Safety at Work etc Act 1974. E.ON Control Solutions Limited in the conduct of its activities will ensure that it:



- Protects the health, safety and welfare of employees and others that may be affected by its activities.
- Meet its responsibilities as an employer to do all that is reasonably practicable to prevent accidents, injuries and damage to health.

The Company will also, so far as is reasonably practicable:

- Provide and maintain safe working environments that are without risks to health, safety and welfare.
- Set standards that comply with the relevant statutory requirements relating to health, safety and welfare with regard to the effect on employees, contractors, visitors and the public.
- Safeguard employees and others from foreseeable hazards connected with work activities, behaviour, processes and working systems.
- Ensure that when new substances, plant, machinery, equipment, processes or premises are introduced, adequate guidance, instruction, training and supervision are provided for safe methods of work to be developed.
- Ensure all employees are aware of their own responsibilities in respect of relevant health and safety matters and ensure they participate in the prevention of accidents.
- Actively encourage a positive health and safety culture within the organisation, in particular consulting and openly communicating with employees on health and safety matters.
- Ensure that contractors undertaking work for the Company are informed of the relevant standards required and are monitored to ensure compliance without detracting from the contractors' legal responsibilities to comply with statutory requirements.
- Co-operate with appropriate authorities and technical organisations to ensure policies are updated and Standards reviewed to reflect best practice
- Undertake inspections, audits and review activities to ensure the Company's objectives for health, safety and welfare are being met.
- To provide a structure for the continuous improvement of our Health and Safety Management

System, which provides the framework for setting, reviewing and measuring health and safety objectives and targets.

The Board of Directors will give full backing to this policy and will support those who endeavour to carry it out.

Matt Brown	Managing Director and CFO	
Mike Ramsden	Support Services Director	

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4.2 Appendix 2 (Environmental Policy)

ENVIRONMENTAL POLICY

As one of the UK’s leading building controls sales and service providers with clients throughout Europe, E.ON Control Solutions Ltd (ECS) is committed to helping public sector, retail, commercial and industrial organisations reduce energy consumption through innovation and partnerships. This is primarily achieved through the installation, maintenance, and management of Building Energy Management Systems (BeMS).

We strive to unlock value of energy management for our clients by reducing real time energy demand, improving energy efficiency and delivering sustainable energy savings.

To support with this, ECS have implemented an Environmental Management System that meets the ISO14001:2015 standards.

Protection of the environment is a core value at ECS, and we consider it sound business practice. Caring for the environment and ensuring high-quality services are integral to our operations. Therefore, ECS commits to:

- Complying with all relevant legislation, regulations, and other requirements applicable to ECS.
- Identifying and evaluating the environmental impacts of our activities to control and reduce them, including preventing pollution.
- Using natural resources responsibly and minimising waste and energy consumption.
- Training employees to be environmentally aware, ensuring that our operations do not harm them, the community, or the environment.
- Setting SMART objectives for reducing carbon emissions and continuous improvement.

Environmental objectives will be set and reviewed through the management review process. ECS aims to meet the needs and expectations of clients, as well as statutory and regulatory requirements.

This policy will be communicated to all third-party contractors or suppliers working on our behalf. We expect our Supply Chain partners to comply with our management system policies and procedures. A copy of this policy is also on ECS company intranet and website in effectively communicate with internal and external parties.

Signed: 

Mr. Matt Brown, Managing Director

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4.3 Appendix 3 (Quality Policy)

QUALITY POLICY

As one of the UK's leading building controls sales and service providers with clients throughout Europe, E.ON Control Solutions Limited are committed to helping public sector, retail, commercial and industrial organisations use less energy through innovation and partnerships.

This will be achieved by unlocking the value of energy management for our clients by reducing real time demand for energy, improving energy efficiency and delivering sustainable energy solutions.

To assist with this, E.ON Control Solutions have implemented a Quality Management System that meets the requirements of ISO 9001:2015 standards.

E.ON Control Solutions Limited's Operations Board are committed to continually improving our Quality Management System by addressing the risks and opportunities that can affect conformity of our products and services, as well as focusing on enhancing customer satisfaction.

E.ON Control Solutions Limited aims to meet the needs and expectations of clients, as well as statutory and regulatory requirements.

Quality objectives will be set and reviewed through the management review process. Training is provided to promote awareness of individual responsibilities within the quality management system. All personnel within E.ON Control Solutions Limited are responsible for the quality of their work, ensuring ownership and accountability for all of our processes at the point of use.

We will communicate this policy to all of the third-party contractors or suppliers undertaking work on our behalf. We will expect anyone representing E.ON Control Solutions from our Supply Chain to comply with our management system policies and procedures. A copy of this quality policy is also on E.ON Control Solutions Limited company intranet and website in order to communicate effectively with other internal and external parties.

Signed: 
Mr. Matt Brown, Managing Director

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4.4 Appendix 4 (Energy Policy)

ENERGY POLICY

As a leading provider of Building Energy Management Systems (BEMS) in the UK and Europe, E.ON Control Solutions Limited (ECS) are committed to helping commercial, public, IT, residential leisure & hospitality, retail and pharmaceutical sectors use less energy via our services whether it's designing and installing small to major projects, site support services, energy management solutions and or data analytics. Our control systems are designed to identify and eliminate inefficiencies in building performance to improve sustainability by reducing CO₂, reduce energy costs and minimise operational expenditure.


ECS is committed to managing energy use efficiently to minimise our environmental impact and reduce our carbon footprint. To achieve this, we will adopt the following best practices:

- Develop and maintain an Energy Management System that meets the requirements of the ISO 50001 standards.
- Comply with all legal and other requirements regarding energy use, consumption and efficiency and fulfilling our responsibilities as a good corporate citizen
- Integrate energy efficiency considerations into all aspects of our business plan whilst being consistent with business management practices.
- Train employees to recognise and implement energy-saving opportunities, ensuring their safety, and protecting the community and the environment from any harm caused by our operations.
- Set SMART objectives to reduce carbon emissions from our business activities.
- Reduce all energy usage.
- Support the purchase of energy-efficient products and services.
- Implement energy performance improvements in our designs.
- Establish monitoring and reporting procedures.
- Communicate our performance with internal and external stakeholders
- Encourage all representatives of ECS, both internally and externally, to comply with our Energy Management System policies and procedures.
- Ensure the availability of necessary resources and information is available to achieve all objectives and targets that contribute to continuous improvement.

Energy objectives will be set and reviewed through the management review process. ECS aims to meet the needs and expectations of clients, as well as statutory and regulatory requirements.

This policy will be communicated to all third-party contractors or suppliers working on our behalf. We expect our Supply Chain partners to comply with our management system policies and procedures. A copy of this policy is also on ECS company intranet and website in effectively communicate with internal and external parties.

Copies of this policy are available on our website and company intranet.

Signed: 

Mr. Matt Brown, Managing Director
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4.5 Appendix 5 (Slavery & Human Trafficking Statement)



it's on us

Slavery & Human Trafficking Statement June 2024

E.ON Group's statement on modern slavery, which outlines our commitment to making sure our employees are protected from slavery and human trafficking.

E.ON's statement

This statement is made by E.ON SE as the ultimate holding company of the E.ON Group ("E.ON")¹, pursuant to section 54(6) of the UK's Modern Slavery Act 2015 (the "Act") for the financial year ending on 31 December 2023.

E.ON's structure, business & supply chain

E.ON is an international energy company which is focused on Energy Networks, Energy Infrastructure Solutions and Energy Retail.

Global trends like sustainability and climate protection, digitalisation and technological innovation are altering the energy landscape. E.ON's core businesses reflect this: the transformation of yesterday's power lines into tomorrow's smart energy networks and the increasing demand for innovative customer solutions.

Value-enhancing procurement of goods and services is an important requirement for the success of E.ON's business. In all E.ON's procurement processes, E.ON requires human rights to be respected and environmental standards to be maintained throughout the entire supply chain. To this end, E.ON has various policies and management processes in place.

E.ON's approach in outline

E.ON has a commitment to act ethically and responsibly in all its business relationships and has zero tolerance of slavery and human trafficking in any part of its business or supply chain. E.ON supports and is committed to upholding the UN Guiding Principles on Business and Human Rights and the core labour standards set out by the International Labour Organisation. E.ON has a wide range of internal policies, standards and processes in place groupwide to assist in tackling slavery and human trafficking, including:

1. E.ON Code of Conduct and E.ON's Human Rights Statement;
2. E.ON Supplier Code of Conduct, with standards regarding human rights, working conditions, environmental protection and ethical business practices that E.ON requires its suppliers to meet;
3. General Purchasing Conditions for suppliers to require compliance with the E.ON Supplier Code of Conduct;
4. Defined and monitored onboarding and qualification processes of new suppliers before E.ON engages in business with them;

5. Frequent evaluations of E.ON's top suppliers against key performance indicators;
6. Whistleblowing hotline to enable employees and third parties to report possible violations of the law or of company guidelines or policies;
7. Introduction of the German Supply Chain Due Diligence Act² ("Supply Chain Act") has required a lot of elements to be enhanced and updated.

For further information about E.ON's responsible business practices please refer to the chapter "Human Rights and Supply Chain Management" in [The E.ON Integrated Annual Report 2023](#).

E.ON's achievements with update for 2023

E.ON recognises the benefits of upholding standards and continually improving supply chain performance through successful collaboration as follows:

1. E.ON's Human Rights Statement was updated in 2023, is signed by all Management Board members and the Chief Human Rights Officer and is published on E.ON's website. The statement acknowledges the International Bill of Human Rights and the Declaration on Fundamental Principles and Rights at Work of the International Labour Organisation (ILO) of the United Nations (UN) and its fundamental conventions and provides an overview of risks and measures taken by E.ON. It also refers to E.ON's own guidelines such as the Code of Conduct for employees and suppliers. E.ON's Code of Conduct obliges all employees to contribute to a non-discriminatory and safe work environment and to respect human rights. In addition, a more detailed group wide policy which applies to all employees provides guidance to employees so that they procure goods and services in line with E.ON's sustainability and human rights standards. The rules and regulations E.ON follows include the European Convention of the Protection of Human Rights and the Principles of the United Nations Global Compact ("UNGC"). E.ON has participated in the UNGC since 2005. E.ON continually improves its eLearning tool for employees such as the annual training module on human rights, compliance, and cyber and data security, which was last updated in September 2023. More than 80 percent of employees had completed the module by the end of 2023.
2. The Supplier Code of Conduct was updated in 2023 and defines standards for human rights, working conditions, environmental protection, and legally compliant business practices that E.ON requires its suppliers to meet. The current version is supplemented by additional requirements from the Supply Chain Act and stipulates the standards to be complied with in relation to fair working conditions in the supply chain and to climate protection. The E.ON Supply Chain Function Policy describes the mandate and organisational setup of the Supply Chain function. The function encompasses the management of procurement processes, activities, policies, tools, and supplier relationships in compliance with legal requirements and internal regulations, for all E.ON entities to which the policy applies. In addition, the Function Policy (in conjunction with the Supply Chain Handbook) defines Group-wide principles, processes and responsibilities for non-fuel procurement by the above-mentioned units. Excluded from this are a number of spend categories on an exception list (for example, energy and fuel procurement, financial and real estate transactions and taxes).
3. In 2023, E.ON continued to focus on monitoring existing and new suppliers to ensure that they complied with E.ON's minimum requirements and that potential risks to health, safety, the environment and corporate social responsibility, including the protection of human rights, were

identified and mitigated. This was facilitated by the adoption of a fully digital supplier onboarding solution at the end of 2018, which was integrated into E.ON's enterprise resource planning (ERP) system. This means that every non-fuel supplier must complete this onboarding process if the individual transaction volume exceeds €25,000 (per event and per spend category). This process (among other requirements) requires the suppliers to pass a compliance check and accept E.ON's Supplier Code of Conduct. As of year-end 2023, 97.4 percent of non-fuel suppliers had completed the onboarding process.

New suppliers are asked to register using the supplier onboarding solution. Depending on the transaction volume and HSE risk, suppliers must answer at least one questionnaire. In certain cases, E.ON may take additional steps. These may include a supplier audit to check whether the supplier complies with E.ON's standards for human rights, working conditions and environmental protection.

4. In 2023 E.ON continued to evaluate its suppliers' performance and, based on the findings, make decisions about its relationship with them. E.ON evaluates them on the basis of five Key Point Indicators (KPIs): quality, commercial aspects, delivery, innovation, and corporate sustainability, including human rights. The outcome of the evaluation determines whether it will require a supplier to take specific improvement measures.

5. Periodic risk assessments help E.ON detect actual or suspected violations. If violations occur, the Supply Chain Compliance Officer and the respective Supply Chain Director are notified immediately, and corrective measures are required from the supplier. Implementation is precisely monitored by E.ON. If the situation does not improve, E.ON terminates its business relationship with the supplier. No business relationships were terminated for this reason in 2023.

6. The human rights due diligence check introduced in 2021 is based on a human rights risk matrix that combines the risks of the different categories of goods and services E.ON procures with the risks of the countries in which suppliers operate. Since being updated in 2023, the matrix covers all of E.ON's procurement categories. Potentially risky suppliers first have to pass additional checks, such as a more detailed questionnaire or audit, and agree to make improvements and provide evidence of their implementation. In 2023, more than 3,600 new and existing suppliers answered the questionnaire. Many high-risk suppliers successfully completed the human rights due diligence check. Suppliers that have difficulty answering the questionnaire or providing evidence of their measures are supported and closely monitored.

In 2022, E.ON introduced a digital solution for ongoing risk assessment of suppliers with medium and high human rights risk. They are assessed in a variety of categories, including sustainability, finance, cybersecurity, supply chain disruption and compliance. The digital solution looks at several elements called Points of Interest ("PoIs") for example, the holding company of suppliers, branches, plant locations and logistics routes. Since the programme's introduction, over 3,800 PoIs have been monitored on an ongoing basis, thereby covering 60 percent of E.ON's annual spend with suppliers. Nevertheless, E.ON is aware that the complexity of international supply chains poses a challenge to transparency. E.ON is therefore also active in industry initiatives to develop industry-specific standards for improved transparency in supply chains.

7. In 2023, four alleged violations of human rights were reported through the Group wide whistle blower hotline. The investigations found that in each case the allegations were unfounded and therefore not a violation of human rights nor E.ON's Code of Conduct.

8. A central E.ON SE Group-wide human rights due diligence project was launched mid-2022 to prepare the Company for the requirements of Supply Chain Act. The project identified any gaps, developed and implemented optimisation measures and designed a Group-wide approach to human rights management. The approach took effect on 1st January 2023, and assigns Group-wide human rights related responsibilities to the Human Rights Centre of Expertise and the Chief Human Rights Officer.

The Human Rights Centre of Expertise assumed the completed projects tasks from mid-2023 onwards. The centre is part of the Sustainability and Climate Department, and ensures legal requirements are fulfilled across all divisions of the Group. It implements and maintains our human rights risk management system, conducts periodic risk analyses of our own business as well as our supply chain, and reports on them. It is also responsible for Group-wide complaints management and exchanges information with external stakeholders on topics relevant to human rights. In addition, it keeps the Chief Human Rights Officer informed about current developments and incidents and advises them on upcoming activities and decisions.

The role of the Chief Human Rights Officer has been expanded in line with the Supply Chain Act, with a greater focus on legal aspects. To meet the associated new requirements, in January 2023 E.ON transferred the role of Chief Human Rights Officer from the Chairman of the E.ON Management Board, Leonhard Birnbaum, to the General Counsel and Chief Compliance Officer. The Chief Human Rights Officer is responsible for monitoring our human rights risk management system and reports on this to the Management Board on a regular basis.

9. E.ON trained its Supply Chain employees on respect for human rights along the supply chain, new aspects of onboarding, and E.ON's risk matrix for human rights.

Plans for 2024

Activities proposed for 2024 include:

- conducting the annual mandatory e-learning on compliance, human rights and cyber and data security for all employees;
- All E.ON entities which are in scope of the Supply Chain Act will be integrated into the digital solution for ongoing human rights risk assessments;

Health, safety and environment events will continue to be conducted throughout 2024 for E.ON employees and contractor representatives. The aim of these events is to reinforce awareness of the importance of these topics to E.ON, both generally and for individual projects, as well as to design specific action plans for joint improvement initiatives related to the products and services a particular

contractor or subcontractor provides. The events also serve as a forum for sharing best practice and communicating E.ON's standards and policies.

E.ON's continued commitment

E.ON will continue to review its policies and processes in relation to the prevention of modern slavery and human trafficking in its business and supply chain, strengthening these where necessary to ensure continued alignment with the Act.

E.ON will also continue to train all employees on, and ensure compliance with, its Code of Conduct and will identify additional training needs where necessary.

This statement has been approved by the E.ON SE Board of Directors on behalf of E.ON in June 2024. A new statement will be published each year on the website.

Dr. Ing. Leonhard Birnbaum
Chief Executive Officer, E.ON SE
June 3, 2024





BMS ELECTRICAL INSTALLATION SPECIFICATION

(Minimum Standards But Not Limited To)

QA-ECS(Doc)037

Version 5

07/11/2024

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1 Electrical Installation Specification History

1.1 Document Location

The original source of the document is stored in the relevant active program directory.

1.2 Revision History

Revision	Revision date	Summary of Changes
1	11/6/2013	Initial Document
1.1	23/01/2014	Updated by 130
2	17/06/2014	Rebranded.
3	03/04/2018	E.ON Rebranding
4	28/03/2024	Collaborative Update on Regulations and Process.
5	07/11/2024	Sections 3.1 points 4 and 7, 4.1 point 7, 5.1 point 7 and 14.3 Note modified to suit feedback from Project Managers

1.3 Contributors

List of contributors of this document, in alphabetical order:

Name	Title
<i>Russell Allen</i>	Senior Engineering Manager - Capital
<i>Keith Dyer</i>	Technical Manager - Camberley
<i>Chris Lunn</i>	Operations Manager - Capital
<i>Sam Saunders</i>	Training Manager - O&M National Management
<i>Neil Shepherd</i>	Commissioning Engineer - Northwest
<i>Greg Smith</i>	Lead BMS Support / Commissioning Engineer - Amersham
<i>Paul Smith</i>	Project Manager - Capital

1.4 Approvals

This document requires the following approvals:

Name	Signature	Title	Date of Issue
<i>Paul Gardner</i>	Paul Gardner	Commercial Director	05/06/2024

2 General

The principal regulations applicable to electrical systems and equipment are:

- Electricity at Work Regulations 1989.
- IET Regulations for Electrical Installations BS7671:2018 – Latest edition.
- Electrical Supply Regulations 1988.
- HSE booklet HS (G) 13 Electrical testing.
- HSE Guidance Note HS@ 25 “Memorandum of Guidance on the Electricity at Work Regulations.”
- HSE Guidance Note HS(G) 85 Electricity at Work: Safe Working Practices”
- IEE Wiring Regulations Guidance Notes 1-6
- HSE Guidance Note GS38 “Electrical Test equipment for Use by Electricians.”

This specification is the minimum requirement and needs to be reviewed with all issued contract specifications prior to starting on site.

BMS installations will be in single or twin-compartment segregated system, using conduit, trunking and/or tray. Single compartment trunking must not be used for both power and controls. All trunking, tray and conduit installations must be of an adequate size to comply with the latest IEE regulations relating to space factors etc.

Cat 5/6 and Ethernet cabling will not be permitted to be installed in Band 2 containment systems and will require segregation as outlined in the latest IEE wiring regulations.

Wiring will be point to point with the correct identification of cores to each device. Multi core wiring to multiple devices is not permitted, unless agreed in advance for good reason.

Marshalling boxes may only be used in extreme cases but must be agreed in advance with the E.ON Project Manager. If used they must consist of fixed terminals and a wiring diagram of the connection box produced by the electrical installer and handed to the E.ON Project Manager prior to any commissioning.

Any agreed Marshalling boxes must be clearly identified and have “As Installed” drawings with the connection details provided.

3 Conduits

3.1 Steel Conduit and Accessories

- Steel conduit is to be heavy gauge welded mild steel tubing, black enamel, galvanised or stainless-steel finish as specified with any associated Conduit boxes of the same manufacture and type.
- Conduit is to comply with BS 4568 Part I and is to be manufactured by a member of the Conduit Manufacturers Association.
- Conduit is to be not less than 20mm outside diameter.
- Conduit boxes are to be of the same manufacture and type as the specified conduit.
- The maximum run of conduit without a draw-in box must not exceed 12 metres and no more than two right angle bends must occur between draw-in points.
- Internal roughness, burrs, swarf, filings, oil, grease, etc. are to be removed from conduits and accessories before they are fixed. Threads must not be left exposed except for running joints, the exposed threads of which shall be painted to prevent corrosion.
- For entries into fuseboards, adaptable boxes and cable trunking, conduit terminations are to be made by means of a galvanised coupling and hexagon headed brass bush.
- Conduit is to be fixed at intervals not exceeding 1200mm with saddle fixings not exceeding 300mm from conduit accessory boxes.
- The circular cross section of the conduit is to be maintained throughout bends and sets. Bends and sets are to be free of flattening, kinking, and wrinkling and the seam weld is to be continuous throughout.
- All conduit work is to be mechanically and electrically continuous and efficiently earthed.
- Conduits shall be installed so as to allow additional circuits to be drawn in at a later date without disturbing the building fabric.
- A minimum clearance of 150mm is to be maintained between conduit and pipework of heating, gas and other services.
- Conduit and accessories installed in damp, or potentially damp, or hostile situations, or exposed to the weather, are to be galvanised.
- Connections to equipment mounted outside the building are to be so arranged that the conduit falls away from the equipment to prevent any water which has gained ingress into the conduit system being drained into the equipment.
- Running joint threads and any exposed steel or galvanised conduit are to be coated with an approved rust inhibitor, followed by one undercoat and two top coats of enamel/galvanised paint to match the finish of the conduit.

BMS ELECTRICAL MINIMUM INSTALLATION SPECIFICATION

3.2 Conduit Installation

- Conduit is to be run in straight lengths, necessary changes of direction are to be made by bends or sets formed in the conduit.
- Draw boxes are to be installed so that the whole of the conduit work is readily rewirable and are to be large enough to prevent undue cramping of cables.
- Outlet boxes for fittings, accessories, etc. are to be used as draw boxes where possible.
- Surface conduit runs are to be plumb, horizontal, or parallel to sloping surfaces.
- Conduit fixed to steelwork is to be secured by purpose-made girder clips attached without drilling the steelwork.
- Surface conduit installed in dry situations is to be fixed by distance/spacer bar saddles, secured to the structure by mild steel wood screws not less than 35mm No 8 onto wood or in plugged holes in brickwork, blockwork, or concrete.
- Steel conduit installed in damp, potentially damp and exterior location is to be fixed by galvanised distance type saddles secured by stainless steel screws not less than 35mm No 8 into plugged holes.
- All boxes are to be securely fixed to the building structure with a minimum of two screws independently of conduit fixings.
- Fixing screws used for boxes or other accessories containing wiring are to be countersunk head used in countersunk holes or round head if holes are not countersunk.
- Final conduit connections to motors and flexibly mounted equipment are to be by means of a length of flexible conduit, connected to the rigid conduit by a draw box.

Table 4.12 - Maximum spacing of supports for conduits				
<i>Conduit diameter</i>	<i>Rigid metal (m)</i>		<i>Rigid insulating (m)</i>	
	<i>Horizontal</i>	<i>Vertical</i>	<i>Horizontal</i>	<i>Vertical</i>
<i>(mm)</i>				
20 to 25	1.75	2.0	1.5	1.75
25 to 40	2.0	2.25	1.75	2.0
Over 40	2.25	2.5	2.0	2.0

3.3 Flexible Conduit

- Metallic flexible conduit is to be manufactured from galvanised mild steel and shall comply with BS EN 61386.1: 2004. Adaptors shall be of the swivel/solid type.
- Protective continuity is to be provided by a green/yellow pvc single core cable run internally to all flexible conduits that contain power circuits, flexible conduits that contain only control cables for control sensors do not require the installation of this green/yellow pvc single core cable to be run internally. The ends of the protective conductor are to be terminated in convenient boxes either side of the flexible conduit. The size of the protective conductor is to conform to 544.2.3 of BS 7671:2018:2018, unless otherwise specified.
- Individual lengths of flexible conduit are not to exceed 1000mm where used for connection to field equipment and devices i.e. motors etc and to be not less than 20mm diameter. Longer lengths of the same standard of flexible conduit are acceptable when used for installation of control cables for control sensor devices within internal partition walls.

4 Cable Tray/Basket

4.1 Cable Tray/Basket

- Cold Cutting procedures for tray and trunking otherwise Hot Works Permit will be required.
- Cable tray systems shall be manufactured in accordance with BS EN 61537, channel support systems shall be manufactured in accordance with BS 6946.
- Cable tray is to be a minimum of medium duty return flange (MDRF) manufactured from galvanised mild steel sheet and perforated. It is to be supplied and fixed complete with all coupling pieces, bends and offsets, etc. and is to be fixed by purpose made brackets.
- Cable baskets shall be manufactured in galvanised steel with zinc coating.
- Cable tray/basket is to be run in straight lengths and any changes of direction are to be made using bends, offsets, etc.
- Connections between lengths of cable tray are to be made using coupling pieces.
- Bends, offsets and coupling pieces are to be manufactured and supplied by the manufacturer of the cable tray/basket. Where it is not possible to install manufactured parts site manufactured equipment will be acceptable subject to meeting all required specifications along with approval from the Eon Project Manager.
- Cable tray/basket runs are to fit closely to the structure and all necessary bends, etc. are to be provided to enable this to be done.
- Support brackets for cable tray are to be made from mild steel and are to be fixed at intervals not exceeding 1200mm.
- Damage to the galvanised finish of brackets and traywork is to be made good with approved cold galvanising paint.
- Where cable trays/cable baskets are installed vertically through floor or run horizontally through fire partitions, the Contractor is to provide the necessary fire barriers in accordance with BS 7671:2018.

5 Trunking

5.1 Cable Trunking

- Cold Cutting procedures for tray and trunking otherwise Hot Works Permit will be required.
- The trunking is to be manufactured from mild steel galvanised as specified to BS EN 50085-2-1.
- Any damage to the enamel finish or galvanised of the trunking or accessories is to be treated with two coats of rust inhibiting paint and finished to match the colour of the trunking.
- The covers of the trunking and junctions etc. are not to be secured by self tapping screws.
- For the securing of trunking covers, toggle or spring strap operated by recessed screw in centre of cover is an acceptable arrangement.
- All joints in the trunking system are to be made using purpose-made connection sleeves supplied by the manufacturers of the trunking.
- All junctions, tees, bends and similar accessories are to be supplied by the manufacturers of the trunking and fitted by an approved method. All junctions, tees, bends and the like are to be gusseted and provided with approved earth bonding connections. Where it is not possible to install manufactured parts site manufactured equipment will be acceptable subject to meeting all required specifications along with approval from the Eon Project Manager.
- Trunking is to be fixed by suitable brackets at intervals of not more than 1200mm and adjacent to changes of direction.
- Any screw heads inside the trunking are to be of the mushroom or round type.
- Trunking must be IP4X as stipulated in BS7671:2018 in accordance with BS EN 50085 and BS EN 60529.

5.2 Cable Trunking Installation

- Cable trunking is to be run in straight vertical or horizontal lengths; any necessary changes of direction are to be made using manufactured fittings.
- All covers are to be arranged to be removable, except those sections of trunking passing through walls, floors, etc. are to have fixed covers for the thickness of the wall and floor only.
- Where the cable trunking is fixed vertically for more than 3 meters the Contractor shall supply and install purpose-made pin racks to support the cable.
- Where cable trunking is installed to control panels/distribution boards to allow final cable entry from the trunking to the control panel it shall be fitted with either option below. The final cable entry method is to be agreed between the electrical sub-contractor and Eon Project Manager prior to undertaking this section of works.
 - Paxolin sheet of not less than 2mm thickness between the cable trunking and control panels/distribution boards with the trunking and paxolin slotted for final cable entry with all sharp edges removed and protective plastic edging strip fitted.
 - Have suitably sized male and female bushes complete with suitable spacer lock rings/couplers fitted between the cable trunking and control panels/distribution boards, where this latter method is used correct spacing of cables passing through all bushes/couplers must be undertaken.
- Fire barriers are to be provided where horizontal trunking passes through walls and partitions at intervals not exceeding 15m. Vertically installed trunking shall be provided with fire barriers at all floor levels or 5m centres whichever is the lesser.
- Cable trunking is to follow the structure closely and all necessary bends, etc. are to be provided for sets around beams, etc. to enable this to be done. The trunking lid shall not be weakened by cutting or reducing the return edge.
- Conduit entries into trunking shall be by coupler and male brass bush.

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- Plain holes or grommeted holes will not be allowed.
- Cables leaving trunking shall do so through holes or slots bushed to prevent abrasion of the sheathing.
- Holes made in trunking shall be neatly made and uniform, shall be filed or reamed to remove ragged, burred, or sharp edges.
- Trunking shall be sized for future expansion by assuming all spare MCB ways are utilised.
- For the purpose of calculation, the trunking shall accommodate all cables including circuit protective conductors with an advisory 25% increase.
- The manufacturer's standard fittings shall be used throughout unless it is not practicable. Where necessary special fittings shall be fabricated utilising the same material and gauge as the manufacturer's trunking and finished to the same standard.

5.3 Overhead and Ceiling Trunking

- Overhead trunking shall be installed in close co-ordination with the main contractor to ensure levels are correct.
- Ceiling trunking shall be installed in close co-operation with the ceiling erector and other trades as necessary.
- All overhead surface containment must be either in metal conduits/trunking or non-inverted tray/basket or if inverted then the cables must be adequately supported/secured to the tray/basket using metal cable tie/clips.
- Within general areas the recommended spacing distances for cable ties are Horizontal every 300mm and Vertical every 400mm with every third cable tie being a metal cable tie.
- Within access or egress routes metal cable ties only should be used with the recommended spacing distances for metal cable ties of Horizontal every 300mm and Vertical every 400mm.
- Metal cable ties are to be installed and cut to length as per the manufacturers instructions.

6 Wiring

All cables will be of a LS0H type unless used for external services. Data sheets for cables to be issued prior to commencing installation and will form O&M documentation.

6.1 PVC Insulated Armoured Cables (External)

- PVC SWA PVC cables are to comply with BS 6346 and shall be produced by a BASEC manufacturer. Unless otherwise specified, cables are to have shaped copper conductors, single wire armouring and PVC oversheath to the appropriate colour where specified.
- Cable colours shall be Phase 1 – Brown, Phase 2 – Black, Phase 3 – Grey, Neutral – Blue, Earth – Green/Yellow.

6.2 XLPE/LS0H Insulated Armoured Cables

- XLPE/LS0H cables are to comply with the requirements of BS 6724 and shall be produced by a BASEC manufacturer. Unless otherwise specified, cables are to have shaped copper stranded conductors insulated with XLPE with LS0H bedding, wire armoring, and LS0H oversheath and be rated at 600/1000v.
- Cable colour note: Cable colours shall be Phase 1 – Brown, Phase 2 – Black, Phase 3 – Grey, Neutral – Blue, Earth – Green/Yellow.

6.3 Installation of Armoured Cables

- All cables are to be installed along routes and at levels indicated on the drawings.
- Every effort is to be made to avoid damage to the armouring and serving of cables. Damage must be reported to the Engineer, who will give instructions on either the replacement of or the repair to the affected cable.
- Great care is to be exercised in the handling of the cables. Cable drums are to be rolled smoothly in the direction of the arrow painted on the side of the drum. Cable drums are to be mounted on cable jacks to enable the drum to rotate freely, and cable rollers are to be used, as necessary.
- Care is to be taken to ensure that the cables are not twisted or kinked and the minimum bending radius is as per BS7671:2018 is maintained.

6.4 General Wiring Cables

- LS0H Insulated Single Core Cables.
- LS0H insulated single core cables are to be 450/750-volt grade with copper conductors, manufactured generally in accordance with BS 7211 and known as 6491B. They shall be by an approved BASEC manufacturer.
- If 1.5mm² or 2.5mm² multi stranded cable is available complying in all other respects with BS 7211, it is to be used in preference to single-strand cable.
- Marking of Wiring within Distribution Boards and Consumer Units.
- Neutral conductors within distribution boards and consumer units shall be marked with their circuit reference by means of sleeves or ferrules.
- Field Wiring Modifications must not be terminated directly into controllers or relays etc, they must be terminated to the correct type of field wiring terminal.

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6.5 Wiring in Conduit and Trunking

- All wiring shall be sized in accordance with the respective tables within the current IET regulations at the time of works.
- All circuit conductors (phases, neutral and protective) of a circuit must be drawn into the same conduit.
- The number of cables drawn into conduit or trunking is not to exceed the number stipulated in the respective tables within the current IET regulations at the time of works.
- Cables are to be continuous and unjointed.
- It shall be sized in accordance with the respective tables within the current IET regulations at the time of works.

6.6 SY, CY & YY Cables

- Use of SY, CY and YY Cables in UK-based Fixed Installation requires written permission from the client and inclusion in the specification.
- Under BS7671 18th Edition Wiring Regulation, SY, CY and YY cables are only appropriate for UK fixed wiring installations requiring compliance with the Wiring Regulations where certain standards can be determined, provisions made, and such use is recorded in the appropriate electrical certification.
- Clause 133.1.3 of the Wiring Regulations requires that when a cable that is neither a British, harmonised, or other national standard is used, the specifier / designer ensure an equivalent degree of safety is achieved as when using a British standard cable.
- SY, CY and YY cables are not manufactured to a specific British, European, or international standard so in most cases it is not possible to demonstrate the performance safety standards required to satisfy the Wiring Regulations.

6.7 Earthing

- Earthing and bonding are two very different, but often confused, methods of preventing electric shock.
- The principle of earthing is to limit the duration of touch voltages if you were to contact an exposed conductive part. The earth creates a safe route for the current to flow instead of causing electric shock.
- The purpose of bonding is to reduce the risk of electric shock if you find yourself touching separate metallic parts when there is a fault somewhere within the electrical installation. Protective bonding conductors reduce the magnitude of touch voltage in this scenario.
- Earthing and bonding are both an essential requirement of any electrical installation and are covered within the safety requirements of BS7671.
- The Purpose of supplementary bonding is to reduce the voltage between the various exposed-conductive-parts and extraneous-conductive-parts of a location during a fault to earth.

7 Control Cable Applications

- The type and size of cable to be installed and the installation method for each individual system is to be agreed between the electrical sub-contractor and Eon Project Manager prior to undertaking control cable installation works.
- BS5308 Type 1 Part 1 type cables can be used in all installations for control wiring i.e. clipped direct, installed on trays and/or within containment.
- Typical Control Cables are Belden 8761 1 pair, Beldon 8723 LS0H 2 pair, & Beldon 8777 LS0H 3 pair.

8 Network Wiring Systems

- The electrical installer must provide E.ON with Drawings clearly showing the cable routes for all Networks cable installations between panels & devices etc.
- The correct Network cable is to be selected depending on type of Network and installation requirements.
- The type and size of Network cable to be installed and the installation method for each individual Network system is to be agreed between the electrical sub-contractor and Eon Project Manager prior to undertaking this section of works.
- Each cable leg of the network wiring must be identified at either end showing to & from i.e., if the cable is coming from unit 2-1, mark it F-2-1 and if it is going to unit 2-2, mark it T-2-2. The screen earth is to be continuous and connected at each device termination.
- The Network wiring must not be teed or starred but wired in a continuous daisy chain circuit. For some individual Network systems it may be possible to allow teed or starred connection to be undertaken, this is subject to the individual Network system operational requirements and must be approved by the E.ON Project Manager.
- All Network wiring must be installed in such a manner to ensure no external factors such as power interference etc can affect the Network operation.
- The electrical installer must provide E.ON with drawings clearly showing the cable routes for all networks. All Sub networks shall be tested for continuity using a calibrated low ohms meter and results recorded, i.e. T- to R- and T+ to R+. Further testing shall be carried out to check there are no crosses in the network, this can be done by using a wave detector or a meter with continuity tester.

9 Typical Network Cable Types

- Belden 9841 or equivalent – (One 24 AWG pairs stranded (7x32) tinned copper conductors, polyethylene insulation, twisted pairs, overall Beldfoil® (100% coverage) + tinned copper braid shield (90% coverage), 24 AWG stranded tinned copper drain wire, PVC jacket.)
- Belden 9842 or equivalent – (Two 24 AWG pairs stranded (7x32) tinned copper conductors, polyethylene insulation, twisted pairs, overall Beldfoil® (100% coverage) + tinned copper braid shield (90% coverage), 24 AWG stranded tinned copper drain wire, PVC jacket.)
- BACnet MS/TP networks can be clipped directly or contained. The screen earth needs to be continuous and terminated at one end only. At terminal devices, the screen earth needs to be sleeved and connected into a terminal block and NOT connected down to earth. Earth cable is to be labelled with the number of the live conductor if no specific numbered earthing terminal otherwise connected behind the live conductor.
- Ethernet Solid Core Network Cable will be used with a Construction Products Regulation (CPR) grade of CCA as a minimum or B2CA as a preference. See section 10 below.
- KNX 1 Pair LSHF Green– Bare Copper, (1/0.8mm), Polyethylene (PE), 2, Cotton Thread, Polyester, Tinned Copper (7/0.16mm), Overall Aluminium Foil (100% Coverage), Low Smoke Halogen Free (LSHF), Green, Red & Black.
- KNX 2 Pair LSHF Green– Bare Copper, (1/0.8mm), Polyethylene (PE), 2, Cotton Thread, Polyester, Tinned Copper (7/0.16mm), Overall Aluminium Foil (100% Coverage), Low Smoke Halogen Free (LSHF), Green, Red & Black, Yellow & White
- Screens to be connected within the control panel unless specific data sheet indicates otherwise.
- Belden 8205 1 pair - Lon network only.
- Beldon 9841 LS0H 1 Pair & Beldon 9842 LS0H 2 Pair.
- The above cables can be used for associated systems and should be clipped direct, installed on trays and/or within containment.

Note: BS Equivalent is acceptable if agreed by E.ON Project Manager. Data Sheets are required to be provided to the E.ON Project Manager to allow for inclusion in all required documentation and manuals.

10 Network Wiring

Construction Products Regulation (CPR) includes power, telecommunications, data and control cables manufactured for or imported into the United Kingdom (UK) for permanent installation within domestic, residential and commercial buildings are subject to the **Construction Products Regulation (CPR)**, covered by BS EN 50575.

30th November 2017 saw the publication of BS6701: Amendment 1, prior to its adoption as a supplement to the BS7671 18th Edition of the IET Electrical Wiring Regulations in July 2018.

The primary objective of the standard was to improve the performance of data and telecommunications cables in fire conditions.

The new BS6701: Amendment 1-2017 standard dictates a given Class as below cable construction in the permanent installation of both copper and fibre optic cables within a building.

This is to be applied to all UK cabling projects, either new build, refurbishment or the extension of existing buildings where the installed cables are subject to the Construction Product Regulations.

The regulation classifies products into one of seven Euroclasses, but in most instances only five will apply to cables. You are likely to see the majority of cables between Classes **Cca** and **Fca**.

F_{ca}	<p>Fire Performance: high level of flammability under test and burns over 425mm. Tests: BS EN 60332-1-2 (basic vertical flame test by factory or lab). FSC Comment: Cables classified to Class Fca may have high levels of flammability due to the materials they are made of. For example, cables with a PE sheath that are primarily intended for external use, such as telephone or duct grade cable, could be tested and classified to Class Fca, which is perfectly acceptable when used in an appropriate environment.</p>
E_{ca}	<p>Fire Performance: limited fire spread under test and burns less than 425mm. Tests: BS EN 60332-1-2 (by an authorised test house, known as a Notified Body (NB) or Approval Body (AB)). FSC Comment: The same basic test as Class Fca for vertical flame propagation for a single wire or cable using a 1-kW fl</p>
D_{ca}	<p>Fire Performance: moderate fire spread and high levels of heat generated. Tests: BS EN 60332-1-2 and BS EN 50399, including smoke generation. Additional Tests: Optional flaming droplets; acidity tests, and additional smoke test FSC Comment: This classification has relatively little use or acceptance within specifying/contracting organisations. This is because no largescale flamespread growth is measured.</p>
C_{ca}	<p>Fire Performance: reduced flame spread, limited fire growth/heat release rate. Tests: BS EN 60332-1-2 and BS EN 50399, including smoke generation. Additional Tests: Optional flaming droplets; acidity tests, and additional smoke test. FSC Comment: More rigorous test than Class Dca but with additional regular, independent factory inspections, audits and periodic retesting. This is widely accepted across Europe as the 'go to' standard, but be aware that many cables do not meet Class Cca although availability is improving.</p>
B2_{ca}	<p>Fire Performance: low flame spread, fire growth & heat release. Tests: BS EN 60332-1-2 and BS EN 50399, including smoke generation. Additional Tests: Optional flaming droplets; acidity tests, and additional smoke test. FSC Comment: Similar to Class Cca although a lower acceptable heat release rate and burn measurement. The additional tests are most relevant to Classes Cca, B2ca and B1ca, in practice, this is likely to be the highest class cables will meet.</p>

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10.1 Installation of data/network Cables

- **Identify the Start and End Points:** Determine where the cables will run from and to, such as from a network switch to individual rooms.
- **Avoid Electrical Interference:** Keep cables away from electrical wires to prevent interference.
- **Measure the Distance:** Ensure that the cable length does not exceed the maximum distance allowed for Cat6 cables (100 meters or 328 feet).
- **Choose the Right Path:** Consider using conduits, cable trays, or existing pathways to protect and conceal the cables.
- **Use Proper Cable Management:** Utilise cable trays or conduits to keep cables organised.
- **Avoid Sharp Bends:** Sharp bends can damage the cables and reduce performance.
- **Secure the Cables:** Use loose cable ties or Velcro straps to secure the cables without over-tightening.
- The wire pairs must not be un-twisted, and the outer jacket must not be stripped back more than 13 mm (0.51 in).
- Each cable leg must be identified at either end showing to & from i.e., if the cable is coming from FCU 2-1, mark it F-2-1 and if it is going to FCU 2-2, mark it T-2-2. The screen earth should only be made off on the receiving end of the cable.
- Network wiring must not be teed or starred, but wired in a continuous circuit.

11 Isolators

- Unless otherwise stated, isolators will be of a weatherproof IP65 type with a rotary lockable handle appropriately sized as specified.
- They will be installed adjacent to each device or power supply and clearly labelled identifying their domain.
- Isolators should be installed within 1 Metre of the point of use.
- Isolators are to be used as shown on control panel drawings.
- Equipment with panel door isolators i.e. booster sets, pressurisation units etc. must also still be fitted with local isolators adjacent to the equipment and not directly mounted on it, this is to allow safe removal and isolation of equipment if required.
- Care must be taken when fixing inverters to framework to ensure correct airflow around the inverter. Certain inverters may need a back plate fitted to them to achieve this.
- Wiring between inverters and motors may be done using a screened SY type cable suitably sized with separate cpc or externally XLPE/SWA.
- External wiring is to be installed in LSF/SWA.

12 Final Connections

- All cables must be identified at both ends with numbers corresponding to the control panel terminals to which they are connected. All screened cables are to be numbered on the individual cores, with the correct size numbers and not the outer sheath. Only colour coded ring type cable numbers shall be used, push on numbering is not acceptable. Cable numbers to be fitted at the same time as the cable termination and not as a latter exercise and prior to any on site commissioning. Numbered from source.
- All screened cables shall be made off with Hellerman type expanding sleeves and the cable ends shall be made off with suitable ferrules using the correct crimping tool. Ferrules and lugs that have been crimped with pliers or side cutters will not be accepted.
- Final connection to drives and control devices will be generally carried out using flexible conduits not exceeding 1 Metre in length.
- Flexible conduits installed in plant and boiler areas, and areas at risk of mechanical damage must be of a metal type i.e. adapter flex or similar.
- Where compression glands are used, the correct size must be used to suit size of cable and only 1 cable shall be installed into each gland.
- Final cable connections onto motors must be done using the appropriate size ring lugs and crimped with the correct tool and crimp lug.
- The pin ferrules are as:

CONDUCTOR SIZE mm ²	FRENCH Telemecanique - T		GERMAN Weidmüller - W	
	Color	Label	Color	Label
0.14	Brown	BROWN	Grey	GREY
0.25	Violet	VIOLET	Light Blue	LIGHT BLUE
0.34	Pink	PINK	Turquoise	TURQUOISE
0.5	White	WHITE	Orange	ORANGE
0.75	Light Blue	LIGHT BLUE	White	WHITE
1.00	Red	RED	Yellow	YELLOW
1.50	Black	BLACK	Red	RED
2.50	Grey	GREY	Blue	BLUE
4.00	Orange	ORANGE	Grey	GREY
6.00	Green	GREEN	Black	BLACK
10.00	Brown	BROWN	Ivory	IVORY
16.00	Ivory	IVORY	Green	GREEN
25.00	Black	BLACK	Brown	BROWN
35.00	Red	RED	Beige	BEIGE
50.00	Blue	BLUE	Olive	OLIVE

13 Control Panels And Field Equipment

13.1 Control Panels

- Before the mounting of any panel, it is the electrical installer's responsibility to check the panel for damage and any damage found is to be reported to the E.ON Project Manager immediately.
- Panels must be mounted using suitable anchors or fixings, screws and associated fixing plugs will not be permitted. All panel frameworks must be earth bonded to the panel.
- Panels having separate power and control sections will require cables entries into both sections, internal holes between the panel cubicles will not be permitted. Care must be taken to prevent swarf entering the control panel when making cable entries.
- All cables are to be dressed neatly and correctly numbered inside control panels. Open bushes are not permitted directly into control panels for cable entries and suitable compression stuffing glands are required.
- Each mains cable must be individually glanded i.e. 1 cable 1 gland.
- Where trunking is installed externally to the MCC as a junction box, larger glands for control cables may be used into the trunking and open glands between the trunking and MCC panel may then be used.
- The trunking within the MCC is not to be used to house slack cable and all cable slack is to be within the trunking external to the MCC.
- Only ring type numbers are to be used to identify cables and must correspond with the terminal numbers within the panel. The control panel is to be left tidy with all swarf and cable cuts vacuumed from the base of the panels. All panel controls.
- Drawings are to be left inside the panel at the end of each day and once the installation is complete.

13.2 Field Equipment

- The electrical installer is responsible for the safekeeping of all controls equipment issued to them. On receipt of any controls equipment, any missing or damaged items must be reported to the E.ON Project Manager immediately.
- The electrical sub-contractor is responsible for the correct installation of control equipment as to the manufactures data sheets.
- All external mounting control devices with a lower IP rating than IP65 are to be mounted in an IP65 enclosure supplied by the installer. Where possible, no control devices are to be mounted on the underside of ductwork.
- When off coil frost thermostats are fitted to external AHU's, the thermostat is to be mounted internally in the AHU. On internal AHU's, care must be taken to protect the capillary where it passes through any metal work, and the capillary must only be laced inside the AHU with the manufacturer's fixing kit.
- The rear cable entry for room/space sensors shall be sealed with an appropriate sealant; expanding foam is not suitable for this purpose.
- Air DP switches/sensors shall always be mounted such that the body of the DP switch is above the monitored point, with no loops in the DP tubing to prevent the build-up of condensation, leading to water entering the DP switch body. All outside DP switches/sensors to be mounted in IP65 plastic enclosures.

Note: Prior to the installation of any control devices, check the manufacturer's recommended installation guides.

14 Power & Control Cable Testing

Cable tests are to be conducted during the progress of the work, during and at the end of the maintenance period.

14.1 Mitigation

Competent Person Definition

- Regulation 16 of the Electricity at Work Regulations 1989, which is titled 'Persons to be competent to avoid danger and injury':

"No person shall be engaged in any work activity where technical knowledge or experience is necessary to prevent danger or, where appropriate, injury, unless he possesses such knowledge or experience, or is under such degree of supervision as may be appropriate having regard to the nature of the work."

- Location of works – Using the latest issue site drawings identify the circuits/areas to be switched /isolated and locked off.
- Isolation of circuits – Using approved calibrated test equipment to verify that circuits are 'dead' and cut off outside of the riser position for removal by others.
- Isolation and removal of equipment in the riser position – By de-energising the main distribution at the rising main and certifying the power is 'dead' before disconnection and removal of the existing distribution equipment external to the riser for removal by others.

14.2 Prior to commencing testing

- The installation should be practically complete with conduit and trunking lids installed.
- Dead testing to be carried out once the installation is complete (all circuits installed with lids complete).
- The E.ON engineer is responsible for requesting power on and energising circuits.
- Subcontractors are not to energise services.

14.3 Testing upon completion of installed services

- The sequence of testing is described below.
- Only competent electricians, working to the IEE Wiring Regulations to be used.
- Except when testing circuits, no work will be carried out on live circuits.
- Dead testing and visual inspection to be carried out on all installed cables. Results are to be recorded and checked with the current regulations.
- Once "Dead" testing has been carried out, the installation shall be visually inspected again prior to energising of the circuits, signage will be in place notifying all parties "Live" testing is in progress. Once the circuit/system has been inspected live testing can take place by the removal of padlocks and circuits can be energised.
- Prior/after each circuit test, use a proving device to ensure that calibrated test meter is operating correctly and identifies the 'live' circuit. 'Null' test leads for correct reading.
- Live testing is to be carried out on all cables installed during these works. All results are to be checked they comply with the existing regulations.
- The circuits will not be left live unless a request for power has been submitted asking for power to remain on.

Note: Commercial Installations should have periodic inspection and testing completed and recorded within a period not exceeding five years from the previous periodic inspection and testing date.

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BS 7671:2018 Electrical Wiring Regulations - Table 8.5 - Correct sequence for safe testing

	REGULATION
Tests should be carried out in the following sequence:	<i>643.1</i>
BEFORE CONNECTION OF THE SUPPLY	
(a) Continuity of protective conductors, including main and supplementary bonding continuity;	<i>643.2.1(i)</i>
(b) Continuity of ring final circuit conductors;	<i>643.2.1(ii)</i>
(c) Insulation resistance;	<i>643.3</i>
(d) Polarity (by continuity method); and	<i>643.6</i>
(e) Earth electrode resistance if an earth electrode resistance tester is used.	<i>643.7.2</i>
WITH THE SUPPLY CONNECTED AND ENERGISED	
(f) Check polarity of supply, using an approved voltage indicator;	<i>GS38</i>
(g) Earth electrode resistance, using a loop impedance tester;	<i>643.7.2</i>
(h) Earth-fault loop impedance;	<i>643.7.3</i>
(i) Prospective fault current measurement, if not determined by enquiry of the distributor; and	<i>643.7.3.201</i>
(j) Functional testing, including residual current devices (RCD's) and switchgear	<i>643.10</i>
Results obtained during the various tests should be recorded on the Schedule of Test Results for future reference and checked for acceptability against prescribed criteria.	

Dead test certification is required to be issued prior to request for power. Zs at the panel is required.

When all inspections and test results are satisfactory, an Electrical Installation/Minor Works Certificate shall be given to the Engineer not later than the date of completion of the works and before acceptance of the installation. The certificate shall be given in the form laid down in BS 7671:2018.

Witness testing is to be available as requested by the Project Manager/Engineer offered to E.ON to inspect.

If site specifies that live testing is not allowed, it is driven by the specification or principal contractor.

15 On Site

- When working on site, you are representing E.ON and more often than not you may be the only E.ON representative on site, so a good onsite customer relationship with our Clients must be maintained.
- The E.ON electrical subcontractor may be required to attend site meetings as/if requested by the E.ON Project Manager.
- Health and safety, as you will all be aware, is important. All sites now require proof of competency by production of a current skillcard, therefore the electrical installer and their site operatives will not be permitted onto an E.ON site unless they hold a suitable in date ECS/CSCS skillcard.
- Access equipment must only be used by personnel having been previously been trained and hold a current in date certificate to do so.
- On most sites the use of step ladders are generally not permitted and only to be used as a last resort. When the use is permitted, the appropriate permit must be obtained (usually from the main contractor).
- All plant & equipment must be inspected daily prior to any use and all electrical equipment must be PAT tested. Pat test register and a labour skill matrix to be issued to E.ON prior to commencing works.
- Site specific Method Statements and Risk Assessments are to be issued to E.ON for each task and site operatives before any on site works commence. Please ensure site operatives have read, understood and signed the documentation relating to the tasks they are undertaking.
- All operatives are to wear minimum PPE, consisting of hard hat, high visibility vest, safety footwear, gloves and safety glasses unless the site conditions determine otherwise. Unless stated otherwise, all operatives must wear a hard hat and high visibility vest with the E.ON logo whilst on E.ON sites. The client may require E.ON operatives to wear hard hats and high visibility vests with their logo, in which case, the loaned equipment is to be returned to the client at the end of the works.
- Damaged, dirty or PPE with slogans/graffiti is not permitted as this is not the way E.ON wants to portray ourselves and you will be asked to leave site.
- Health & safety issues on site affect E.ON future business and in turn yours, therefore please ensure personnel on site are inducted and fully understand site specific requirements. Red & yellow cards issued on site are taken extremely seriously and are reported to director levels. H&S misconducts are taken into consideration when tendering for future projects.
- Progress reports must be issued on a weekly basis. The reports are to be used to update the E.ON Project Manager of progress made and to highlight any on site problems i.e. technical queries, missing controls equipment etc.
- If for any reason the work is not continuous and the sub-contractor is not on site throughout the contract, E.ON must be notified when you leave site, the reason for leaving site and when you intend to return to site.
- During the installation, E.ON will carry out a site inspection to confirm the works comply with this specification. Snag lists of any remedial works required will be provided and these must be rectified within 7 days from issue.

IF IN DOUBT ASK YOUR E.ON PROJECT MANAGER!!!