

**CONTRACT TENDER SPECIFICATION
FOR THE SUPPLY OF SPECIALIST
ELECTRICAL CONTRACT EFFORT TO
THE ISIS NEUTRON & MUON SOURCE**



Science & Technology Facilities Council
Rutherford Appleton Laboratory

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Science & Technology Facilities Council
Rutherford Appleton Laboratory



Rutherford Appleton Laboratory
Chilton, Didcot, Oxfordshire OX11 0QX

Framework Specification for the Supply of Specialist Electrical Contract Effort to the ISIS Neutron & Muon Source

**TENDER SPECIFICATION FOR THE SUPPLY OF ELECTRICAL
SPECIALIST CONTRACT EFFORT TO THE ISIS AND MUON
SOURCE**

APPROVAL

Title	Name	Signature / Date
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REVISION HISTORY

Issue	Date	Author	Revision Comments
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PREFACE

The specification provides detailed information for the requirement of company(s) experienced in the field of electrical engineering for the supply of specialist contract effort suitably qualified in the installation and termination of a range of electrical systems which include AC & DC High Voltage and Low Voltage high current and Instrumentation coaxial and multi-core cables.

The contract will cover all such installations directly associated with the ISIS Neutron & Muon Source at the Rutherford Appleton Laboratory.

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Rutherford Appleton Laboratory



Rutherford Appleton Laboratory
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The contract excludes works on the electrical services associated with the building infrastructure used to house the ISIS accelerators, target stations and beam line instruments complex.



The laboratory is situated on the Harwell campus site in South Oxfordshire, England.

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1. CONTRACT INFORMATION

1.1. Introduction

The Scope of work covers electrical engineering installations associated directly with the ISIS accelerators, target stations and beamline instruments. A listing of the electrical systems involved in the Contract is given below along with outline details later in the document.

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- AC Power Systems
- DC Power Systems
- RF Systems
- Instrumentation Wiring Installations
- Control System Wiring Installations

The installation of cables for AC and DC power applications and Instrumentation and Control systems required by the sub-systems used on the various scientific facilities on the Rutherford site. The tendering company must have previous working experience in these types of cabling installations.

1.2. Exclusions

The scope of works specifically excludes electrical and data communication systems associated with the building infrastructure used to house the ISIS accelerators, target stations and beamline instruments.

1.3. Contract Length and Value

£500K - £700k for a 3 year period with the options to extend on a one year plus one year basis.

1.4. Multiple Companies

Due to the diverse nature and broad range of works involved in the Contract the skills required have been sub-divided into Lots.

Lot 1 – Electrician Supervisor, Electrician and Improver, Apprentices, Control Panel Builder, Cabling Installer and General Worker - Estimated to be 90% of overall contract value

Lot 2 – Consultant Engineer - Estimated to be 10% of overall contract value

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When tendering for the contract the tendering company should state which Lot of the contract they are tendering for bidders cannot bid for both lots.

1.5. Radiation

The scope of work includes the possibility of installation within the designated radiation areas of the ISIS facility on the Rutherford site. Therefore it is desirable that the contract workers are classified radiation workers however, it is possible that persons could work within these radiation designated areas as non-classified contract staff and their dose accumulation will be monitored. Any exceedance of the relevant specified dose constraints may result in removal of the individual from work in radiation designated areas. All appropriate ionising radiation regulations will apply to these contract staff. All contract staff must be at least 17 years old before they are permitted to work within designated radiation areas as a non-classified worker. As a point of clarification the minimum age for a classified radiation worker is 18 years old.

1.6. Health & Safety

The STFC SHE Management System consists of separate Health and Safety and Environment policy statements supported by a suite of about 40 SHE codes. Based on relevant legislation, SHE Codes outline the STFC's approach to managing SHE hazards and the standard of controls expected. Contract staff will be expected to work within the rules and regulations of the STFC SHE codes and where necessary training will be provided by STFC. They must have a thorough working knowledge of the Electrical Contracting Industry National Working Rules along with the current IET regulations BS7671 for electrical installations. They must have a thorough working knowledge of all relevant Construction Industry Safety Regulations, (COSHH, CDM, PPE,etc). STFC applies a "Risk Assessed" approach to all aspects of its work. Therefore contract staff must be willing to conform to all STFC codes, procedures, local rules and obey instructions given by the supervising officer. Undertake work in accordance with the risk assessments and method statements agreed with STFC and raise any concerns with regard to their work and its safety with their STFC supervising officer. They must also report all injuries, near misses and environmental incidents. All

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contract staff shall attend a site specific SHE induction training course before commencing work at STFC. Contractors must work in such a manner as not to put themselves, their employees, STFC staff or others at risk and must comply with all relevant legislation, SHE codes and all local rules.

1.7. Emergency Call Out Response

Many of the scientific facilities on the Rutherford site operate on a 24 hour 7 day a week basis. These facilities are used by visiting scientists travelling from around the world to use the facilities on a pre-allocated time period. Therefore reliability and user confidence is of paramount importance. The contractor must be willing to accept a maximum response time of 3 hours to site in case of emergency breakdowns which compromise the operation of these facilities. This response time may result in weekend and / or out of normal hours working.

1.8. STFC Rutherford Working Week

STFC operates a 37 hour working week at the Rutherford Appleton Laboratory This is based around a flex-time approach which excludes any time taken for lunch breaks so therefore a standard 42 hour working week can be assumed. Any contract staff will not be permitted to take part in the STFC flexible working hours system; but some flexibility over start and finish times is permitted with the earliest start being 7am and the latest start time being 8.30am. Contracting companies when submitting their response to this specification should assume a standard 42 hour Monday to Friday working week. Travelling time to and from site will not be included as paid for this standard working week. The contractor shall only be paid for hours actually worked on site. Lunch breaks are unpaid.

1.9. Code of Conduct

STFC is committed to creating a working environment in which everyone is respected and can flourish equally, without fear or favour. We do not tolerate behaviour or attitudes that support coercion, intimidation or discrimination. We are committed to working only with contractors whose standards are consistent with our own, and who respect our values. The Research Councils

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Code of Conduct Policy has the following policy statement. “For the purpose of this policy, the use of the word “employee” covers Research Council employees on permanent or temporary contracts as well as persons who are on secondment to the Research Councils and non-employees such as students, **contractors** and other persons carrying out work on Research Council premises and/or on behalf of the Research Councils”. Therefore all contract staff are expected to comply with the Code of Conduct Policy and STFC reserves the right to remove or refuse access to site any contract staff deemed to be non-compliant with the code of conduct.

2. SCOPE OF WORKS

2.1. AC Power Systems.

Some of the facilities on the Rutherford site use high voltage AC systems which can be classed as not part of the AC site distribution systems. An example of this type of installation is the ISIS Synchrotron main magnet power supply. This system uses a 14.7kV AC single core cabling system to provide the electrical power to the main magnets.

2.2. DC Power Systems.

Some of the facilities on the Rutherford site use a mixture of high voltage low current, high voltage high current; or low voltage high current cables to provide the electrical power to the load. These cables range in size from 35mm² single core copper cable to 400mm² single core copper cable. The lengths of these cables vary between a few metres up to a maximum of 150 metres. Some of the existing installations use 400mm² aluminium cables. The contract company must have the skill necessary for the installation and dressing of large aluminium cables. The company must have the skill necessary for the installation and testing of copper busbars.

2.3. RF Systems

Radio Frequency systems are used on sections of the ISIS facility to accelerate the particle beam. Whilst the contractors will not be expected to work on RF waveguide systems there are other

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areas of the RF systems that incorporate AC & DC Power systems as well as Instrumentation and Control wiring which may form part of the contractors duties on site.

2.4. SCADA Systems.

The contract company must have available suitably qualified personnel for the undertaking of assembly, wiring, termination, testing and commissioning of scientific plant, electrical and electronic supervisory control and data acquisition (SCADA) systems. Working voltages of these systems vary with the majority being ELV or LV systems. In addition to the AC/DC power components many of the electrical installations on the Rutherford site comprise a mixture of Control and Instrumentation multi-core, twisted pair, coaxial cables, Cat 5 and occasionally single and multi-mode fibre-optics. The successful contractor will need to be able to demonstrate a high level of competency in all these areas of installation and connectivity skills.

2.5. Heavy Cable Installations

The contract company must have available suitably skilled staff or sub-contractors for the installation of heavy HV or high current DC (400mm²) cable; either within trench systems or at high level on containment. Risk assessments and method statements, (RAMS), must be submitted to STFC before work in this category can commence.

2.6. Cable Terminations

The contract company must have available suitably qualified personnel for the jointing and terminating of high voltage cables up to the maximum rated voltages mentioned in section 2.1 AC Power Systems.

The contract company will need to be capable of consistently producing “low ohmic value” terminations using both crimp and solder techniques.

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2.7. Estimated Requirements

The contract is not for any fixed quantity of work but only for such quantities as STFC may demand from time to time. The Contractor shall clearly understand that STFC does not bind itself to demand any work under the Contract or to receive and pay for any work other than that actually ordered.

3. ELECTRICAL CONTRACTOR (The Company)

3.1. Requirements

This electrical contractor should meet the following requirements:

- Diverse portfolio of experience including similar past projects and customers
- Experience of working with Risk, Method, COSHH, noise and fire assessments
- Experience of Working in CDM controlled areas.
- Accept working in classified radiation environments under controlled conditions.
- The tendering company should state the number of PAYE Electrician/Technical tradespersons within the company

- Membership or willing to attain membership of one or more of these or other equivalent bodies:
 - JIB (Joint Industry Board)
 - ECA (Electrical Contractors Association)
 - NIC (National Inspection Council)

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Overseas Contractors

- If you have qualified as an electrician outside the UK, you should be willing to register for the Joint Industry Board’s Electrotechnical Card Scheme (ECS). The card is proof that you meet the standard of qualifications and skills needed to work as an electrician in the UK. See the ESC (Link Below) for more details.

Electrotechnical Card Scheme  (FAQs) <http://www.ecscard.org.uk/FAQs/>

3.2. Desirable Requirements

This electrical contractor should meet the following requirements:

- Operate ISO9001 or similar/equivalent Quality management systems.
- Some past experience of similar technology based projects
- Provide on site safety training for their employees and sub-contractors; e.g. toolbox talks etc.
- The tendering company should provide information to indicate how long the company has been established.

4. LOT 1 CONTRACT TRADESPERSONS

4.1. Approved Electrician Supervisor

The Electrician Supervisor must be able to carry out electrical installation work efficiently from drawings and specifications without immediate supervision in the most proficient and economical manner. They must be able to supervise other operatives and larger work groups, (greater than 3 operatives). They must be able to set out jobs from drawings and specifications and ensure that the necessary installation materials are on site in a timely and efficient manner. They must be able to accept responsibility for the proper completion of jobs and have a thorough working knowledge of all

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pertinent regulations dealing with safe installation practices; relevant British Standards and codes of practice; health and safety and construction industry safety regulations; and environmental legislation; with particular reference to the current IEE (IET) regulations and industry standards for electrical installations. They must possess a current approved testing qualification and be able to demonstrate recent experience.

Further Requirements for this role are as per described in the Joint Industry Board for the Electrical Contracting Industry Handbook 2016

<http://www.jib.org.uk/jib-handbook.aspx>

Overseas Tradespersons

If you have qualified as an electrician outside the UK, you should be willing to register for the Joint Industry Board’s Electrotechnical Card Scheme (ECS) the registration/card will have to be in place before the contract is to commence. The card is proof that you meet the standard of qualifications and skills needed to work as an electrician in the UK. See the ESC (Link Below) for more details.

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4.2. Approved Electrician

Approved Electricians must possess particular practical, productive and electrical engineering skills with adequate technical supervisory knowledge so as to be able to work on their own proficiently and carry out electrical installation work without immediate supervision in the most efficient and economical manner; be able to set out jobs from drawings and specifications; be able to accept responsibility for the proper completion of jobs and, if required, supervise other operatives. They must also have a thorough working knowledge of the National Working Rules for the Electrical Contracting Industry, of the current IET Regulations for Electrical Installations, of any relevant Regulations and British Standards and Codes of Practice, and of the Construction Industry Safety Regulations.

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Requirements for this role are as per described in the Joint Industry Board for the Electrical Contracting Industry Handbook 2016

<http://www.jib.org.uk/jib-handbook.aspx>

Overseas Tradespersons

If you have qualified as an electrician outside the UK, you should be willing to register for the Joint Industry Board’s Electrotechnical Card Scheme (ECS) the registration/card will have to be in place before the contract is to commence. The card is proof that you meet the standard of qualifications and skills needed to work as an electrician in the UK. See the ESC (Link Below) for more details.

Electrotechnical Card Scheme  (FAQs) <http://www.ecscard.org.uk/FAQs/>

4.3. Electrician

Electricians must be able to carry out electrical installation work efficiently and in accordance with the National Working Rules for the Electrical Contracting Industry, the current IET Wiring Regulations, and the Construction Industry Safety Regulations; possess particular practical, productive and electrical engineering skills with adequate technical supervisory knowledge so as to be able to work on their own proficiently and carry out electrical installation work without immediate supervision in the most efficient and economical manner; be able to set out jobs from drawings and specifications; be able to accept responsibility. The Electrician must meet the role are as per described in the Joint Industry Board for the Electrical Contracting Industry Handbook 2016.

<http://www.jib.org.uk/jib-handbook.aspx>

Overseas Tradespersons

If you have qualified as an electrician outside the UK, you should be willing to register for the Joint Industry Board’s Electrotechnical Card Scheme (ECS) the registration/card will have to be in place before the contract is to commence. The card is proof that you meet the standard of qualifications and skills needed to work as an electrician in the UK. See the ESC (Link Below) for more details

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4.4. Electrical Improver and Apprentices

STFC recognises and encourages the requirement for Contracting Companies to train via apprenticeships. Supervision, safety and training of trainee grade contract tradespersons on site must be the responsibility of the Contracting Company. STFC will provide suitable safety training where required when the training requirement is caused by a particular hazard due to the nature of scientific works on the Rutherford site. Attention is brought to the age restriction due to the radiation hazard described in section 1.5 of this document.

Electrical Improvers must, under the supervision of a fully skilled operative directly employed by the contracting company, be able to install wiring enclosures and electrical equipment required by the electrical installation work in accordance with the National Working Rules for the Electrical Contracting Industry, the current IET Regulations for Electrical Installations and the Construction Industry Safety Regulations. Electrical Improvers or Apprentices will not be deemed competent to carry out final connections, isolation of supplies or any form of inspection or testing.

Further Requirements for this role are as per described in the Joint Industry Board for the Electrical Contracting Industry Handbook 2016

<http://www.jib.org.uk/jib-handbook.aspx>

Overseas Tradespersons

- If you have qualified as an electrician outside the UK, you should be willing to register for the Joint Industry Board’s Electrotechnical Card Scheme (ECS) the registration/card will have to be in place before the contract is to commence. The card is proof that you meet the standard of qualifications and skills needed to work as an electrician in the UK. See the ESC (Link Below) for more details.

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5. LOT 1 CONTRACT TRADESPERSONS

5.1. Approved Jointer

The jointer must have experience in jointing all types of cable up to 11kV including those which are up to and including the maximum voltages specified within the IET Regulations. The Jointer should also be familiar with the requirements of the IET Regulations.

5.2. Cable Installation

Cable Installation Supervisor, Leading Cable Hand and Cable Foreman

Requirements for these roles are as per described in the Joint Industry Board for the Electrical Contracting Industry Handbook 2016

<http://www.jib.org.uk/jib-handbook.aspx>

Overseas Tradespersons

- If you have qualified as an electrician outside the UK, you should be willing to register for the Joint Industry Board’s Electrotechnical Card Scheme (ECS) the registration/card will have to be in place before the contract is to commence. The card is proof that you meet the standard of qualifications and skills needed to work as an electrician in the UK. See the ESC (Link Below) for more details.

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6. LOT 1 CONTRACT TRADESPERSONS

6.1. Electrical Control Panel Builder

The scientific facilities utilise a variety of electrical and electronic supervisory control and data acquisition (SCADA), systems. These involve a wide variety of panel wiring systems. Duties will be varied and will include: marking out control panel mounting plates to layout drawings, drilling and mounting cable trunking, component rail and components and building up and making terminal rails. Wiring of assembled back plates to a set of schematic wiring diagrams and associated test and verification and installation & testing of field wiring. The SCADA systems utilise a range of Extra-Low Voltage or Low Voltage equipment.

Requirements

- Served a registered apprenticeship or approved equivalent scheme
- Relevant qualifications as per <http://www.jib.org.uk/jib-handbook.aspx>
- Previous experience within Electrical and Control engineering and be able to work from schematic and layout drawings to assemble, test and install control panels.
- Knowledge and ability to understand wiring diagrams for wiring looms and PLC, relay/contactator type circuits.
- Be capable of consistently producing “low ohmic value” terminations using both crimp and hand solder techniques.
- Ensure right first time point-to-point wiring of assemblies/ control panels.
- Ensure product integrity through verification and maintenance.
- Demonstrate competencies in Wiring, Cable looming, Crimping, Hand soldering, Mechanical Assembly, Wire Soldering, Testing to all complex schematics.
- Simple mechanical work- drilling holes and mounting connectors and other parts.
- Be familiar with and be able to demonstrate the specialist skills required when terminating into high density plug, sockets and terminal systems.

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- Possess a working knowledge of the current IET Regulations (BS7671)
- Be capable of installing & testing field wiring.
- NICEIC Inspection & Testing (Electrical) or Equivalent
- Construction Skills Certification Scheme, CSCS ECS Wireman/ Panel Builder Card Holder
- Some knowledge of the specialist skills required for noise reduction and EMI issues generally.

Overseas Tradespersons

- If you have qualified as an electrician outside the UK, you should be willing to register for the Joint Industry Board’s Electrotechnical Card Scheme (ECS) the registration/card will have to be in place before the contract is to commence. The card is proof that you meet the standard of qualifications and skills needed to work as an electrician in the UK. See the ESC (Link Below) for more details.

Electrotechnical Card Scheme  (FAQs) <http://www.ecscard.org.uk/FAQs/>

6.2. Communication Cabling Installer

The scientific facilities utilise a variety of data and communication systems based on both copper and fibre optic cabling. These communication systems will be solely associated with the scientific facilities equipment for data acquisition and data transfer; they will not include the normal building infrastructure communication systems. The majority of works will be associated with installation; however some projects may also involve the design of these scientific communication systems. Hence the desirable requirement listed below.

Requirements

- Served a registered apprenticeship or approved equivalent scheme.

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- Relevant qualifications as per <http://www.jib.org.uk/jib-handbook.aspx>

6.3. General Worker (Electrical)

General Worker (Electrical) may be required to assist in the installation of cables and to perform other unskilled work associated with the installation of electrical systems and equipment required by the scientific experiments at the Rutherford Laboratory.

7. LOT 2 CONTRACT TRADESPERSONS

7.1. Consultant Engineer

The scientific facilities utilise a variety of specialist high power electrical equipment including, pulsed, DC, AC, Pulsed Power and RF systems. From time to time there is a requirement for specialist consultants to advise STFC on the design and development of such equipment.

8. Notes For Contractors

8.1. Works in Controlled Areas

NOTES FOR CONTRACTORS REQUIRED TO WORK IN CONTROLLED AREAS AT THE RUTHERFORD APPLETON LABORATORY

1. Certain areas at the Rutherford Appleton Laboratory (RAL) mostly within the ISIS complex, are designated as Radiation Controlled Areas as defined in the Ionising Radiations Regulations, 1999, because of the presence of ionising radiation and/or radioactive substances.
2. For each area Local Rules have been written which detail the procedures to be carried out in that area to ensure compliance with the Regulations, and a Radiation Protection Supervisor (RPS) appointed to oversee the implementation of the Local Rules.

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Chilton, Didcot, Oxfordshire OX11 0QX

Framework Specification for the Supply of Specialist Electrical Contract Effort to the ISIS Neutron & Muon Source

3. The Regulations require that persons working in Controlled Areas are either: -
- a. Designated as 'Classified' by their employer. This involves initial certification of fitness in a Health Register, continuing health surveillance and the issue, evaluation and keeping of records of personal dosimeters by an Approved Dosimetry Service (ADS). Note that Classified persons must be aged 18 years or more.
 - b. Employed under the conditions of a written System of Work (SOW) compliance which will ensure that their radiation dose will be less than 3/10 of that permitted for Classified persons.

For a particular area, and job within that area, the officer responsible for the area will decide whether or not the Contractor's personnel need to be Classified or if the work can be carried out under the terms of a written SOW.

4. If a written SOW is appropriate then the Contractor must comply with the Local Rules, the SOW itself and any other instructions (written or verbal) given to him by the RPS. Additionally, personal dosimeters (supplied by RAL) will be required to be worn as directed by the RPS. Exceptionally, Contractors' personnel may be required to supply biological samples.

5. If the work requires the Contractor's personnel to be Classified then: -
- a. If they are already Classified under the Regulations then written evidence of this, a copy of their dose record for the current calendar year and the name and address of their ADS must be forwarded to the RAL Personal Dosimetry Service (RAL-PDS) via the Contract Superintending Officer (CSO). The Contractor will also make the Health Record available to the Occupational Health Officer at RAL.
 - b. If personnel are not currently Classified a Health Register must be raised for each person and an entry made by a doctor appointed by the Health and Safety Executive. The Occupational Health Officer at RAL will provide this service and will also provide appropriate medical surveillance for the duration of the Contract. The Contractor must also nominate an ADS to take over maintenance of his employees' dose records at the end of the Contract.

In both cases the RAL - PDS will provide personal dosimeters (to be worn as directed by the RPS) and record keeping services for the duration of the Contract; at the end of the Contract the dose records will be forwarded to the Contractor's nominated ADS.

If, during the duration of the Contract, any of the Contractor's personnel are being employed as Classified Persons elsewhere the RAL - PDS must be informed (via the RPS).

The obligations on the Contractor, quoted in par. 4 for non-Classified persons, also apply to Classified Persons except that the written SOW may be replaced by a written Permit to Work.

6. The Contractor must immediately inform the RPS of all accidents and incidents involving ionising radiation and radioactive substances.

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8.2. Sub-Contractors

No part of the work may be placed with a sub-contractor unless approval of the STFC contract manager has been obtained in writing. The sub-contractor shall in all cases be bound by the conditions of the Contract applicable to the quality of labour ordered. The Contractor shall ensure that provisions to this effect are included in any sub-contract or order.

8.3. Tools

The Contractor shall be responsible for the supply of all necessary plant, equipment, tools etc. required by their labour force to carry out safely all work ordered under this contract. The STFC contract manager shall have sole discretion on the issue of any STFC equipment to the Contractor on loan term conditions for any work ordered.

The contractor shall ensure that all items of Portable Electrical Equipment brought to site are tested and inspected and that the correct PAT label is attached prior to use. All items of Portable Electrical Equipment must only be used for the purpose for which it was intended and in the environment for which it was designed and constructed. STFC reserves the right to inspect power tools and any other equipment brought onto site and to forbid their use if considered unsafe.

8.4. Personnel Protective Equipment, PPE

The Contractor shall be responsible for the supply of PPE equipment deemed necessary for the safe completion of work under this contract. Checks must be carried out to ensure the PPE is being worn whenever necessary.

8.5. Time Sheets

The contractors shall maintain time sheets (in duplicate) which shall be countersigned by the member of STFC or their deputy managing the contract. One copy of the time sheet shall be

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retained by the STFC contract manager for invoice verification. All invoices shall reference the STFC purchase order number that they are being raised against.

8.6. Site Attendance

The contractor shall give notice in writing of the names of their tradespersons prior to their commencement on site. Any substitutions for whatever reason must also be provided in writing. Absence due to sickness must be reported to STFC on the 1st day of sickness.

8.7. Waste Disposal

The contractor is responsible for ensuring that all waste and debris generated from their activities is removed and disposed of in a safe manner in compliance with the law. Hazardous or combustible waste must not be accumulated within the work site. Under normal circumstances STFC will provide suitable waste disposal routes and the contractor will be advised of these routes prior to commencement of work. Certain work packages may require the contractor to provide suitable waste disposal methods; in these instances the contractor will be given sufficient notice before commencement on site.

Waste generated from within classified radiation areas may require a radiation survey by STFC Health Physics before it can be assigned as waste and disposed off in a suitable manner. The contractor will be informed if a radiation survey is required before work commences. Any waste generated by the works whether from components free issued by STFC or supplied by the contractor and requiring specialist disposal due to the results of the radiation survey are deemed to be the property of STFC and must not be removed from site by the contractor. All copper waste generated by the works which is from copper items such as cable or bus bar that are free issued by STFC to the contractor remains the property of STFC.

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