



Galileo Energy Services

Unit A6, M4 Business Park, Maynooth Road, Celbridge, Co. Kildare, W23 VFY7.
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**CBS JAMES STREET
8 BASIN VIEW,
THE LIBERTIES,
DUBLIN 8.
D08 H2H9.**

ELECTRICAL SERVICES SPECIFICATION

VOLUME E1

PARTICULAR SPECIFICATION FOR THE ELECTRICAL INSTALLATION

TENDER ISSUE (T2)

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GENERAL ITEMS

Introduction

The intention of this specification and the drawings issued is to describe and provide for a complete installation. The Contractor is advised that the work to be executed as described in these documents shall be complete in every detail, notwithstanding that every item involved may not be specifically mentioned or described. The Contractor shall be held to allow for all materials and labour necessary for an entire and complete installation and shall not avail of any unmentioned error or omission should such exist.

The works entails the installation of new electrical services in the Science Room at CBS James Street. Refer to the drawings for further information, layout of the building and services/works required. All works shall be in compliance with all relevant Building Regulations, Irish Standards, British Standards, CIBSE Guidelines and Good Engineering Practices.

The Contractor shall be required to ensure all necessary flexibilities & resources are available to the project to meet the deadlines and programmes. The Contractor shall liaise with the Main Contractor regarding the programme and order of works and any concerns he may have over the completion date should be raised prior to the awarding of the contract.

The Contractor shall take all reasonable care to ensure all site workers and visitors are not endangered by any element of their works. The Contractor must ensure that the works are completed as soon as possible and/or within the agreed program time frame.

The Contractor shall also review all Architects and Structural Engineers drawings to familiarise themselves with the proposed development and scope of works involved. It is the Contractor's responsibility to raise any concerns over the proposed works with the Engineer prior to commencement of works. Failure to inform the Engineer of any such concerns will be deemed that the contractor has accepted the design and scope of works to be fault free.

This specification will set out in general terms the design drawings and data to be used by the Contractor in order to submit a tender bid for the electrical services installation and the works associated with the installation.

The procurement, delivery, supply, handling, erection, installation and commissioning of the services as there under described as may be seen or inferred from the enclosed drawings and documents from the Consulting Engineer.



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The Contractor shall satisfy himself that the installation is in accordance with all codes and standards. All works described shall comply with:

- i) The Safety, Health and Welfare Act, 1989.
- ii) Requirements of the Health and Safety Authority / SI 138.
- iii) Requirements of the Fire Officer.
- iv) All Irish Building Regulations including Building Control (Amendment) Regulations (BC(A)R), S.I. 9 of 2014.
- v) Factories Act / Statutory Instruments.
- vi) Client Safety Protocol.
- vii) Client Specifications.
- viii) Chartered Institute of Building Services Engineers.
- ix) The Tender Drawings.
- x) The Contract Preliminaries.
- xi) All relevant Irish, British and European Standards and Codes of Practice.

Please note that 'The Contractor' in this specification refers to the Electrical Contractor.

The Contractor shall familiarise himself with the above and the obligations therein.

For any queries relating to this specification or related drawings, the Contractor shall contact the following:

*Ms. Joanne Martin,
Galileo Energy Services,
Unit A6,
M4 Business Park,
Celbridge,
Co. Kildare.
Tel: 01-6274103
E-mail: joanne@galileoenergy.ie
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Site visit prior to tender submission

The Contractor shall be deemed to have carried out a site visit of the site prior to the completion of his tender to ascertain for themselves the full extent and nature of the works.

The Contractor shall ensure that all factors, site conditions, and items are taken account and what items are necessary in order to complete the installation and to leave same in a complete working condition to the satisfaction of the Employer's Representative.



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No extras or variations shall be allowed for additional work that could have been ascertained by visiting the site. The Contractor shall contact the Main Contractor to arrange an appropriate appointment to visit the site during the tender period.

Tendering contractors **MUST NOT** arrive to site without prior appointment.

Tenderers shall note that no claim in respect of lack of knowledge of prevailing site conditions, builders work or existing services can be considered.

The tender drawings are based on the best information available at the time of preparation and by visiting the site the contractor shall satisfy himself of the exact extent and nature of works involved.

Standard and code of practice

Unless specifically stated otherwise, or approved by the Engineer, installation, materials and equipment shall be in accordance with the relevant Irish, European International and British Standards and Codes of Practice and CIBSE Guidelines, whether indicated in this Specification or not.

Where stated in this document the British Standard Reference numbers shall be compatible with the I.E.C. reference numbers or vice versa.

Acts and regulations

The installation(s) shall comply with all Acts, relevant Statutory Instruments and Regulations including any special Regulations issued by the electricity, gas and/or water authorities.

The tender shall be based on the Acts and Regulations current on the date for return of tenders. If these Acts and/or Regulations are amended or new Acts and/or Regulations are enacted after that date the Electrical Contractor shall inform the Engineer immediately.

Specified equipment

The Contractor shall refer to the rear of this document for a schedule of the specified equipment on which The Company's price is based. The Tenderer may offer an alternative manufacturer, providing the equipment offered is equal in all aspects, i.e. aesthetic appearance, classification and performance.

Alternative equipment proposed to that specified shall only be accepted/installed with the expressed approval of the Engineers in writing prior to the completion of the tender documents.



Plant warranties

Where a manufacturer's warranty applies, the warranties on plant and equipment shall commence from the date of commissioning and acceptance of plant by the Engineers.

Form of tender

The Contractor will pay particular attention to the proper completion of the Form of Tender. Completion of the Form of Tender must be as per the item numbers listed and should note that any section heading may apply to one or more of the items listed in the Summary of Prices.

The Contractor shall include in his tender under additional headings if necessary, and irrespective of the items indicated for all work specified or implied by the drawings or specification.

The tenderer shall be deemed to have full knowledge of the Specification and Drawings supplied to him and to have made himself fully acquainted with all requirements and to have obtained clarification on any matter or detail, which may be obscure to him.

Should any matter arise which in the opinion of the tenderer is obscure, he shall submit the details for clarification in writing to the Employer's Representative Engineer within 7 days of expiration of the tender period. The Employer's Representative shall circulate a reply to all Tenderers before the tender period expires.

The tender price is to be based on the works being carried out at rates of pay during working hours and under conditions of labour not less favourable than those established for the trade or industry in the district where the works are to be carried out. Any non-productive time associated with the recruitment of additional staff by the Contractor during the execution of the contract shall be deemed to be included in the tender price.

Installation and setting out of works

The Contractor shall set out the whole of the works and be responsible for the correctness of the positions, levels and dimensions of the several works. All openings, plinths, bases and holes to be cut in the structure shall be positioned and marked by the Contractor.



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The tender drawings are diagrammatic only and the Contractor shall allow for a practical installation allowing for the setting around obstructions and other minor modifications which may or may not be apparent from the Architectural, Engineering, Structural, or services drawings.

The exact courses and positions of all pipes, ducts, flues, cabling, conduit, trunking etc. and other items of equipment shall be duly laid out and marked on the job by the Contractor and approved before execution as the best possible course and position, having regard to all considerations including temperature and the proximity to other services plant.

The Contractor shall make good any incorrectly set out works and shall be liable for costs of making good any work incorrectly carried out.

The Contractor shall furnish all materials, labour and instruments necessary to enable the setting out to be checked.

Conflict between drawings and specifications

In the event of there being a conflict between drawings and specification, the tenderer shall obtain clarification before submitting his tender. Failure to do so will be deemed to imply that the most onerous requirements have been included for.

In the event that an apparent contradiction exists between any of the specification or between any of the specification and the drawings, this shall be addressed in writing to the Engineer during the tender period for clarification. If an apparent contradiction is not identified during the tender process, then it shall be at the discretion of the engineer to identify which document or clause takes precedence.

Claims raised post-tender in relation to apparent contradictions shall not be entertained and the onus shall remain with the contractor to highlight any such issues during the tendering period. This in no way overrides the order of precedence of information as defined within the contract.

Contract drawings and specifications

Refer to the 'Document Issue' sheet issued with this pack as this document highlights all the contract drawings and specifications.

Details of the complete installation are indicated on the contract drawings and described within this specification.



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The exact locations of all equipment shall be agreed on site with the Consulting Engineers prior to installation where any doubt or potential conflict with other installations is perceived. Plant and equipment which is installed and which conflicts with existing work or installations will be removed and reinstalled without expense to the client by the Contractor.

Materials and workmanship

All materials used in the works shall be fit for the use for which they are intended and for the conditions in which they are to be used in and includes materials which:

- a) Bear a CE mark in accordance with the provisions of the Construction Products Directive (89/106/EEC)
- b) Comply with an appropriate harmonized standard, European technical approval or national technical specification as defined in article 4(2) of the Construction Products Directive (89/106/EEC)
- c) Comply with an appropriate Irish Standard or Irish Agreement Board Certificate or with an alternative national technical specification of any member state of the European community, which provides in use an equivalent level of safety and suitability.

The installation shall be carried out and maintained in the best and most substantial and workmanlike manner. Workmanship shall comply with British or Irish Standards and the relevant codes of practice.

Only fully qualified and competent tradesman and helpers shall be employed on the works. Work shall not be sub-let or done by any other Contractors without the Employer's Representative permission.

No work shall be covered up prior to inspection by the Employer's Representative.

Wherever a proprietary name is used to specify a material or process it shall be deemed to have the term '**or equivalent**' appended to it.

Where a material or process is described by reference to its propriety name the name is used to indicate the standard of construction, appearance, ease of maintenance and durability acceptable to the Employer's Representative. The Employer's Representative will approve the use of alternatives where such alternatives are shown to equal or surpass the qualities of the product or process specified. Accordingly proprietary names wherever mentioned in the Specification, schedule of Rates or on the drawings shall be deemed to mean the provision of the named product or process or an approved alternative.



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Notwithstanding the above no items shall be used for the works except those as specified in the contract documents except with the permission of the Employer's Representative. Any points, which differ in the contract documents to the Contractors normal practice, may receive consideration at tender stage if referred to the Employer's Representative. If no reference is made at tender stage it will be assumed that the Contractor will proceed exactly according to this specification.

Improper materials

The Employer's Representative shall have the power to order during the progress of the works the removal from site of any material, which in his opinion is not in accordance with this contract, the substitution of proper materials, and the removal and proper re-execution of any work, which in respect of materials and workmanship is not in accordance with the contract. This condition is not withstanding any previous tests or interim payments.

Liability for defects

Works showing defects or damage, whether caused by or as a consequence of negligence on behalf of the Contractor or not and regardless of whether the defects are discovered during the progress of the works or upon completion of the works, and regardless of whether the works have been approved or fully certified, the Contractor shall make good, at his own expense, such damage or defects discovered. On refusal to do so the Employer shall be entitled to carry out the work necessary and recover the expenses associated with such work.

Allow for maintaining the works in perfect condition for 12 months after the issue of the Employer's Representative's Certificate of Substantial Completion in accordance with the Conditions of Contract.

Conditions of building and site

The Contractor shall be responsible for making good any damage caused to the fabric or decor of the building or site by, or as a result of, his negligence or the negligence of his employees or contractors or others unnamed or otherwise. All rubble and waste shall be removed as it arises. Upon completion of the works, the site and building shall be thoroughly cleaned to the satisfaction of the Employer.

The Contractor shall pad ladders or similar equipment so that the building structure or finishes are not damaged in anyway. He shall also ensure that oil, grease or similar goods do not cause damage to the structure during the execution of the works.



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Local authorities

The Contractor shall observe and comply with the requirements of all Statutes and Byelaws and serve notice on the Authorities or Owners of water, gas, electricity or any other items, which may be affected in any way by the execution of the works.

Plant

The Contractor shall supply all necessary slings, tackles, scaffolding, haulage, instruments, materials, apparatus, tools and labour for delivery and erection of the works, and for the completion and testing of the works to the entire satisfaction of the Employer's Representative.

Loss, theft, damage and injury

The Employer or Employer's Representative shall not bear any responsibility for the loss, theft or damage of equipment or materials associated with the works either during delivery or at any time during the execution of the works. All plant, equipment, tools, workmanship and materials shall comply with the relevant safety standards. The Contractor shall bear responsibility for the safety of his employees and agents throughout the execution of the works.

Copyright

Copyright is reserved on the Consulting Engineers' documents, which include all drawings, specifications, sketches and the like. These documents may only be used in relation to the works as outlined in this contract. Photocopying of documents is not permitted without prior permission of the Consultant Engineer. Any copies of documents made during the execution of the works shall be returned to the Consulting Engineer prior to final payment

Contractors drawings

The Contractor shall prepare if requested by the Employer's Representative any working drawings necessary for proper completion of the Contract. Two copies of each drawing shall initially be submitted to the Employer's Representative and upon approval the Contractor shall provide 6 no. copies of said drawings for distribution.

Working drawings shall show the final arrangement of all items of plant and their associated connections, all control assemblies and panels, as well as the routing of all pipework and ductwork.



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The Contractor shall consult with all relevant parties and in the preparation of his working drawings so as to ensure there is no conflict between the Mechanical, Electrical and other services, Architectural or structural elements.

Variations, extras and omissions

No variation shall vitiate this Contract or save as hereinafter provided or give rise to any claim for compensation.

Where an extra, variation, omission is required the Contractor shall submit a price for such variation, omission or extra to the Employer's Representative in writing within seven days of the request for such a price.

He shall not proceed with such alteration, variation or extra until such a time as he has received a Variation Order in writing from the Employer's Representative.

No payment shall be made whatsoever to the Contractor for any variation, alteration, addition or extra unless a Variation Order is produced. Variations shall be priced at the rates submitted by the Contractor with his tender where such are applicable.

Pricing

Un-priced items

Any item left un-priced shall be deemed to be included for in the tender and the cost of the item shall be deemed to be spread across and included in the rates generally.

Currency

All prices and rates shall be deemed to be denominated in Euros (€).

Electricity supply, electric wiring and equipment

All electrical equipment is to be suitable for the standard ESB supply of 400/230V @ 50hz AC. Where starters or controls are provided with any equipment included under the mechanical services contract, they shall be handed over to the Electrical Contractor together with their wiring diagrams, for erection and commissioning by him.

Electrical sub-systems certification

All electrical subsystems shall be certified as having been carried out in compliance with the requirements of the ETCI Wiring Regulations.



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Copies of the ETCI Subsystems certificates, accompanied by the relevant test results, shall be included with the ETCI Completion Certificate in the Health and Safety File for the project.

In the event of the Contractor failing to secure subsystem certificates for all items of equipment then the Contractor shall be liable for the cost of having the system tested, remedied as necessary and certified.

The tender figure shall be deemed to include for all costs incurred by the Contractor in providing the appropriate documentation.

Proprietary names

Wherever a proprietary name is used to specify a material or process it shall be deemed to have the term '**or equivalent**' appended to it. If applicable, if the Contractor proposes an alternative material or equipment, this material or equipment shall be approved by the Employer's Representative prior the end of the tendering period.

Where a material or process is described by reference to its proprietary name, the name is used to indicate the standard of construction, appearance, ease of maintenance and durability acceptable to the Client / Employer's Representative.

The Client / Employer's Representative will approve the use of alternatives where such alternatives are shown to equal or surpass the qualities of the product or process specified. Accordingly proprietary names wherever mentioned in the Specification, Schedule of Rates or on the drawings shall be deemed to mean the provision of the named product or process or an approved alternative

'Safepass' accreditation

The Contractor shall comply with the requirements of the construction industry's safety accreditation scheme, known as the 'Safepass' scheme.

Decision of the Employers Representative

The decision of the Employer's Representative on all questions relating to the execution of the works, the meaning of the Drawings and Specification, the manner of the execution of the works or the quality of the materials, the nature, quality of the works executed or what amount was included in the Contract shall be final, conclusive and binding.



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Works outside the contract

The contractor should note that claims for additional works will not be entertained unless specifically requested in writing by the Employer's Representative.

Waste management

The site shall at all times be kept as clean and tidy as possible and the contractor shall be responsible for removing debris and rubbish on a regular basis. Removal of waste from site shall comply with the statutory waste management requirements.

Damage

External:

The Contractor shall note that any damage to the existing yards, main entrance, grassed areas, access roads or paved areas that may arise during construction stage of the project and caused by the construction works or by the Contractor's vehicles or staff, is to be made good by him at no extra cost to the Client.

The Contractor should provide all necessary protection to existing paved, grassed and landscaped areas around the site and shall make good any damage caused by lack of such protection at no extra cost to the Client.

The work is not to interfere in any way with the public roads. In particular, the Contractor is to ensure that these areas are to be left free of all dirt and debris and builder's materials and parking of construction vehicles, etc and the roadways are to be thoroughly cleaned as and when required.

Any damage caused to the surrounding public roadways shall be made good to the satisfaction of the Local Authority at the Contractor's expense.

Any damage caused to the surrounding barracks roadways shall be made good to the satisfaction of the Client at the Contractor's expense.

Internal:

The Contractor shall note that any damage to the existing walls, windows, floor coverings, ceilings, doors, etc. that may arise during construction stage of the project and caused by the construction works or by the Contractor's plant or staff, is to be made good by him at no extra cost to the Client.



Any damage caused to the internal building as listed above shall be made good to the satisfaction of the Client at the Contractor's expense.

Interpretation of this specification and drawings

This specification has been written using simple, direct language wherever possible. Imperative terms such as 'provide' and 'submit' mean that the Electrical Contractor shall 'provide' or 'submit' the relevant samples, documentation or information.

If any discrepancies exist or there is any doubt about the interpretation of the Documents, obtain clarification from the Project Manager.

Declaration of Performance/CE markings

General:

The Contractor shall be aware of the Construction Products Regulation (CPR), which entered into force on 1 July 2013 and requires mandatory CE MARKING of construction products covered by Harmonised European Standards (HENs), when products are placed on the EU market. The purpose of the CPR and CE Marking of construction products is to facilitate the free circulation of construction products across the EU market. In doing so, the CPR has established a common technical language for declaring, specifying and setting requirements for construction products.

All CE MARKED construction products must have a Declaration of Performance (DoP), drawn up by the manufacturer. The DoP provides information on the performance of the construction product in relation to technical essential characteristics e.g. compressive strength, durability etc.

It is important that the electrical contractor uses only CE MARKED construction products within this installation and obtains a DoP for each product to ensure the product is fit for the use for which it is intended and for the conditions in which it is to be used. Furthermore, it is the Contractor's responsibility to ensure all works should be carried out using "proper materials...which are fit for the use for which they are intended and for the conditions in which they are to be used" in order to demonstrate compliance with the requirements under Building Regulations.

All materials, equipment and plant used in the works shall be fit for the use for which they are intended and for the conditions in which they are to be used in.

All materials, equipment and plant shall adhere to the following:

- Shall bear a CE mark in accordance with the provisions of the Construction Products Directive (89/106/EEC)



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- Shall comply with an appropriate harmonized standard, European technical approval or national technical specification as defined in article 4(2) of the Construction Products Directive (89/106/EEC)
- Shall comply with an appropriate Irish Standard or Irish Agreement Board Certificate or with an alternative national technical specification of any member state of the European community, which provides in use an equivalent level of safety and suitability.

The Contractor shall provide a Declaration of Performances (DOP's) cert for all materials, equipment and plant used in the works.

Evidence:

The Contractor shall provide evidence of Declaration of Performances(DOP's) and CE markings for all equipment, plant and material used in this project upon request by the Employers Representative. This is also mandatory for B(C)ar compliance sign off.

BREXIT implications for CE Marking and deployment of products for contracts with the EU member states including the Republic of Ireland:

As the UK has recently left the EU on the 31st January 2020. Contractors shall be aware of the implications and non-compliance risks for them or any of their sub specialists to install products which are CE marked under UK notified bodies. Post Brexit, UK notified bodies used for certification of conformity for 'CE' marking proposes will lose their status as EU Notified bodies and will be removed from the EU Nando website. In such instances the manufacturer of the product will need to obtain alternatives for certification of conformity for 'CE' marking.

Trade union rates and agreements

The Contractor must be in compliance with all Trade Agreements and the Contractor shall pay all employee's connected with the project to current trade union rates. If the Contractor appoints Sub-Contractor's to complete work then they too shall be compliant with current trade union agreements.

This will be monitored on site to ensure that all the Contractors employees and subsequent Sub-Contractors are in compliance with all Trade Agreements and that all are paid current union rates.

All employee's and Sub-Contractors employed by the Contractor for the duration of the works shall have their union cards on them at all times.



NZEB/BER Compliance

This building needs to be NZEB compliant.

An NZEB compliance report and calculation has been carried out for this project and the building is NZEB compliant based on all the plant, equipment, materials, etc. as specified below in the specification document.

The Contractor shall ensure that all items specified within this specification is installed as a preliminary NZEB/BER calculation has been carried out based on this specification.

If the Contractor is to deviate from the specified items within this specification and propose alternatives, the Contractor must ensure that these items match the specified criteria within this specification.

If in any case the Contractor takes the onus to install any item that isn't an equivalent to the specified items or isn't formally approved by the Engineer, then the Contractor shall be asked to carry out an individual NZEB/BER assessment to ensure it meets the desired NZEB/BER criteria. This shall be carried out at the Contractors expense and any cost implications for this shall be at the expense of the Contractor.

Timescale, working hours, payment, etc.

Refer to the Main Contractor for specific details on these requirements.



BUILDING CONTROL REGULATIONS

General:

All works shall be carried out to the new Building Control (Amendment) Regulations (BC(A)R), S.I. 9 of 2014.

Therefore, the Contractor shall allow for the following over the following stages of the contract:

Commencement Stage:

- Familiarise themselves with the drawings, specifications and documents lodged with the Commencement Notice.
- Ensure a competent person is assigned to oversee the Construction works.

During Construction:

- Install the services and construct the building in accordance with the plans and specifications.
- Ensure that the workmanship complies with the requirements of the Building Regulations.
- Ensure that materials which they select and for which they are responsible comply with the requirements of the Building Regulations.
- Co-operate with the design team, the Assigned Certifier and other certifiers.
- Co-operate with the Assigned Certifier for the implementation of the site inspection plan.

Upon Completion:

- Sign the Certificate of Compliance (completion).
- Provide to the Assigned Certifier, such documents for which they are responsible, as may assist the Assigned Certifier to collate particulars for the purposes of handover and certification, and/or for further submissions to the Building Control Authority.
- We will require Certificate of Compliance with the Building Regulations and relevant standards and manufacturers requirements at this stage.
- Ensure the coordination and provision of all test certificates and confirmations to the satisfaction of the Assigned Certifier or other designated inspectors or certifiers providing Ancillary Certificates;
- Maintain records.



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Inspections during the Construction Process:

The Contractor shall allow the following for inspections during the Construction Phase:

- Contractor to give the Engineer at least 5 days notice to carry out a necessary inspection.
- All services that are to be hidden or concealed shall be left exposed until inspected.
- Prior to closing up services in walls, ground, attics, etc., all tests shall be completed and sign off sheets shall be signed and witness signed. Test sheet to contain the name of the tested, name of the witness, type of test, duration of test and results recorded.
- No cost variations will be accepted for time delays or opening up for inspections if these procedures are not followed.

BUILDERS WORK

General:

All builders work associated with the execution of this Contract shall be carried out under the main contract by the Main Contractor.

The Contractor shall liaise with the Main Contractor on all builders work requirements relating to their installations and shall prepare detailed builders work drawings for the Main Contractor.

The Contractor shall prepare any working drawings if necessary, agree all details with the Employer's Representative, mark out and be responsible for correctness, and the cost of any unnecessary work due to the Contractor failing to comply with this condition shall be the Contractors responsibility.

The Contractor shall ensure that cutting away and general attendance is reduced to a minimum and must not impede or delay the carrying out or completion of this work. The permission of the Employer's Representative shall be secured before cutting or chasing is commenced.

The Contractor shall be responsible for the preparation of the following:

- Builders work drawings, including all necessary opes for installation
- Technical submittals, for all items of plant and equipment that vary from the specified equipment herein.
- Ensuring that all services/installation details are completely integrated with all aspects of the building elements, to the satisfaction of the Client.



Opes through Fire Barrier Membrane:

All services through fire barriers, fire walls or floor slabs shall be sleeved either side of the fire barrier/wall/slab. All opes shall be filled in and fire proofed by the Main Contractor after services is installed and commissioned. Allow for all necessary works. Liaise with Main Contractor in ensure that all opes for services are fire-proofed.

M&E CO-ORDINATION AND M&E CO-ORDINATOR

M&E Co-ordinator:

The co-ordination of the mechanical installations and electrical installations shall be the responsibility of the Main Contractor as they shall appoint a dedicated M&E Co-Ordinator for the mechanical installations and electrical installations on site.

In addition, the co-ordination of the electrical installations shall be the responsibility of the Electrical Contractor and the co-ordination of the mechanical installations shall be the responsibility of the Mechanical Contractor but both Contractors shall allow for co-ordinating their installation with each other and the M&E Co-ordinator.

All mechanical and electrical installations shall be co-ordinated by the M&E Co-ordinator which shall be the responsibility of the Main Contractor. The Main Contractor shall appoint a suitably qualified person to complete this role. The M&E Co-ordinator shall have relevant experience on site and experience in M&E installations:

The M&E Co-ordinator shall allow for the following (non-exhaustive list):

- Oversee the installation of the M&E installations for the duration of the projects.
- Detailed co-ordination of the M&E installations.
- Completing co-ordination drawings for the M&E Contractors on site.
- Ensuring that the M&E installations are completed and installed in compliance with design documents and current regulations.
- Programming of the M&E installations with the M&E Contractors and the Main Contractor
- Shall be responsible for reporting on progress and creating procurement schedule.
- Shall be responsible for the overall progress & quality of work.
- Responsible for ensuring the clients requirements are being met



Electrical Contractors Co-ordination:

The Electrical Contractor shall allow for liaising with all other trades in relation to coordination. Before any works are started on site, the Electrical Contractor shall hold a meeting with the Mechanical Contractor to co-ordinate the M&E installations in the building.

The co-ordination of the mechanical installations and electrical installations shall be the responsibility of the Main Contractor as they shall appoint a dedicated M&E Co-Ordinator for the mechanical installations and electrical installations on site.

The Electrical Contractor shall provide all information necessary and on time to the M&E Co-ordinator for the proper discharge of this responsibility. The Electrical Contractor shall agree all methods, sequences timing and all relevant details of the works within his contract with the M&E Co-ordinator in advance and shall not deviate from this agreement unless otherwise agreed in writing with the Contractor. No adjustments will be made to the electrical contract sum where additional work is required due to poor co-ordination or where the Employer's Representative has not been informed in good time of a co-ordination difficulty that could have been resolved by a design decision had the issue and its full implications been advised to the Employer's Representative in good time. The Electrical Contractor shall liaise with all other trades when co-ordinating their works.

The Electrical Contractor shall mark out opes and holes on all floor and wall surfaces as required to the satisfaction of Services Engineer, Structural Engineer and M&E Co-ordinator in sufficient time to allow the Main Contractor complete his works to programme.

METHOD STATEMENTS AND RISK ASSESSMENTS

Before any works commence to the services in the building, the Electrical Contractor shall submit risk assessments for the works and method statements for the works to the Main Contractor for works in the building.

The Electrical Contractor shall allow for carrying out a risk assessment on all works and services to be installed in the building and shall highlight any risks to the Main Contractor.

Safety and Method statements must relate fully to this project only, e.g. the identification of hazards therein, and to enshrine the health & safety principles of prevention in the protection of employees and for others who may enter onto this site, or be effected by this work outside the line of site fencing etc.



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The safety statement shall include the names of authorized deputies and job titles. Commitment signed by the Managing Director of the company to uphold the health and safety principles of this project, in compliance with Regulation 12 of the 89 Act.

Method statements shall describe the method to be employed by the Contractor to ensure that hazards and risks associated with this work have been identified, and that the hazards or risks will be reduced or eliminated to an acceptable level as far as reasonable practicable.

The method statement shall also specify the plant or equipment to be used and the safety procedures to be adapted when using plant or equipment. The contractor is obliged to ensure that all works will be carried out in accordance with all relevant safety standards.

Method statements are required where a particular task involves a specific risk to people and to all other parties who may be affected by the contractor's actions.

Examples include the following:

- Working at heights
- Connecting to existing mechanical and electrical services
- Decommissioning of existing mechanical and electrical services
- Hot works in the building.



(6-) ELECTRICAL WORKS

General

The Contractor shall be responsible for all electrical works and shall ensure that the full price for this work is included in the tender price.

This section of the Specification outlines the mechanical services installation and describes the particular requirements of the electrical services to be installed.

This section is intended to be read in conjunction with all other technical and non-technical sections of the specification and with the tender drawings. Where this section is at variance with any other sections of the tender documents, the tenderer shall obtain clarification from the Employers Representative before tendering.

Failure to do so will be deemed to imply that the most onerous requirements have been included for.

60.0 ELECTRICAL SITE SERVICES

Non Applicable

61.0 ELECTRICITY CENTRE

Refer to 'Section 62.0' for further information.



62.0 POWER DISTRIBUTION SERVICES

62.01 Decommissioning of the existing power and general services installation throughout the room

The Electrical Contractor shall allow for the decommissioning and removal of the existing power and general services installation throughout the Science Room. This includes all electrical boards, sockets, spurs, cabling, isolators, etc. throughout the rooms. Refer to the drawings for further information.

The PA System, intruder alarm system etc shall be retained.

A new power and general services installation shall be installed throughout the room as indicated on the drawings.

62.02 Existing main distribution electrical board

The existing main distribution electrical board in the building shall be retained.

The Electrical Contractor shall carry include for a detailed survey of the existing main electrical board in the building.

62.03 New sub-distribution electrical board for the Science room

General:

A new sub-distribution electrical board shall be installed for the Science Room as indicated on the drawings.

Refer to the electrical schematic and electrical drawings for locations, quantities, details, etc. of the sub-distribution electrical board to be supplied and installed in the Science Room.

In total, there will be 1no. sub-distribution electrical boards to be supplied and installed in the Science Room.

The Contractor shall allow for the supply, installation and wiring of the new sub-distribution electrical board as indicated on the drawings.

The Contractor shall supply, install, connect, test and commission the new sub-distribution electrical boards as indicated on the drawing. Refer to the electrical schematic drawing for details on the new sub-distribution electrical boards to be supplied and installed.



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The assembly of the new sub-distribution electrical boards shall adhere to the following specifications and shall have the following specifications:

- Wall mounted.
- The protection rating of the enclosure shall be minimum IP40 in accordance with IEC144.
- Board shall be supplied with a moulded case circuit breaker incomer.
- Sheet steel cubicle with MCCB type cubical construction. The enclosure framework shall be of sheet steel construction, minimum of 2.5mm thickness, sprayed and stove enamelled. Doors and panels shall also be of sheet steel construction and be 1.5mm minimum thickness.
- The protection rating of the enclosure shall be minimum IP40 in accordance with IEC144.
- Board shall be supplied with a moulded case circuit breaker incomer.
- Type tested assembly.
- 630A rated busbar.
- The board shall be extensible at both ends and shall be of MCCB type wall mounted cubical construction.
- All panel sections providing direct access to live assemblies shall be openable only with a special tool.
- All panel sections accessing shrouded MCBs shall be provided with a handle for opening.
- The board shall be manufactured to 'Form 2A' separation in accordance with IS EN 60439.
- The board shall be compliant with I.S. 10101:2020.
- Shall be suitable for a voltage of 630/230V (3 phase)
- Electronic surge protection shall be provided on the incoming mains as detailed in item '62.04'.

The Contractor shall provide with his tender the manufacturer's name and the overall dimensions of the new sub-distribution electrical boards they propose to supply and install. Detailed schematics shall be approved by Employer's Representative, prior to ordering of boards.

The Contractor shall not make site alterations unless authorised by the Employer's Representative. Where site modifications to assemblies are authorised, they are to be carried out in accordance with manufacturer's certified drawings and instructions. Ensure that modifications made comply with type test certificate obtained for arrangement of components.



Testing of the new electrical board:

The new electrical board shall go through a rigorous pre-test check list and a thorough testing procedure to ensure that the product reaches the expected standards and safety expected.

Test certificates shall be completed for all switchgear involved in this project and shall be signed off by both the switchboard technician that built the switchboard and the test engineer before final signoff by the director of the company.

All test certification, copies of test sheets records and results associated with this project shall be submitted both in hard copy to form part of the O&M manual and electronic copy

Miniature Circuit Breakers (MCB's):

The Contractor shall supply, install, connect, test and commission all the main circuit breakers as indicated for the new sub-distribution electrical board.

All circuit breakers shall generally be 'Type B' rated to at least 10kA, unless highlighted otherwise. They shall conform to BS 3871 Part 1 and be of the sizes indicated in the drawings or accompanying schedules and be suitable for DIN rail mounting.

Where the prospective short circuit current exceeds the breaking capacity of the circuit breaker, back up protection by means of fuses shall be provided in accordance with Manufacturer's Recommendations.

Where possible, circuit breakers shall be of plug-in type, to allow replacement without undue difficulty.

Circuit breakers shall be Type B, C and D to ISEN60898 to the following table:



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MCB'S SHALL BE TYPE B,C,D TO ISEN 60898 TO THE FOLLOWING TABLE		
TYPE	INSTANTANEOUS TRIP CURRENT	APPLICATION
B	5 x In	RESISTIVE LOADS
C	10 x In	DISCHARGE LIGHTING, SMALL MOTORS ETC.
D	20 x In	LARGE INDUCTIVE LOADS, LARGE MOTORS, WELDING PLANT, ETC.

NOTE: SIZES OF EARTHS TO CONFORM WITH THE FOLLOWING TABLE	
CROSS SECTIONAL AREA OF CONDUCTOR. S sqmm	CROSS SECTIONAL AREA OF CORRESPONDING PROTECTIVE CONDUCTOR.
S < 16	S
16 ≤ S < 35	16
S ≥ 35	0.5S

Residual Current Breakers with Over-Current (RCBO's):

The Contractor shall supply, install, connect, test and commission all the RCBO's as indicated for the new sub-distribution electrical boards.

Combined MCB/RCD units shall be of the same manufacturer as the MCB's as identified above. They shall be double pole operated and protect against, overload, short circuit and earth leakage currents.

The RCD shall be electro-magnetically operated and comply with all relevant sections of BS 4293 and BS 3871. RCD's shall operate at 30mA.

Moulded Case Circuit Breaker (MCCB's):

The Contractor shall supply, install, connect, test and commission all the moulded case circuit breakers as indicated for the new sub-distribution electrical boards.

MCCBs shall comply fully with IS EN 60947-2:2006 or equal and approved. The internal trip unit for the Main Incomer shall be electronic. Their contacts shall be capable of inspection.

When used as a main incoming device, MCCB's shall have a rated prospective short circuit current of not less than 40 kA at a power factor of 0.2, the internal trip unit for the Main Incomer shall be electronic and shall be tested to P2 category IEC157-1.



Load Break Switches

The Contractor shall supply, install, connect, test and commission all the load break switches as indicated for the new sub-distribution electrical board. Load break switches shall be of the rotary air-break type and shall comply fully with IEC 408 or equal and approved.

Their prospective short circuit current rating shall be adequate for their duty. (For guidance see below) They shall have on/off indication and be complete with door interlock to prevent inadvertent contact with live parts and must be lockable in the off position.

- Switch Current Rating (Rated Current)
- Symmetrical Withstand
- Current (RMS – 1s)
- Up to 63 Amp 2.5kA
- Up to 100 Amp 4.0kA
- Up to 160 Amp 9.0kA
- Up to 250 Amp 13.0kA
- Up to 400 Amp 13.0kA

Contactors:

Contactors shall comply fully with IEC158-1 or equal and approved.

They shall be rated for AC3 Category and shall have at least 1 N/O and 1 N/C spare auxiliary contacts.

Motor Starters:

Starters shall comply fully with IEC292-1 or equal and approved.

They shall incorporate the following protection features: -

- Thermally delayed over-current release on all poles set to trip at 120% full load in two hours and incorporating temperature compensation.
- Positive protection against single phasing in the form of an extra differential tripping bar or similar approved device.
- Manual reset with protection against premature re-closing.

Push Buttons and Control Switches:

Push buttons shall be in accordance with IEC337 and IEC144 and have a protection rating of IP65.



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They shall be colour coded as follows:

- Start/On -Green.
- Stop/Off -Red.
- Reset -Yellow/Black.

Pilot Lights and Indicators:

Pilot lights shall be LED Type and in accordance with IEC337 and IEC144 and have a protection rating of IP65. Their maximum Voltage shall be 230V Volt but where possible they shall be of either 110 Volt or 24Volt, as specified. Neon indicators shall not be used.

Pilot lights shall either be of LED, Transformer type or Series Resistor type.

Time Switches:

Time switches shall be digital 7-day, 24-hour type, complete with day omission and 36 hour spring reserve.

Instrumentation:

Instruments shall be provided where indicated and shall comply with IEC473 in all respects. They shall be of minimum 96mm x 96mm unless agreed otherwise with the Engineer and contain a modbus communication module.

Instrument Transformers shall comply in terms of rated Current, rated Voltage, limits of error etc., with VDE 0414 and IEC 185.

Terminals:

Terminals shall be provided at top or bottom of cubicle as specified and shall comply with IEC 61032:1997.

All items of equipment shall be wired to these terminals and they shall be capable of accepting the incoming cable sizes as specified. They shall be of PVC grade and be identified by means of terminal numbers. The Manufacturer shall provide a terminal list, or numbered Drawing.

Push-in type terminals are not acceptable.

Labelling:

All MCCB's, circuits and devices shall be provided with engraved plastic circuit labels. A main label to be provided in accordance with IEC 439, which gives



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details of voltage rating, current rating, class of equipment, fault rating and serial number.

Labels shall be provided on all chambers inside and outside the panel, indicating the function of every item. Labels shall be 'Traffolyte', black on white, screw on type, and shall be subject to the Engineer's approval.

Every control centre sub-circuit shall be labelled to indicate its function and rating and shall be suitably indicated on heat sealed chart.

Construction:

Busbars - To be manufactured from HDHC Copper and housed in separate compartments. Secondary busbars are considered a part of the main busbar system. All busbars shall have bolted joints. Phase and neutral busbars shall be fully rated throughout the length of the assembly.

Connections - To be HDHC Copper.

The structure is to be manufactured from sheet steel formed or folded to give an inherently rigid design.

Fuse Switches, MCCBs, Motor Starters and similar devices shall be designed on a common modular dimension and shall be dimensionally interchangeable.

Segregation shall be provided between devices.

Finish - All main steelwork to be epoxy powder finish. Nuts, bolts and fasteners to have zinc plated finish. Main steelwork to be finished Light Grey (or otherwise approved).

Earthing:

Earth Continuity - The main structure together with devices shall be provided with earth continuity in the form of copper bonding tape or cable connected to the earth busbar. Earth Busbar - A copper shall run the length of the FBA.

A main HDHC Earth Busbar shall run the full length of the switchboard and all metalwork shall be bonded to this. Doors shall be bonded by 1.5 sq.mm cross section minimum size flexible cable.

The size of the busbars shall be in accordance with the Switchgear COP and I.S. 10101:2020.



New Incoming and Outgoing Sub-Mains Cables:

The Contractor shall supply, install, connect, test and commission the new incoming and outgoing sub-mains cabling to and from the new sub-distribution electrical boards as indicated.

Refer to the electrical schematic for details and sizes on all sub-mains cabling. Refer to the electrical drawings for lengths required and proposed routes of all sub-mains cabling.

Connection to the existing main distribution electrical board in the building:

The new sub-distribution electrical boards shall be supplied and fed from the existing main distribution electrical board as indicated on the drawings.

62.04 Electronic surge protection

Electronic surge protection shall be installed in the new electrical boards to provide surge protection on all incoming lines and devices into the building.

The services in the electrical board that will require surge protection devices (SPD's) and the type required are highlighted below:

- TP & N incomer on the new sub-distribution electrical boards for the Science Rooms (Type 2 combined lightning & SPD).

Surge Protection Devices (SPD's) shall be installed at distribution panels as shown on drawings.

Where equipment/panels are more than 30' from service entrance SPD, additional local protection shall be provided in the form of distribution panel protection.

Distribution branch circuits that feed equipment that generates electrical disturbances shall have additional SPD protection to prevent this noise feeding back onto other circuits. Additionally, SPDs may be used where sensitive electronic equipment is located more than 30' from the closest upstream SPD.

Surge protection devices shall adhere to the following specifications:

- Shall be capable of handling both direct lightning current of 25kA 10/350 μ s per pole and maximum discharge currents of 40kA 8/20 μ s per pole.



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- Type 2 arresters shall have a maximum discharge current of 40kA 8/20 μ s waveform per pole 160kA 8/20 μ s, TP+N system.
- The arrester shall be fully co-ordinated between lightning and surge currents. The arrester shall be fully energy co-ordinated to work correctly in conjunction with other surge protection devices from the same manufactures range.
- The arresters shall be of the pluggable type to facilitate easy removal and replacement of defective modules. Locking modules with quick easy release button. The unit shall have easy hot-swop replacement cartridges.
- Must have remote interrogation IR.
- The arresters shall have international test approvals either UL or KEMA.
- The arrester shall comply with the Surge Protection Device standard EN 61643-11 and shall be tested for vibration and shock proof characteristics in accordance with EN 60068 – 2.
- The arrester shall have a maximum let through voltage of less than 1.5kV even in the case of direct lightning.
- The arrester shall be able to withstand multiple direct strikes without damage.
- The arresters shall have visual indication of status. Green - ok. Red – defect.
- The arrester shall have thermo dynamic control which disconnects the device from the supply in case of defect.
- Arresters to be equipped with a optional fault alarm changeover contact to remotely signal device failure.
- To easily distinguish the arrester from circuit breakers and RCD's they shall be coloured red.
- Disconnect fusing shall be installed where required in accordance with the SPD instructions.
- Shall have a UP value of <1500.
- Shall have a 10 year warranty.



- Accepted manufacturer's of surge protection are Furse, Dehn & Sohn, or equivalent.

62.05 New cable carrier LV and ELV installation in the building

General:

The Electrical Contractor shall allow for supplying and installing new cable containment and a new cable carrier system for the new electrical services throughout the Science Room as indicated on the drawings.

Trunking and Tray:

The primary trunking and cable tray routes for the Science Room and existing building are as indicated on the drawings but these primary electrical routes are to be finalised and decided by the Electrical Contractor in conjunction with the Engineer. All new cable containment shall be installed in compliance with I.S. 10101:2020.

All power, lightings, circuit wiring, etc. in the building shall be installed in metal conduit, trunking, tray, etc. as described below.

All sub-mains cabling in the Science Room shall be installed on suitably sized tray as described below. The new containment routes on the drawings are indicative only.

The Electrical Contractor shall allow for all necessary bends, offsets, crossovers, additional labour, etc. in installing the new cable containment in conjunction with the Mechanical Services.

The Electrical Contractor shall allow for visiting the site during the tendering period to review all necessary works that are involved in supplying and installing the necessary cable containment for the new electrical services.

The Electrical Contractor shall allow for all necessary brackets, unistrut, threaded rod, etc. in hanging the cable containment. Cable containment shall be properly aligned and securely fixed at regular intervals at 1000mm on straight runs. Where bends, angles or offsets occur, additional fixings shall be supplied at a distance not exceeding 150mm on each side of the accessory.

A space factor of minimum 40% must be allowed in all carrier systems. Overloading and under sizing of the cable carrier system will not be permitted.

Where trunking or cable tray systems pass through fire compartment boundaries, the Contractor is responsible for the internal fire stopping with a



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suitable approved material, and also the provision of a lid to cover cable tray at such points.

Before setting to work, the Contractor shall confirm with the Engineer the exact routes for conduits and final location of all wall-mounted devices. Particular care shall be taken to co-ordinate all services on site with the Consulting Engineer before commencing work.

A system of galvanised steel cable tray and trunking shall be installed to distribute sub mains, general and emergency lighting, power, fire alarm, public address and mechanical services control wiring throughout the building. Separate trunking shall be provided for data. Separate systems shall be segregated in accordance with I.S. 10101:2020.

Cable containment shall be Uni-trunk or equivalent.

Information and communication technology cables shall be run on a separate cable tray system generally following the same service routes and they shall be separated from power distribution cables. Where crossovers are required, they shall be at 90° to the power cable route.

Cable capacities of conduit and trunking systems shall not exceed the requirements of I.S. 10101:2020. It is the responsibility of the Electrical Contractor to verify that the trunking system as designed satisfies these regulations.

If cables exceed the trunking capacities, the Electrical Contractor must bring this to the attention of the Engineer prior to order or installation of the trunking system.

Trunking and cable tray systems shall be free of sharp corners, edges or burrs, where cable insulation could be damaged. Cables shall be installed in a manner that will not damage or put undue physical strain on them.





Conduits:

All of the electrical installation below the ceiling in the building shall be surface mounted and as a result, all conduits shall be surface mounted throughout the building.

All surface mounted conduit to be installed in the building shall be steel conduit. Location of all surface mounted conduits to be discussed on site.

All conduits shall be galvanised welded steel to BSS 31 Class E for heavy gauge tubing as manufactured by ASCM or approved equal. 16mm outside diameter is the minimum size to be used. All inlet boxes, conduits shall be plugged or capped whilst waiting for further items to be attached.

The ends of every fitting, tube length or nipple are to be reamed and all threads to be coated with aluminium paint after assembly. All fittings shall be installed so as to facilitate easy re-wiring. Inspection fittings shall be fitted at all bends, tees and elbows. Back entry elbows or tees shall be used, if necessary, to enable easy of accessibility without disturbing any plasterwork.

Inspection fittings shall be flush with the plasterwork and floorboards over conduit fittings shall be screwed in position. The complete conduit installation shall be finished before any wiring is pulled through.

Allow for all junction boxes for jointing of conduits. The minimum spacing of conduit supports shall be as follows:

Nominal Conduit Size

25 mm. and less
25 mm. to 40 mm.
Exceeding 40 mm.

Spacing of Supports

1.75 metres
2.00 metres
2.50 metres





Conduit Fixing and Fittings

Surface conduit, where used, shall be run parallel to building elements and shall be fixed to the structure by means of galvanised spacing saddles affording a clearance of 3mm min. and spaced at 100mm min.

Saddles shall be fixed with wooden plugs or rawl plugs as the surface permits. Where conduit is to be concealed in plasterwork, it shall be fitted using galvanised pipe hooks. Conduit boxes shall be fitted using brass round head screws.

Where conduits are fixed under flooring, which is supported on joists, cutting away shall be kept to an absolute minimum.

The approval of the Employer's Representative must be sought prior to any notching.

Hanging of cable containment:

The Electrical Contractor shall allow for hanging the new cable containment from the existing concrete ceiling slab. The Electrical Contractor shall install suitable supports in order for the tray/trunking to be installed.

Refer to drawings for the size, quantity, layout and routes of the cable containment.

In order to install the cable containment at high level from the existing concrete ceiling, the Electrical Contractor shall allow for the following:

- Dropping 10mm threaded rod from the ceiling/steel at 1000mm distances over the length of the containment run.
- The threaded rod shall be hung from the ceiling slab via 10mm G-Clamps or supports shall be drilled into the ceiling for supports.
- The base supports for the cable containment shall be single channel unistrut. Supports shall be placed at 1000mm distances over the length of the containment run.
- Allow for connecting the threaded rods to the single-channel unistrut.



62.06 Cabling, wiring and cable sizes

General installation:

All final sub-circuit cables for lighting, power, etc., shall adhere to the following specifications:

1. All cabling shall be run in metal cable containment and shall be run in conduit, trunking, tray etc. See section 62.05 for further information.
2. All final sub-circuit cables for lighting, power, etc., shall be single core low smoke and zero halogen (LSZH) insulated type, flame retardant to BS 4066, with stranded copper conductors, thermosetting insulation type E1.5 to BS 7655 all complying with BS 7211. All cabling shall be LSZH sheathed cable.
3. All cables to be class Cca-s1, d2, a1. All cables to be CPR 2017 compliant.
4. Multicore unscreened cables for control and signalling requirements shall be of the unarmoured type with copper conductors, PVC insulation and PVC sheath to BS 7655 all in accordance with BS 6004/BS 6346 (as appropriate).
5. All cables shall be 450/750 volt rated and no cable less than 2.5mm² in cross section shall be used without the permission in writing of the Engineer.
6. Only insulated cables shall be installed in conduit and/or trunking and cabling for different services shall not be installed in the same conduit without the permission in writing of the Engineer.
7. Joints on cables in trunking shall not be permitted. The cables of different circuits run in trunking shall be taped together at not greater than 3 metre centres.
9. Cables in excess of 10 sq. mm cross sectional area shall not be installed in trunking with smaller cables. In addition MICS LSF or armoured cables shall not be installed in trunking with other cables.

LSZH Cabling:

All final sub-circuit cables for lighting, power, etc., shall be single core low smoke and zero halogen (LSZH) insulated type, flame retardant to BS 4066, with stranded copper conductors, thermosetting insulation type E1.5 to BS 7655 all complying with BS 7211. All electrical cabling shall comply with I.S. 10101:2020. All cabling shall be LSZH sheathed cable.



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All LSZH or LSOH cabling shall adhere to the following specifications:

Product features:

- Flame-retardant according to IEC 60332-1-2 (flame spread on a single cable)
- No flame-propagation according to IEC 60332-3-22 and IEC 60332-3-24 respectively IEC 60332-3-25 (Flame spread on vertical cable or wire bundle)
- Halogen-free according to IEC 60754-1 (amount of halogen acid gas) Corrosiveness of combustion gases according to IEC 60754-2 (degree of acidity)
- Low smoke density according to IEC 61034-2
- UL Cable Flame Test.
- All cables to be class Cca-s1, d2, a1. All cables to be CPR 2017 compliant.

References/Approvals:

- UL AWM style 21089.
- Based on EN 50525-3-11.
- Based on EN 50525-2-51.

Product Make-up:

- Fine-wire strand made of bare copper wires
- Core insulation: Halogen-free
- Cores twisted in layers
- Outer sheath: Special halogen-free compound, grey (similar to RAL 7001).
- All cables to be class Cca-s1, d2, a1. All cables to be CPR 2017 compliant.

Cable Sizes

All conductors carried in conduits shall be single core LSZH cabling as specified in 'point 2' above. All cable sizes are to be a minimum of 2.5mm². Conduit capacities as set down in Appendix 12 of the I.E.E. regulations latest edition are not to be exceeded. Joints in conductors between terminating points will not be permitted.

See also electrical schematics for specific cable sizes.

Cable sizes shall be as follows:



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- Lighting final circuits (1kW max load): 2.5mm²/2.5mm² CPC
- Emergency light fittings: 2.5mm²/2.5mm² CPC
- 20amp radial circuits (6no sockets max): 4.0mm²/4.0mm² CPC
- 20amp radial circuits (general power): 4.0mm²/4.0mm² CPC
- 32amp radial circuits (non-cooker): 6.0mm²/6.0mm² CPC
- Cooker: 10.0mm²/10.0mm² CPC
- 10amp radial circuit (general): 2.5mm²/2.5mm² CPC
- 10amp radial circuit (lighting, facade): 2.5mm²/2.5mm² CPC
- 10/16 amp radial circuit (exterior lighting, columns): 6.0mm²/6.0mm² CPC
- Undersink electric water heaters: 4.0mm²/4.0mm² CPC

Sub-mains cabling:

Refer to section 62.07.

62.07 New sub-mains cables to be supplied and installed

New sub-mains cabling:

The Contractor shall supply, install, connect, test and commission all new sub-mains distribution cables from the existing main distribution electrical board to all the necessary items as indicated on the drawings.

Refer to drawings for the information on the type and size of all sub-mains cabling to be provided from the existing main distribution electrical board to the different items in the building.

Also refer to drawings for the location of all plant and equipment.

For reference, the Contractor shall allow for the supply and installation of the following sub-mains cabling in the building (refer to drawings for location of all items):

- 1no three-phase 4core 25mm² sub-mains cable (sub-mains cable as specified below) with separate 25mm² earth between the existing main



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distribution electrical board (EMDB.01) and the existing sub-distribution electrical board (NSDB.01) in the Science room 1. Refer to drawings for the locations of each board and the exact length of cable required. Allow for a cable length of 40metres.

- 1no three-phase 4core 25mm² sub-mains cable (sub-mains cable as specified below) with separate 25mm² earth between the existing main distribution electrical board (EMDB.01) and the existing sub-distribution electrical board (NSDB.01) in the Science room 2. Refer to drawings for the locations of each board and the exact length of cable required. Allow for a cable length of 40metres.

Sub-mains cable specification:

Cables shall be of type and size indicated on the drawings and shall be laid on cable trays or run in pipe ducts over the entire length of the cable run.

The Contractor shall provide all cable supports and cable glands necessary for correct installation and termination of the cables.

Sub-mains cable shall adhere to the following specifications:

- **Composition:** Manufactured to BS 6724 Table 6 (2 Core) Table 8 (3 Core) Table 10 (4 Core) Table 13 (5 Core)
- **Type:** Plain Annealed Copper Conductor / XLPE Insulated / LSNH Bedded / Galvanised Steel Wire Armour / LSNH Sheathed. 600/1000V
- **Conductor:** Plain Annealed Copper Class 2 Stranded to BS EN 60228
- **Insulation:** Thermosetting XLPE Type GP8 to BS 7655-1.3
- **Bedding:** Compatible LSNH Polymeric Material (LSNH)
- **Steel Wire Armour:** Galvanised Steel Wire
- **Sheathing:** LSNH Type LTS1 to BS 7655-6.1
- **Current Ratings:** For current ratings refer to table 4E4A of BS7671 IEE Wiring Regulations Seventeenth Edition.

Sub-mains cables and sub-distribution cables shall be 4 Core CU/XLPE/LSHN/SWA/LSNH with separate CPC's for cables over 16.0 sq.mm, and 5 Core CU/XLPE/LSHN/SWA/LSNH for cables of 16.0sq.mm or less. Cables shall be sized as scheduled on the electrical drawings.

Internal sub-mains cables and sub-distribution cables shall be fixed to cable tray. Cable tray shall be perforated type, galvanised medium gauge sheet steel. Sub-



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mains cables and sub-distribution cables shall be installed on cable trays at a spacing of twice the diameter of the larger adjoining cable with nylon cable ties. Sub-mains cable distribution within the building shall be XLPE insulated, steel wire armoured, LSNH sheathed cable that shall be installed directly on steel cable tray.

A separate CPC shall be installed with every sub-mains feed and should be of the size detailed in the distribution drawings. The armour of the cable should also be bonded at both ends to the distribution equipment by means of a nut and bolt through a tab linked to the earth bar.

The objective of the system is to provide an efficient and effective system for the distribution and support of small power requirements.

The design parameters are defined within the ETCI National Rules for Electrical Installations.

All cables shall have stranded or flexible copper conductors and LSF or heat resisting insulation to suit the particular application.

Cable carriers for incoming mains cables must be complete with lid. Under no circumstances will exposed cables be acceptable in any location throughout the building.

Information and communication technology cables shall be run on a separate cable tray system generally following the same service routes and they shall be separated from power distribution cables. Where crossovers are required, they shall be at 90° to the power cable route.

Segregation, Concealment and Re-Wiring:

The Contractor shall comply with I.S. 10101:2020 when wiring installations. Circuits shall be segregated as indicated.

Draw wires shall be left within empty conduits for use of specialist installers. Draw wires comprising nylon tapes with fitted eyelets shall be used by the Electrical Contractor.

For concealed conduit the Contractor shall ensure that the system is installed to enable re-wiring to be carried out from boxes for fittings or accessories only. Draw-in boxes will only be permitted with prior permission in writing. The Contractor shall not use tallow or any other substances to facilitate drawing-in of cables.



Cable containment:

Suitable cable tray shall be supplied and installed for all new sub-mains cabling in the building. Refer to section 62.06 for further information.

62.08 Internal sockets and spurs

Standalone internal sockets:

The Electrical Contractor shall allow for the supply and installation of all new standalone internal sockets in the rooms as indicated on the drawings.

See drawings for quantities and the locations of the new power and general services that are to be installed in the rooms.

Sockets that are to be installed on dado trunking are highlighted in 62.09 and 62.10 below.

The Electrical Contractor shall supply, install, connect, test and commission the standalone general service socket outlets installation as indicated on the drawings for the building.

General services wall/floor mounted outlets shall be single or twin switched 13A 3 pin type mounted on suitable conduit boxes. Sockets are to be located 450mm generally above finished floor level and 200mm above worktops. The main earth terminal on all sockets shall be connected to the earth terminal in the conduit box.

All conduits below the ceiling throughout the building shall be exposed and surface mounted. Therefore, all standalone electrical sockets, spurs, isolators, etc. shall be surface mounted.

Wiring to the sockets shall be as highlighted below.

The new electrical distribution system shall be installed in a steel conduit/trunking system throughout.

Surface mounted switched socket outlets shall be from the MK Albany Plus (Brushed Stainless Steel) range as K2958 BSS (1 gang) or MK Albany Plus K2947 BSS (2 gang), or equivalent. Mounting boxes to be K829 ALM (1 gang) or K830 ALM (2 gang), or equivalent.

Please note that all new sockets shall adhere to Building Regulations Part M.



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Therefore, all new sockets shall adhere to the following specification:

- Single socket shall be as K2958 BSS, or equivalent.
- Double socket shall be as K2947 BSS, or equivalent.
- All sockets shall be of brushed stainless steel finish.
- Surface mounting box for single socket shall be as K829 ALM, or equivalent. Mounting box to be supplied without knockouts.
- Surface mounting box for double socket shall be as K830 ALM, or equivalent. Mounting box to be supplied without knockouts.
- All double sockets shall have outboard rocker switches as highlighted in image below.
- All rocker switches shall have neon indicators in the switch rockers to indicate that they are on.
- The rockers on the socket shall contrast with the colour on the socket.



Recessed internal sockets in benches:

The Electrical Contractor shall allow for the supply and installation of all new standalone recessed sockets in the benches as indicated on the drawings.

See drawings for quantities and the locations of the new power and general services that are to be installed in the rooms.

The Electrical Contractor shall supply, install, connect, test and commission these standalone general service socket outlets.

Recessed sockets shall be twin switched 13A 3 pin type mounted that shall be recessed into the furniture. The main earth terminal on all sockets shall be connected to the earth terminal in the conduit box.

Wiring to the sockets shall be as highlighted below.

The new electrical distribution system shall be installed in a steel conduit/trunking system throughout.

All sockets that shall be recessed into the bench shall have outboard rocker switches as highlighted in image below. Please note that all sockets shall adhere



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to Building Regulations Part M. Therefore, all sockets shall adhere to the following specification:

- All sockets shall be recessed so include for all accessories for recessing the sockets.
- Double socket shall be as MK Logic Plus K2746 GRA, or equivalent.
- All sockets shall be of grey graphite finish.
- Mounting boxes shall be 886 ZIC (2 gang), or equivalent.
- All double sockets shall have outboard rocker switches as highlighted in image below.
- All rocker switches shall have indicators in the switch rockers to indicate that they are on.



Sockets below counters:

Where new sockets are to be located below counters and in presses, the Electrical Contractor shall include for the supply and installation of a double pole isolation switch for each socket above the counter and connection of that switch to the socket for isolation.

All isolators shall be as manufactured by MK Albany Plus and finished in brushed stainless steel, or equivalent.

Wiring to the sockets shall be as highlighted below.

All double pole isolation switch shall adhere to the following:

- Isolation switch shall be as K961 BSS, or equivalent. All switches shall be of brushed stainless steel finish.
- Supplied with 13amp fuse with fuse holder.
- Isolation switch shall have a neon indicator in the switch rocker to indicate that they are on.
- Surface mounting box for single switch shall be as K829 ALM, or equivalent. Mounting box to be supplied without knockouts.



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Unswitched fused spur outlets:

The Electrical Contractor shall include for the supply, erection and wiring of all new unswitched fused spur outlets for connection to electrical control/equipment panels throughout the building.

All spur outlets shall be as manufactured by MK Albany Plus and finished in brushed stainless steel, or equivalent.

All unswitched fused spur outlets in the building shall adhere to the following:

- Spur outlet shall be as K978BSS, or equivalent. All spur outlets shall be of brushed stainless steel finish.
- Supplied with 13amp fuse with fuse holder.
- Supplied with flex outlet.
- Fused spur outlet shall have a neon indicator to indicate that they are on.
- Surface mounting box for single switch shall be as K829 ALM, or equivalent. Mounting box to be supplied without knockouts.

Connection to all equipment shall be by fixed spur outlet, mounted in line with the equipment on the drawings. Wiring to the fused spurs shall be as highlighted below.



Switched fused spur outlets:

The Electrical Contractor shall include for the supply, erection and wiring of all new switched fused spur outlets for connection to electrical control/equipment panels throughout the building.

All spur outlets shall be as manufactured by MK Albany Plus and finished in brushed stainless steel, or equivalent.

All spur outlets in the building shall adhere to the following:



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- Spur outlet shall be as K961 BSS, or equivalent. All outlets shall be of brushed stainless steel finish.
- Supplied with 13amp fuse with fuse holder.
- Isolation switch shall have a neon indicator in the switch rocker to indicate that they are on.
- Surface mounting box for single switch shall be as K829 ALM, or equivalent. Mounting box to be supplied without knockouts.



Connection to all equipment shall be by fixed spur outlet, mounted in line with the equipment on the drawings. Wiring to the fused spurs shall be as highlighted below.

Isolators

A number of single phase and three phase isolators shall be installed in the building as indicated on the drawings.



The Electrical Contractor shall allow for the supply, installation and cabling of these isolators as indicated on the drawings.

All three-phase and single-phase isolators shall have a red lockable switch on a yellow enclosure. The isolators shall also have an on/off indicator.

The housing shall be ABS enclosure and shall be flame retardant. Isolators shall be as Santon, or equivalent.

Refer to the drawings for the size and fuse rating of the isolators.



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Wiring:

All new wiring shall be carried out in radial circuits. Refer to section 62.06 for details on the new cabling and wiring required. All final sub-circuit cables for power shall be single core low smoke and zero halogen (LSZH) insulated type cable.

Circuiting shall be as indicated on the drawings and each circuit shall be protected by a 20A RCBO.

The maximum no. of sockets shall be 5no. twin sockets per final circuit. All wiring shall be carried out to current standards and regulations. All final circuit wiring for internal sockets shall be completely enclosed in surface-mounted conduit or in dedicated mains only trunking system.

Cable sizes shall be as follows:

- 16amp radial circuits (sockets): 4.0mm²/4.0mm² CPC
- 20amp radial circuits (sockets): 4.0mm²/4.0mm² CPC
- 32amp radial circuits (sockets): (non cooker) 6.0mm²/6.0mm² CPC

Power outlets to fans, air-conditioning units, water boilers and cookers shall be switched with neon indicator.

The Electrical Contractor shall co-ordinate fully to ensure no sockets are located behind radiators or cupboards.

All general power circuits shall be provided with combined MCB/RCDs giving distinction between MCB and RCD tripping. All circuits supplying socket outlets shall be individually protected by a 30 mA RCD.

62.09 Power installation on wall mounted dado trunking

General:

The Electrical Contractor shall supply, install and fit the dado trunking installation in the building as indicated on the drawings.

There is horizontal wall mounted dado trunking and vertical wall mounted dado trunking so refer to drawings for the arrangement of this dado trunking.



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All wall mounted dado trunking shall be 3-compartment dado trunking arrangement. Refer to the drawings for quantity, locations, drops, etc. for the dado trunking arrangement in the building.

Dado trunking shall generally be wall mounted which shall be mounted and fixed directly to the wall. Allow for dado trunking drop from ceiling void to low level dado trunking as indicated on the drawings.

Where dado trunking is to be installed above desks, the bottom of the dado trunking shall be 150mm above desk height.

Dado trunking:

The Electrical Contractor shall allow for the supply and installation of all dado trunking as indicated on the drawings.



Dado trunking shall adhere to the following specifications:

- Wall mounted dado trunking shall be MK 'Prestige 3D Compact' (or equivalent).
- 3-compartment dado trunking.
- 140mm x 45mm.
- Dado trunking shall complete with all necessary corner pieces, stop ends, couplers etc.
- Allow for all additional lengths of vertical trunking required to route cabling to ceiling level.

Sockets on dado trunking:

The Electrical Contractor shall supply, install, connect, test and commission the general service socket outlets on the dado trunking in the building as indicated on the drawings and schedules.

Refer to the drawings for quantities, locations and types of sockets required on the dado trunking.



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All double sockets shall have outboard rocker switches as highlighted in image below. Please note that all sockets shall adhere to Building Regulations Part M.

Therefore, all sockets shall adhere to the following specification:

- All sockets shall be recessed so include for all accessories for recessing the sockets.
- Single socket shall be as MK Logic Plus K2757 GRA, or equivalent.
- Double socket shall be as MK Logic Plus K2746 GRA, or equivalent.
- All sockets shall be of grey graphite finish.
- Mounting frames/boxes shall be VCT-121 WHI (1 gang) or VCT-121 WHI (2 gang), or equivalent.
- All double sockets shall have outboard rocker switches as highlighted in image below.
- All rocker switches shall have neon indicators in the switch rockers to indicate that they are on.



IT points on dado trunking:

A number of IT and telephone points shall be installed and recessed in the dado trunking as indicated on the drawings. The Electrical Contractor shall allow for installing all required back boxes, face plates, RJ45 outlets, etc. Refer to the drawings for quantities, locations and types of sockets required on the dado trunking.

Allow for supplying and installation all mounting frames/boxes for all new IT points on the dado trunking. Mounting frames/boxes shall be VCT-121 WHI (1 gang) or VCT-121 WHI (2 gang), or equivalent. Refer to section 64.01 for information on the cabling and faceplates for the IT installation.



62.10 Bench mounted pedestal boxes and sockets

General:

The Electrical Contractor shall supply, install and fit pedestal boxes with sockets on the benches as indicated on the drawings. Refer to the drawings for quantity, locations, drops, etc. for all the sockets that are to be installed on pedestal boxes.

Pedestal boxes:

The Electrical Contractor shall allow for the supply and installation of all pedestal boxes for sockets on the benches as indicated on the drawings.



Pedestal boxes shall adhere to the following specifications:

- Single sided.
- Suitable for double socket.
- Black in colour.
- Powder coated steel finish.
- Size is approximately 150mm wide by 82mm deep by 82mm high.
- Earth terminal.

Sockets on pedestal boxes:

Socket outlets on the boxes shall be from the MK Albany Plus (Brushed Stainless Steel) range as MK Albany Plus K2947 BSS (2 gang), or equivalent.

Please note that all new sockets shall adhere to Building Regulations Part M.

Therefore, all new sockets shall adhere to the following specification:

- Double socket shall be as K2947 BSS, or equivalent.
- All sockets shall be of brushed stainless steel finish.
- All double sockets shall have outboard rocker switches as highlighted in image below.



- All rocker switches shall have neon indicators in the switch rockers to indicate that they are on.
- The rockers on the socket shall contrast with the colour on the socket.



62.11 Electrical attendances to the new gas pressure proving system in the Science Room

General:

A new gas pressure proving system shall be installed in the Science Room and the Contractor shall allow for the wiring and electrical attendances to this new gas detection system in each of the areas.

The new gas pressure proving systems shall be supplied and fitted by the Mechanical Contractor but the Electrical Contractor shall allow for the wiring of all the new system associated controls.

In total, there are 3no gas pressure proving systems required.

The gas pressure proving system shall consist of a main panel, a gas pressure proving valve, gas detectors, carbon monoxide detectors and emergency buttons as indicated on the drawings. The new systems shall have the following features:

- Gas pressure proving
- Gas detection
- CO2 detection
- Emergency button

The Contractor shall include for the following electrical attendances to the gas pressure proving systems which shall be as follows:

- Supply and installation of a 13amp single phase fused spur outlet to each of the gas pressure proving panels. Location as indicated on the drawings. Power wiring as indicated below. Refer to section 62.06 in the tender specification for the cabling.
- Power cabling from each gas pressure panel to each gas pressure proving valve. Location as indicated on the drawings. Power wiring to each gas



- All current wiring regulations must be followed with reference to running low and mains voltage cables together. The maximum cable length between a detector and the control panel should not exceed 100 metres, if the distance between the main panel and the detectors is greater than 20 meters a 1mm screened cable must be used on the +VE, 0v terminals. Gas detectors, require a four core screened Belden type security cable or 600v rated BMS cable (max cable length of 100 meters.) Remote emergency stops and thermal links require a two core screened cable. Warranty will be void if Fire Protection Cable or cable over 1mm dia. is used on the SELV side.



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Emergency lock-stop button:

Remote emergency knock-off gas buttons shall be installed for the gas appliances in the rooms as indicated and these emergency knock off buttons shall be wired and linked back to the gas pressure proving panels.

The emergency knock-off button shall be supplied by the Mechanical Contractor but shall be wired by the Electrical Contractor.

Control wiring shall be 2-core 1.5mm² from the control panel to the emergency button. The equipment and wiring details shall be provided by others. See drawings for the quantities and locations of all equipment.

Power Wiring:

Electrical power supplies to the panel and the valve shall be 230VAC 50 Hz c/w 13amp spur and shall be supplied as part of this contract. Refer to section 62.06 in the tender for information on cabling.

Refer to drawing 61(E001) for cabling routes and location of all items in the rooms.

Control Cabling:

Control wiring shall be 4-core 1mm screened Belden type security cable from the control panel to the valve and the detectors. The equipment and wiring details shall be provided by others. See drawings for the quantities and locations of all equipment.

Refer to drawing 54(M002) for cabling routes and location of all items in the rooms.

Fire Alarm Wiring:

Each of the new gas pressure proving system shall be connected and interfaced to the new fire alarm system in the building so that in the event of a fire alarm activation, each gas valve on the gas pipework to the room will shut down.

A new fire alarm interface shall be supplied and installed from the new fire alarm system to the room and shall be connected to each new gas pressure proving panel. Refer to 68.02 for further information.



62.12 Electrical attendances to the two-port valves and local room stat

The Electrical Contractor shall allow for the wiring of the two-port valve and associated wall stat in the Science Room as indicated on the drawings.

Allow for power supplies to the valve/thermostat and control wiring between the valve/thermostat. Refer to drawings for cabling routes and location of all items in the room.

The Electrical Contractor shall include for the following electrical attendances to the 2-port valve and thermostat arrangement in the rooms as indicated:

- 230V power supply via a 13 amp unswitched spur for the 2-port valve which shall be installed at low level in the room. Final location of spur to be confirmed with the system installer. Refer to section 62.09 for information on spur required.
- 3-core 4.0mm² LSZH cable from the wall mounted thermostat to the 2-port valve. The thermostat shall be located at 1100mm above finished floor level. Refer to the drawings for the location of the thermostat and the length of cabling required.
- Wiring installed in steel conduit from the 2-port valve to the thermostat. Include for all necessary cable containment.
- Wiring shall be taken from the new electrical board in the Science room which is indicated on the drawings.

Wiring shall be by the Electrical Contractor and shall be exactly to supplier's instructions. The Electrical Contractor shall liaise with the supplier regarding installation of equipment.

62.13 Electrical attendances to the Heat recovery Unit

The Electrical Contractor shall allow for the wiring of the Heat Recovery units in the room as indicated on the drawings. Quantities and locations of Heat Recovery units as indicated on the drawings. In total there are 1no. heat recovery units to be wired in the building.

Final location for the electrical attendances to each heat recovery unit shall be confirmed on site with the Mechanical Contractor. All heat recovery units shall be supplied and installed by the Mechanical Contractor but shall be wired by the Electrical Contractor as per manufacturers requirements.



62.14 Electrical attendances to the Extract Fan for the Fume Cupboard

Extract fan for the fume cupboard in the Science Room:

The Electrical Contractor shall allow for the wiring of the extract fan for the fume cupboard in the Science Room as indicated on the drawings, which shall be supplied and fitted by the Mechanical Contractor.

The fan for the fume cupboard shall be controlled by a controller in the fume cupboard so allow for control wiring from the fan to the fume cupboard as indicated on the drawings.

The Electrical Contractor shall allow for the following attendances in wiring the fan for the fume cupboard:

- The extract fan shall be supplied and installed by the Mechanical Contractor. However, the Electrical Contractor shall allow for the wiring of all the extract fan as indicated on the drawings. Electrical power supplies to the fan shall be 230VAC 50 Hz c/w 13amp spur and shall be supplied as part of the electrical contract.
- Allow for the power supply to the extract fan from the new electrical board. Wiring to the extract fan shall be carried out using 4.0mm² in LSOH. Wiring shall be exactly to supplier's instructions. Refer to section 62.23 for details on cabling.
- All wiring from the fused spur to the extract fan shall be installed in steel conduit. Refer to section 62.09 for details on spur outlets.
- The fan for the fume cupboard shall be controlled by a controller in the fume cupboard so allow for control wiring from the fan to the fume cupboard as indicated on the drawings. Control wiring from the extract fan to the fume cupboard shall be carried out using 4.0mm² in LSOH. Wiring shall be exactly to supplier's instructions. Refer to section 62.23 for details on cabling.
- All control wiring from the extract fan to the fume cupboard shall be installed in steel conduit.
- Any other works deemed necessary for the wiring of the fan.

The fan for the fume cupboard shall be interlinked to the MVHR unit in the room so allow for control wiring between the fume cupboard extract fan and the MVHR unit. The MVHR unit shall shut down when the fume cupboard is in use. Contractor to allow for all works to enable this functionality.



62.15 Earthing and bonding

The electrical installation shall be effectively earthed and non-current carrying metalwork shall be bonded, all in accordance with I.S. 10101:2020 rules and as described below.

This shall include all conduit, metal clad equipment; fuse board, trunking, service sockets, cable sheath, steel oil tanks etc. or any metal work whatsoever adjacent to the electrical equipment. All items shall be bonded together and earthed to a main earthing terminal on the new sub-distribution electrical boards.

The objective of the system is to provide an effective system to minimise danger to life and equipment arising from:

- Faults between line conductors and non-current carrying metal work.
- Atmospheric discharges.
- Accumulation of static charges.
- The design parameters are defined within I.S. 10101:2020.
- The system requirements are as defined on the system drawing.

Bonding cables shall be run in conduit throughout the installation, terminating at the bonding point in surface or flush conduit box. Final connection shall be from a bushed outlet or outlet plate to the bonding point. Main bonding clamps shall be fitted with approved labels. The use of perforated strip is not permitted, use only proprietary bonding clamps.

62.16 Testing and commissioning

The Electrical Contractor shall test all items of equipment individually and shall commission the full installation as a unified system. All testing and commissioning shall be carried out in the presence of and to the satisfaction of the Employer's Representative. The Electrical Contractor shall give to the Employer's Representative seven days notice in writing before testing or commissioning is carried out.

62.17 CO₂ monitor

General:

The Electrical Contractor shall allow for the supply and installation of a CO₂ monitor in each of the rooms as indicated on the drawings. This shall be installed on the wall at the front of each room as indicated on the drawings.



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The single wall mounted self-contained unit shall consist of a CO₂ sensor enclosure and a LED display and all associated electronics.

The unit shall be located at the teaching wall facing the body of the classroom. The display colour will be capable of changing from Green to Amber and Red to indicate CO₂ levels, thus providing easy visual indication as well as specific readings.

The LED colour indicator should be capable of being easily identifiable from the rear of the classroom.

The system will enable the teaching space users to be aware when the desired levels are breached so that the necessary intervention via opening windows for ventilation can take place to maintain the comfort levels and air quality.

A laminated A4 size label (screwed at the four corners to the wall) incorporating clear and simple advice and instructions on how the teaching space can be operated efficiently with regard to heating, lighting and ventilation during school hours shall be located in a suitable location near the door of each teaching space.

It is paramount that all staff are provided with full user training and demonstration of these systems as part of the handover requirements.

The parameters and sensor settings should be as follows;

Carbon Dioxide (CO₂) Traffic Light Display Indicator Ranges		
Optimum Range <1500ppm		
Green	Amber	Red
<1500ppm	1500 to 2000ppm	>2000ppm

Equipment:

The Electrical Contractor shall allow for supplying and installing a CO₂ monitor in each classroom in the location as indicated on the drawings. Each CO₂ monitor shall be as Honeywell 'IAQPoint2Touch', or equivalent.



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Honeywell

IAQPoint2™ SPECIFICATIONS

Touchscreen Indoor Air Quality Monitor



Model	IAQPoint2 with CO ₂ Sensor	IAQPoint2 with VOC Sensor
Gases	CO ₂	Volatile Organic Compounds (VOC)
Detection Method	Non-dispersive Infrared (NDIR) with ABC automatic background calibration algorithm	Metal oxide semiconductor (MOS)
Range	0-2,000 ppm 0-5,000 ppm	0-100 (400-2,000 ppm CO ₂ Equivalent)
Accuracy*	±30 ppm +3% of reading @ 25°C for 0-2000 ppm; ±30 ppm +5% of reading @ 25°C from 2000 to 5000 ppm	
Response Time	T ₉₀ < 60 seconds	T ₉₀ < 60 seconds
Calibration	No Calibration Required	No Calibration Required
Temperature Sensor		
Detection Method	Band Gap	
Accuracy	±0.5°C at 25°C and 50% RH	
Humidity Sensor		
Detection Method	Capacitive Type	
Range	0-95% RH	
Accuracy	±5% at 25°C and 50% RH	
System Operation		
Temperature	32° to 122°F (0° to 50°C); 32° to 104°F (0° to 40°C) for VOC Wall mount configurations	
Humidity	0 to 95% RH, Non-condensing	
Power In	20 to 30 VAC; 16 to 28 VDC	
Consumption	200 mA @ 24 VDC	
Dimensions	3.0 (W) x 4.6 (H) x 1.5 (D) in (11.8 x 7.7 x 3.7 cm)	
Weight	.44 lbs (.20 kg)	
Enclosure	ABS	
Display	TFT, Multicolor graphical touch screen display; 1.9 (W) x 2.6 (H) in (4.9 x 6.5 cm) (Optional with Analog units)	
Languages	English, French for first release	
Outputs		
Analog	4-20 mA, 2-10 VDC fixed	
Digital	Modbus RTU, BACnet MS/TP, BTL listed, LonWorks, LonMark certified	
Relay	3 Amps, 250 VAC resistive, and 30 VDC SPDT; Field configurable set point & hysteresis	
Override	Selectable on Display Units	
Mounting Options		
Wall Mount	IP22	
Duct Mount	IP54	
Certifications		
US	ANSI/UL 61010-1	
Canada	CAN/CSA C22.2 No. 61010-1	
Europe	CE	
Warranty	1 year	





62.18 PAF plates for the data projectors

The Electrical Contractor shall allow for installing Projector Audio Faceplates (PAF's) for the installation of the data projector in each of the rooms as indicated on the drawings.

Projector Audio Faceplates (PAF's) shall be required as indicated on the drawings and suitably sized stainless-steel plates shall be provided to accommodate the various PAF outlets and shall be mounted on the wall mounted dado trunking.

All socket outlets on the PAF shall be labelled to indicate their use.

A PAF plate (PAF1) shall be mounted at low level at the teachers desk and a second ceiling mounted PAF plate (PAF2) shall be provided behind the smart TV.

The various data and signal outlets on the PAF plate (PAF2) at high level on the teaching wall shall be wired to the corresponding outlet to the low level PAF plate (PAF1) at the teachers desk.

All the wiring associated with the PAF's shall be accommodated and the Electrical Contractor shall allow for linking the PAF's for each data projector at the teaching wall in each classroom as indicated on the drawings.

The low level PAF plate (PAF-1) at the teachers desk shall incorporate the following connections:

- 1no VGA socket.
- 1no HDMI socket.
- 1no Mini stereo jack plug audio input socket.
- Faceplates shall be plastic as supplied by Nexxia, or equivalent.





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The PAF plate (PAF-2) at high level on the teaching wall shall incorporate the following connections:

- 1no VGA socket
- 1no HDMI socket.
- L&R Audio-output Phono type sockets
- Faceplates shall be plastic as supplied by Nexxia, or equivalent.



Cabling:

The Electrical Contractor shall allow for cabling to joining the PAF1 plate at low level to the PAF2 plate at high level. The cables required to connect the PAFs shall be compatible with the types of data projectors being provided in the building. Cabling shall be as follows:

- VGA sockets in the PAFs shall be interlinked using suitable VGA cables. Allow for supplying a VGA cable of 5metres length to join the two PAF plates. VGA cabling shall be as follows:
 - Black cable.
 - With two Ferrite cores
 - Double shielded
 - 3 x Coax RGB + 8 sync wires
- HDMI sockets in the PAFs shall be interlinked using suitable HDMI cabling. Allow for supplying a HDMI cable of 5metres length to join the two HDMI sockets. HDMI cabling shall be as follows:
 - Black cable.
 - Gold Plated Connectors,
 - HDMI 1.3, Category 1, Copartner, All Systems Broadband XEC.
 - HDMI Gold Digital Video Cable, 10.2 Gbps.
 - 24K gold-plated connectors assure optimal signal transfer.



- The mini stereo jack plug type input sockets shall be wired to the audio output phone sockets using suitably rated speaker cable.
 - Black cable.
 - High Quality flexible PVC cable for audio.
 - Gold plated connectors
 - Oxygen free copper cable

62.19 Key isolation switch at the Teachers Desk in the Science Room

The Electrical Contractor shall supply and install a key operated knock off button in the Science room as indicated on the drawings.

Allow for the supply and installation of key operated emergency knock-off switch type isolator in the Science room that shall isolate power to all power sockets and isolators throughout the room when activated.

The button shall have a key-operated red mushroom head that shall be mounted on a yellow control box. The switch shall have 2no positions that shall be on/off. Switches as manufactured by EAO, Saia-Burgess or equivalent.

The Electrical Contractor shall allow for all necessary contactors in the subsequent electrical board for each room as required.



The button shall adhere to the following:

- Shall be surface mounted.
- Shall have a key-operated red mushroom head that shall be mounted on a yellow control box.
- The switch shall have 2no positions that shall be on/off.
- Effortless to use "turn to release" functionality for easy reset once activated
- Chromium plated metal panel with prominent red round push button, easily alerting to the eye
- 2 NC contacts, for simple configuration



- Short-circuit protection using a 10 A cartridge fuse which conforms to EN/IEC 60947-5-1
- Conforming to several industry standards including, EN/IEC 60204-1, 60947-1, 60947-5-1 and more
- Rated NEMA 13 & NEMA 4X, providing additional protection against environmental disturbances such as dust, oil or spraying of water (primarily fit for indoor use)
- IP 65, IP 66, IP 67 & IP 69K rated
- Switches as manufactured by Schneider or equivalent.

The Electrical Contractor shall allow for all necessary contactors in the subsequent electrical board for each room as required.

62.20 Electrical emergency push buttons located throughout the Rooms

The Electrical Contractor shall supply and install a number of general emergency electrical knock-off buttons throughout the rooms as indicated on the drawings.

These buttons shall isolate power to all power sockets and isolators throughout the rooms when activated.

The button shall have a red mushroom head that shall be mounted on a yellow control box.

The Electrical Contractor shall allow for all necessary contactors in the subsequent electrical board for these buttons as required.



The button shall adhere to the following:

- Shall be surface mounted.
- Shall have a red mushroom head that shall be mounted on a yellow control box.



- Effortless to use "turn to release" functionality for easy reset once activated
- Chromium plated metal panel with prominent red round push button, easily alerting to the eye
- 2 NC contacts, for simple configuration
- Short-circuit protection using a 10 A cartridge fuse which conforms to EN/IEC 60947-5-1
- Conforming to several industry standards including, EN/IEC 60204-1, 60947-1, 60947-5-1 and more
- Rated NEMA 13 & NEMA 4X, providing additional protection against environmental disturbances such as dust, oil or spraying of water (primarily fit for indoor use)
- IP 65, IP 66, IP 67 & IP 69K rated
- Switches as manufactured by Schneider or equivalent.

The Electrical Contractor shall allow for all necessary contactors in the subsequent electrical board for each room as required.

62.21 Modifications to the existing main electrical board

The Electrical Contractor shall allow for all works, attendances, etc. in modifying the existing main distribution electrical board in order to install the new MCCB's and RCBO's for the new electrical items.

The Electrical Contractor shall allow for modifying the existing electrical board for the following:

- A new three-phase 63amp MCCB for each of the new sub-distribution electrical board for each Science Room.

The Electrical Contractor shall allow for all works in modifying the existing main electrical board in order to supply these items.

The Electrical Contractor shall allow for the supply and installation of the new MCCB's and RCBO's as highlighted above and shall allow for all works in installing this items in the existing electrical board. Refer to section 62.03 for details on the MCCB's and RCBO's.

The Contractor shall carry out a detailed survey of the existing electrical board once appointed.

62.22 Load test on the existing main electrical board

The Electrical Contractor shall allow for carrying out a load test on the existing main distribution electrical board to see what electrical load the board is pulling.



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For this load test, the Electrical Contractor shall measure the total load per phase by means of load monitor for one week continuous.



63.0 LIGHTING SERVICES

63.01 Decommissioning the existing lighting installation in the room

The Electrical Contractor shall allow for the decommissioning and removal of the existing lighting installation throughout the room (apart from the areas as indicated on the drawings). This includes all light fittings, cabling, light switches, controls, etc. throughout the building. Refer to the drawings for further information.

A new lighting services installation shall be installed throughout the building as indicated on the drawings.

63.02 New light fittings and lighting installation in the Science Room

General:

The Electrical Contractor shall, install, connect, test and commission the whole of the new lighting installation in the room as shown on the drawings and as described in the specification.

See the drawings for the locations internally and externally where new lighting is to be installed. This includes all light fittings, cabling, cable containment, controls, etc.

The type of luminaire required for each location is specified in the appropriate schedules. The new light fittings in the Science Room shall be fed from the new electrical board in the science room store as indicated on the drawings. The exact location of each luminaire shall be determined on site in consultation with the Employer's Representative.

The circuit shall be arranged for a loop-in system of wiring. Circuit arrangement shall be based on a maximum of 1kW per circuit. Circuit protection shall be by means of 10A MCB only.

Switching arrangements shall be as indicated on the drawing.

The Electrical Contractor shall allow for the supply and installation of all new light fittings as indicated on the drawings. All the new light fittings for the project shall be supplied and installed by the Electrical Contractor.



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The Electrical Contractor shall allow for the supply, installation, cabling and commissioning of all the light fittings listed below. The type of luminaire required for each location is specified in the schedule below.

The Electrical Contractor shall install these luminaires in the locations as shown on the drawings. The exact location of each luminaire shall be determined on site in consultation with the Employer's Representative.

The proposed schedule of light fittings for the project is as highlighted below.

Samples:

The Electrical Contractor shall ensure that all the luminaires required for the project are placed on order in due time to ensure delivery to suit the project construction programme. However, approval of the Employer's Representative shall be obtained for final selection of the luminaires before the orders are placed.

A sample of each luminaire shall be erected on site in a suitable location for inspection by the Employer's Representative for this purpose.

The Electrical Contractor shall allow for providing a sample of each proposed light fitting on site so that the Design Team can approve all light fittings prior to ordering. The Electrical Contractor shall allow for factoring the cost of providing samples of the light fittings into his tender costs.

Wiring:

Refer to section 62.06 for details on the cabling and wiring required.

All final sub-circuit cables for lighting installations shall be single core low smoke and zero halogen (LSZH) insulated type cable.

All final circuit wiring for lighting shall be completely enclosed in surface-mounted conduit or in dedicated mains only trunking system.

Cable sizes shall be as follows:

- Lighting final circuits (1kW max load): 2.5mm²/2.5mm² CPC
- Emergency light fittings: 2.5mm²/2.5mm² CPC

Cable Carrier:

Refer to section 62.05 for further information on cable containment. All new cabling for the new lighting installation shall be installed in a steel conduit/trunking system.



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Schedule of light fittings to be provided by the Contractor:

See drawings for quantities and locations of all light fittings. All light fittings shall be supplied by Thorn Lighting, or equivalent.

<u>New light fittings</u>	
Type	Description
A  600mm x 600mm recessed LED light fitting	A high performance 600mm x 600mm square light fitting that shall be recessed and inset into the new suspended ceiling: <u>Light source:</u> LED <u>Output:</u> 36watt <u>Body:</u> White sheet steel <u>Diffuser:</u> UV Stabilised polymethylmethacrylate <u>Colour:</u> White <u>Dimensions:</u> 597mm x 597mm x 55mm <u>Luminous flux:</u> 4250lm <u>Lifetime:</u> 50,000hrs L90 at 25°C <u>Dimming:</u> Yes <u>High frequency:</u> Yes <u>Lamp Efficacy:</u> 118 lm/W <u>Colour temp:</u> 4000k <u>IP rating:</u> IP20 <u>Weight:</u> 5.05kg <u>CE Marked:</u> Yes <u>Warranty:</u> 5 years on all components Light fitting shall be as Thorn Omega Pro 2' 4440-840 OP HF Q600 (or equivalent).



63.03 New lighting switches in the rooms

General:

The Electrical Contractor shall allow for the supply and installation of new light switches for the new lighting installation in the rooms as indicated on the drawings.

All new light switches to be installed the Science Room shall be 'Push-to-Make' retractive light switches. Refer to drawings for types, locations and quantities.

Standalone momentary (Push-To-Make) retractive light switches:

The lighting in the rooms shall be operated via daylight dimming and absence detection.

As a result, the lighting in these rooms will require momentary (push-to-make) retractive light switches to operate the lighting in these rooms.

All new new light switches shall be 'Push-to-Make' retractive light switches and shall be standalone. Refer to the drawings for quantities and locations of all momentary (push-to-make) retractive light switches required in the rooms.

All standalone momentary (push-to-make) retractive light switches shall be surface mounted.

Standalone momentary (push-to-make) retractive light switches shall be from MK Albany Plus range, or equivalent, and shall have a brushed stainless steel finish. Include for suitable cover plate, grid and surface mounted back box. Mounting boxes to be supplied without knock outs.

The Electrical Contractor shall allow for the following from the MK Albany Plus range, or equivalent for each standalone momentary (push-to-make) retractive light switch:

- Brushed stainless steel cover plate as K3431BSS for one gang or K3432BSS for two gang, or equivalent.
- Surface mounted back box in metalclad grey as K829ALM, or equivalent. Back box to suit light switch.
- Single pole two-way push switch with 'Press' printed on the switch. The switch shall be finished in white as K4885PWHI, or equivalent.

Lighting switches shall be provided and ganged as indicated on the drawings and shall be either 1-way, 2-way or intermediate as indicated. Switches for internal use shall be of the 15/20 Amp inductive rating grid switch type.



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Mounting heights and cable containment for all light switches:

All new lighting switches to be installed, unless stated otherwise, shall be surface mounted, this includes all standalone light switches on dado trunking and standalone light switches.. All lighting switches, unless stated otherwise, shall be located 1200mm (to the top of the light switch) generally above finished floor level.

All new cabling to the light switches shall be installed in surface mounted steel conduit. All conduit supplies to the back box for all the surface mounted light switches shall be surface mounted on the wall so ensure for a neat installation.

Refer to section 62.05 below for further information on the conduit and cable containment required.

Wiring:

Refer to section 62.06 for further information on cabling required for the lighting installation.



63.04 New lighting controls for the rooms

Science Room

General:

Automatic lighting controls shall be installed for the Science Room as indicated on the drawings. The controls shall incorporate 3no control elements:

- Manual On/Off control
- Automatic daylight dimming
- Absence Control

The lighting controls in the Science Room shall be based on manual on/off switching, daylight sensing to dim lights as required to "Off" in response to the changes in daylight levels and absence detection to turn off lights.

A momentary action (bell push) rocker type switch shall be installed in the Science Room for the lighting circuits in these rooms (see drawings for quantities).

Absence detection shall be set up so that the sensor in each room will require the lighting 'push-to-make' light switch to turn the lights on and will time out when the area is left unoccupied and will need re-activation again by the light switch. In rooms (where possible), lighting control shall be set up such that all light fittings are linked to just one detector in each room such that all lights respond in the same manner to the automatic control signals.

A remote daylight dimming/PIR sensor shall be supplied for all the light fittings in each of these rooms and this sensor shall be linked to the light fittings in the room for lighting control.

Allow for the necessary control wiring between the light fittings and the relevant sensor in each area/room.

Operation of lighting system in these rooms:

- The user will enter the room and to press the 'push-to-make' rocker switch to bring the lights on. The lights shall then turn on to the required light level only if the detectors sense that the room is occupied AND the photocell senses that there is an inadequate lighting level in the room.
- The lights will remain on while the room is occupied. There is no time limit to this.
- Once the room is vacated, the system will time out and switch the lights off. This timeout period shall be set to 15 minutes.



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- If the room is entered before the lights have timed out, the system will reset and stay on until once again the room is vacated.
- If the room is entered after the lights have timed out, the user will have to press the 'push-to-make' rocker switch to bring the lights back on.

The daylight level sensors shall be programmed as follows:

- The average working plane illumination levels in these rooms shall be 500lux. This lux level shall be constantly maintained.
- The sensor shall adjust the illumination levels of the lights / row of lights connected as required.
- Where day light levels are above the required illumination levels, the light fittings shall not operate. The lighting levels are as follows:
 - If the light level is above the required lux level then the lights/rows of lights will turn off.
 - If the light levels above are achieved, then the light/row of lights will turn off.
 - If the light level is below 100 lux below the required levels, then the light/row of lights will turn on.
 - The light level hysteresis should be set to five minutes to prevent short cycling.

Remote daylight dimming/absence detector for these rooms:

The Contractor shall allow for the supply and installation of a remote motion sensor to control the light fittings in these rooms as indicated on the drawings. All detectors shall be as follows or equivalent:

- *Type:* Thorn SENSE MRE DDP, or equivalent
- *Colour:* White
- *Mounting:* Recessed into the ceiling or surface mounted
- *Detection range:* 360°
- *Cover:* 7 meters at 2.8m
- *Voltage:* 230V AC
- *Detection:* Infrared detection

See drawings for quantities and locations.



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Wiring & Control Wiring:

See detail on drawings for control wiring and mains wiring for lighting controls.

The Electrical Contractor shall include for the following wiring and control cabling:

- All new mains wiring from the new electrical boards in the Science rooms to all the new light fittings in the Science Room as indicated on the drawings. Refer to 62.06 for information on cabling. The Electrical Contractor shall allow for all attendances in completing these works.
- For the rooms where there is absence detection and daylight dimming to be installed, the Electrical Contractor shall allow for the wiring as per detail on the drawings so refer to that. The Contractor shall include for all mains power supply cabling to the new light fittings in these rooms in 3-core 2.5mm² LSZH cable as indicated. The Electrical Contractor shall also include for 3-core 2.5mm² LSZH low voltage cabling from the sensor to all the light fittings in that room.
- Allow for the supply and installation of all retractive 'Push-To-Make' light switches for each room that these switches are required for as indicated on the drawings. Refer to 'Section 63.02' above for details on the light switches. Retractive 'Push-To-Make' light switches shall be installed for all rooms and areas that require daylight dimming and absence detection.
- All associated cabling. Refer to section 62.06 for specific details on the cabling required for the lighting system.
- All associated cable containment. Refer to section 62.05 for specific details on the cabling required for the lighting system.

The Electrical Contractor shall ensure that the lighting control system selected is compatible with the luminaires selected. This shall include liaising with the



lighting control specialist prior to 1st fix, to ensure the light sensor is located in the optimum location within each room.

Commissioning:

The Electrical Contractor shall allow for the testing and commissioning of the lighting systems for the Science rooms to ensure all lighting control parameters are achieved. The Electrical Contractor shall allow for a full day of commissioning on site to set all light levels and times for the lighting controls in the Science rooms of the building.

The lighting system in the Science rooms of the building shall be commissioned, tested, and demonstrated to the Design team and the client.

A testing and commissioning cert for the lighting controls, stating that each and every area has been commissioned to the above parameters shall be provided to the Consultant Engineer prior to handing over the building.

A testing and commissioning cert for the lighting controls, stating that each and every area has been commissioned to the above parameters shall be provided to the Consultant Engineer prior to handing over the building.

63.05 Cable carrier system for lighting installation

New cable containment i.e. trunking, tray, conduits, etc. shall be installed throughout the rooms for all the necessary cabling to new light fittings and light switches.

All new lighting in the Science Room shall be supplied and wired from the new electrical boards in each of the Science room. Refer to the drawing for further information.

Refer to section 62.05 for further information on the cable carrier system required.

63.06 Decommissioning of the existing emergency lighting installation throughout the Science Room

The Electrical Contractor shall allow for the decommissioning and removal of the existing emergency lighting installation throughout the Science Room as indicated on the drawings. This includes all emergency light fittings, cabling, light switches, controls, etc. throughout the building. Refer to the drawings for further information.



A new emergency lighting installation shall be installed throughout the building as indicated on the drawings.

63.07 New emergency lighting in the rooms

General:

The Electrical Contractor shall supply, install, connect, test and commission a fully comprehensive operational emergency/escape lighting systems installation throughout the rooms as indicated on the drawings.

The emergency lighting installation shall be installed in conjunction with the fire alarm system. All emergency light fittings shall be supplied, tested and commissioned by the Electrical Contractor.

The objective of the system is to provide an efficient and effective emergency lighting system meeting the requirements of IS 3217:2023.

The emergency lighting shall consist of standalone and integrated maintained luminaires and exit signs, as indicated on the system drawings. In the event of circuit power failure the emergency fitting or exit sign shall illuminate for a period of 3 hours.

The Electrical Contractor shall supply and install the emergency lighting system and emergency light fittings in compliance with IS 3217:2023, BS EN 50172 and IEC 62034.

All emergency light fittings for this building shall be EMC compliant, CE Marked and manufactured to IS EN60598-2-22.

The emergency lighting system shall operate for a period not less than 3 hours following failure of the normal supply.

The system shall include all emergency lights and exit signs, and the Electrical Contractor shall take responsibility to ensure that all emergency luminaires are compatible with the chosen system.

Each emergency luminaire shall have a switching unit which shall automatically switch the luminaire to the emergency circuit in the event of local or mains power failure. The installation shall consist of self-contained maintained emergency exit signs with appropriate running man symbol.

Types of luminaires required for the various locations are shown on the drawings and described in the below. The Contractor shall ensure that the luminaires are placed on order to suit the installation programme. However, approval of the Engineer shall be obtained before placing orders.



Containment

A new cable carrier shall be installed for the new cabling for the emergency lighting installation in the rooms. A system of galvanised steel cable trunking shall be installed to distribute the new lighting cabling throughout the building.

See section 62.05 above and drawing for further information on containment required for new cabling for the emergency lighting system.

New Electrical Boards:

All the new emergency light fittings for the Science Room shall be wired on the same circuits as the new general lighting in the room as indicated on the drawings.

This ensures that the emergency lights will protect not just against a general power cut, but also against the failure of a lighting circuit. If it desired to switch the normal lighting by a contactor; then this is done by the use of suitable multi pole contactors controlled as desired.

The emergency lighting should be connected before the contactors, such that opening of the contactor won't discharge the batteries.

Emergency Lighting Test Units:

The new electrical boards that is to be installed for the Science Room shall be provided with an emergency lighting test unit. An emergency lighting test unit shall be provided in the new electrical boards to be supplied and installed in the Science rooms as indicated on the drawings.

All test units shall be complete with interface units on the lighting MCB board as necessary. Power to each central test unit shall be in 3 x 2.5 mm² cables in conduit from a separate circuit on the lighting MCB board.

The emergency lighting test unit shall have the following functions:

- Shall have a timer.
- Shall have pre-set test durations for selection.
- Shall have indicators for 'Test', 'Complete' and 'Elapsed Time'.
- Shall have automatic restoration of mains power.

Facility shall be provided for periodic testing of the emergency lighting luminaires without having to switch off the relevant circuit.



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Emergency luminaires shall generally be suitable for 3-hour duration. The recharge period for the batteries after full discharge shall not exceed 24 hours.

A full discharge/recharge test must be performed for every luminaire during commissioning procedures. Each emergency luminaire shall have a switching unit which shall automatically switch the luminaire to the emergency circuit in the event of local or mains power failure. The emergency lighting system shall operate for a period not less than 3 hours following failure of the normal supply.

Supplies to emergency sections of signs shall be taken from the interface unit on the lighting MCB board fed from the MCB controlling the adjacent lighting circuit. Also, where sustained, a switched supply, taken from the same circuit, shall be run to the sustained section of the fitting together with a permanent supply. The switch for the sustained fittings shall be mounted with the nearby light switch.

Emergency Luminaires

The Electrical Contractor shall supply, test and commission all the emergency light fittings throughout the Science Room. Refer to schedule below for further information on all emergency light fittings to be supplied and installed. The Electrical Contractor shall ensure that all emergency luminaires (maintained and non-maintained as appropriate) shall be compatible with the emergency lighting test system.

All emergency light fittings shall be designed and manufactured to meet the requirements of EN60598-2-22 and all applicable EU standards. All emergency light fittings shall also be EMC compliant and CE Marked.

Emergency lighting luminaires shall be mounted at least 2000mm from the finished floor level. Emergency lighting safety signs shall be positioned between 2000mm and 3000mm above finished floor level (measured to the base of the sign).

See 'Schedule of Emergency Light Fittings' below for information on all type, models and makes of emergency light fittings required for the installation.

LED emergency exit signs & control modules

LED Emergency Exit Signs shall be used in conjunction with remote Control Modules. The LED sign shall utilise a strip of LEDs

Cabling

The Electrical Contractor shall allow for new cabling for the new emergency lighting system throughout the rooms.



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New cabling shall be supplied and installed from the new electrical boards in the Science Rooms. All new cabling for the emergency lighting shall be wired from the new MCB's in the new electrical boards in the Science rooms.

All cable carrying mains voltage for emergency lighting services shall be LSZH. Wiring to all emergency light fitting shall be cabled in 3 x 2.5mm² LSZH which is installed in conduit. Wiring to exit signs shall also be installed in 3 x 2.5mm² LSZH in conduit to a surface outlet box over which the fitting shall be mounted.

All cabling shall low smoke and zero halogen (LSZH) insulated type, flame retardant to BS 4066, with stranded copper conductors, thermosetting insulation type E1.5 to BS 7655 all complying with BS 7211. All cabling shall be LSZH sheathed cable.

Refer to section 62.05 for further information on cable containment and refer to section 62.06 for further information on cabling.

All the new emergency light fittings shall be wired on the same circuits as the new general lighting in the rooms as indicated on the drawings. This ensures that the emergency lights will protect not just against a general power cut, but also against the failure of a lighting circuit.

If it desired to switch the normal lighting by a contactor; then this is done by the use of suitable multi pole contactors controlled as desired. The emergency lighting should be connected before the contactors, such that opening of the contactor won't discharge the batteries.

Containment

A new cable carrier shall be installed for the new cabling for the emergency lighting installation in the rooms.

A system of galvanised steel cable trunking shall be installed to distribute the new lighting cabling throughout the rooms. See section 62.05 above and drawing for further information on containment required.

All new conduits below ceiling level shall be surface mounted throughout the building.

Commissioning

The Electrical Contractor shall make allowance for the specialist manufacturer to commission the emergency lighting system in the rooms in accordance with the manufacturer's recommendations.



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The Electrical Contractor shall allow for fully testing and commissioning the emergency lighting system throughout the rooms in full compliance with IS 3217:2023.

The Electrical Contractor shall allow for the following during the commissioning for the emergency lighting system for the rooms:

- Carry out a full test on the emergency lighting system in each room. A full discharge/recharge test must be performed for every luminaire during commissioning procedures.
- The test shall be carried out at night time when it is fully dark to see the effectiveness of the emergency lighting system in the rooms. Results shall be recorded and any discrepancies highlighted.
- The Electrical Contractor shall allow for the witnessing of the emergency lighting system by the Engineer in the rooms.
- Check all emergency light fittings in the rooms to ensure all lamps and LED indicators are operational.
- Verify sub-circuit monitoring in the building.
- Simulate power failure to each area in the building.
- Verify maximum 24-hour recharge. The recharge period for the batteries after full discharge shall not exceed 24 hours.
- Carry out a second full duration test in the rooms after the 24-hour recharge has elapsed.

Lux level check:

The Electrical Contractor shall allow for carrying out a test on the emergency lighting system in the rooms at night time to ensure that all lux levels are being achieved. The test shall be carried out at night time when it is fully dark to see the effectiveness of the emergency lighting system in the rooms. Results shall be recorded and any discrepancies highlighted.

After the test is completed, the Electrical Contractor shall confirm that the light levels are compliant with I.S. 3217:2023 and if not, what areas are not compliant. The Electrical Contractor shall allow for the cost of labour for carrying this test outside of normal working hours.

The Electrical Contractor shall mark on a drawing the lux levels that is being achieved by the emergency lighting throughout the rooms.

Labelling:

The Electrical Contractor shall allow for labelling, numbering and identifying all the new emergency light fittings in the rooms. All fittings shall be adequately labelled with a dedicated ID number via a small adhesive sticker to identify fitting number and where it is wired from.



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For example, if an emergency light fitting is wired from the new sub-distribution electrical board NSDB-01, it should be labelled; NSDB.01-EL-01 and NSDB.01-EL-02 for the second fitting and so on. The unique label shall be highlighted on the record drawing as highlighted below. The Electrical Contractor shall mark on a drawing the lux levels that is being achieved by the emergency lighting throughout the building.

Certificates:

When the system is commissioned and handed over to the Client, in compliance with I.S. 3217:2023, the Contractor shall provide the following certificates for the emergency lighting system for the rooms:

- Certificate of Installation as highlighted in I.S. 3217:2023.
- Certificate of Commissioning as highlighted in I.S. 3217:2023.
- Certificate of Handover as highlighted in I.S. 3217:2023.

Warranties on emergency light fittings:

All emergency light fitting shall have a 6-year warranty as a minimum. This warranty shall include battery replacement within the 6-year warranty period.

Schedule of emergency light fittings:

The Electrical Contractor shall allow for supplying and installing the emergency light fittings listed below for the emergency lighting installation in the rooms.

All emergency light fittings shall be EMC compliant, CE Marked and manufactured to IS EN60598-2-22. See drawings for locations and quantities.



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Emergency light fittings shall be as follows:

<u>Type</u>	<u>Description</u>
E1  Single-sided wall mounting emergency exit sign	New emergency exit light fitting with 3hr <u>maintained</u> emergency operation c/w status indicator. Refer to drawing for directional arrows required. Light fitting shall adhere to the following: • Wall mounted. • Single sided screen-printed legend panel in appropriate European signs directive format pictogram. • Body - flame retardant ABS. • Panel - flame retardant acrylic • Legend - flame retardant PVC • Batteries(self-contained)-3.2V 3.2A/h LiFePO4 • Lamp Colour – 5700K • IP40. • Finish shall be white (RAL 9016) • 1 watt LED in total. • Built-in downlighter (70 lumens) • Three-hour maintained. • Weight is 1.06Kg • 6-year warranty including battery • The light fitting shall conform to the current BS ISO 3864-1 & ISO 7010 S standards. • CE marked The proposed lighting fitting is <u>Ventilux Atlantic EB</u> (or equivalent).



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<u>Type</u>	<u>Description</u>
E2  Recessed mounted fitting with 'Open Plan' lens	New standalone recessed mounted LED emergency light downlighter (<u>Open Area Version</u>). Fitting shall be a high performance LED light fitting. Light fitting shall be a <u>non-maintained</u> emergency operation c/w status indicator. Light fitting shall adhere to the following: • Recessed into the existing suspended ceiling. • Shall be for open area and therefore supplied with the <u>open plan lens</u> (symmetrical light pattern). • Supplied with remote battery pack • Non-maintained • Dimensions of fitting is 80mm diameter by 38mm high. • Lamp power - 3 watt • Lamp colour - 6000K. • Weight is 0.5Kg. • 230 lumens in emergency • Lamp head material is spun aluminium. • Remote pack material is flame retardant ABS • Batteries (self-contained) - 6.4V, 3.2Ah LiFePO4 • Non-Maintained 3 hour duration • Class II. • IP40 • Colour shall be white RAL 9016 • Status indicator to indicate operational condition. • 6-year warranty. • CE marked. • Fitting shall conform to the EN 61347-2-7, EN 61347-2-13, EN 60598-2-22 and EN 55015 standards. The proposed lighting fitting is <u>Ventilux Halo Plus (Open Plan)</u> (or equivalent).



63.08 Cabling, wiring and cable sizes

Refer to section 62.06 for information on cabling.

63.09 Testing & Commissioning

The Electrical Contractor shall test all items of equipment individually and shall commission the full installation as a unified system. All testing and commissioning shall be carried out in the presence of and to the satisfaction of the Employer's Representative. The Electrical Contractor shall give to the Employer's Representative seven days notice in writing before testing or commissioning is carried out. All tests shall be carried out in accordance with IEE Recommendations, relevant British and Irish Standards or IEC Publication.



64.0 COMMUNICATION SERVICES

64.01 Decommissioning and removal of the existing ICT system in the rooms

The Electrical Contractor shall allow for the decommissioning and removal of the existing data points throughout the Science Room as indicated on the drawings). This includes all data points, cabling, outlets, etc. throughout the rooms. Refer to the drawings for further information.

New data points shall be installed throughout the rooms as indicated on the drawings.

64.02 New IT points

General:

The Contractor shall allow for supplying and installation new data points in the Science Room as indicated on the drawings.

All new IT points shall be cabled in CAT6a cabling and shall be cabled and connected to the existing comms cabinet in the building.

All cabling for the data points as indicated shall be CAT 6A UTP (unshielded twisted pair) horizontal cabling 1071. Allow for cabling to all IT points as highlighted from the associated comms cabinets and punching down at both ends.

The contractor shall price for 100 meters of cable for each IT point installed in the Science room.

The Electrical Contractor shall allow for the supply and installation of all face plates, RJ45 outlets, back boxes, etc. for all the IT points as indicated on the drawings. See drawings for quantities of data/IT points required in the rooms.

The entire installation shall be carried out by a data specialist Contractor. The specialist Contractor shall be fully trained and certified to install the specified product and fully authorised to issue a warranty certificate.

For remote IT points (i.e. IT points that are not mounted on dado trunking) these IT points shall have a brushed stainless steel or metalclad finish to match the finish on the double sockets. For these IT points include for the faceplate, suitable surface mounted back box, surface mounted conduit drop and RJ45 outlet. Refer to section 62.08 for further information.



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In some instances, the IT points shall be installed in 3-compartment trunking, provide for 35mm deep back boxes and RJ 45 outlets for all IT points as indicated on the drawings.

For IT points mounted on the dado trunking, these IT points shall be finished in a grey colour to match the colour of the sockets that will be installed on the dado trunking. For these IT points include for the faceplate, suitable back box for recessing into the dado trunking and RJ45 outlet. Refer to section 62.09 for further information.

The Contractor shall allow for the following:

- The supply, installation, testing, commissioning of all new data points in the Science room. Refer to drawings for quantities and locations. All new data points shall be cabled in CAT6a cable.
- Supply and installation of necessary face plates, RJ45 outlets, etc. for all the new data points.
- The punch down at each end of each of the CAT 6A cable for the data point.
- Wiring back all new data points in the Science Room back to this existing comms cabinet
- Terminating all new data points into the existing comms cabinet in the building.
- All associated labour
- All associated testing, labelling and Certification
- All other items of equipment deemed necessary to complete the installation as specified

Existing comms cabinet:

All new data points that are to be installed in the Science Room shall be wired from and connected to the main comms cabinet for the building.

The Electrical Contractor shall allow for all attendances in wiring back all new data points in the Science Room back to this existing comms cabinet and terminating them into the cabinet.

Cabling:

All cabling for the data points as indicated shall be CAT 6A UTP (unshielded twisted pair) horizontal cabling 1071. Allow for cabling to all IT points as highlighted from the comms cabinet and punching down at both ends.

Allow for a cable length of 100metres for each data cable.



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IT Face plates and points:

The Electrical Contractor shall allow for the supply and installation of all face plates, RJ45 outlets, back boxes, etc. for all the IT points as indicated on the drawings. See drawings for quantities of data/IT points required in the rooms.

The entire installation shall be carried out by a data specialist Contractor. The specialist Contractor shall be fully trained and certified to install the specified product and fully authorised to issue a warranty certificate.

For remote IT points (i.e. IT points that are not mounted on dado trunking) these IT points shall have a brushed stainless steel or metal clad finish to match the finish on the double sockets. For these IT points include for the faceplate, suitable surface mounted back box, surface mounted conduit drop and RJ45 outlet. Refer to section 62.08 for further information.

In some instances, the IT points shall be installed in 3-compartment trunking, provide for 35mm deep back boxes and RJ 45 outlets for all IT points as indicated on the drawings.

For IT points mounted on the dado trunking, these IT points shall be finished in a grey colour to match the colour of the sockets that will be installed on the dado trunking. For these IT points include for the faceplate, suitable back box for recessing into the dado trunking and RJ45 outlet. Refer to section 62.13 for further information.

Punch-down and testing:

The specialist IT structured wiring contractor shall be responsible for punch down at each end of each data cable, together with testing and commissioning to current requirements and for warranty purposes. All cables shall be 100% continuity tested with results recorded on disc in Excel format.

All circuits shall be tested with an approval proprietary tester and all results shall be recorded in tabular form for the client.

The installation shall be fully tested (i.e. 100% of all cables) to comply with the requirements to support 1000BASE-T to 100m and comply with IEEE 802, TIA 568-B Category 6A ISO/IEC 11801 Class E and EN 50173. Fibre Optic cables shall be 100% tested @ 850nm and 1300nm.

Level III test instruments shall be used and all test results recorded on disc and included in the hand-over documents.

Cables that fail the test must be replaced. The engineer reserves the right witness all of the testing.



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Cable identification and labelling:

All labeling shall conform to good labeling and identification standards. The specialist contractor shall be responsible for labeling at both the user and communications cabinets locations to an agreed labeling system in all UTP / Multicore / Fibre installation. Hand written labels will not be acceptable.

Cable Carrier:

A new cable carrier shall be installed for the new data cabling installation in the building.

A system of galvanised steel cable tray shall be installed to distribute the data cabling throughout the building as indicated on the drawings. Refer to section 62.06 above below for further information on cable containment.

All new data cables and distribution shall be installed in a steel conduit/tray system. All data cables on trays above the ceiling shall be securely clipped to the tray via clips.

64.03 PA speakers

The existing PA speakers in the rooms shall be retained.

65.0 RESERVED

66.0 TRANSPORT SERVICES

Non applicable.

67.0 RESERVED



68.0 SECURITY AND PROTECTION

68.01 Decommissioning the existing fire alarm installation in the rooms

The existing fire alarm system throughout the room shall be thoroughly decommissioned and removed from site. This includes all associated cabling, devices, panels, etc. This existing fire alarm installation in the rooms shall be replaced with a new fire alarm installation as described in section 68.02 below.

68.02 New fire alarm installation and devices for the rooms

General:

As indicated above in 68.01, the existing fire alarm system throughout the Science Room shall be decommissioned and replaced with a new fire alarm installation throughout the rooms.

The Contractor shall allow for the supply, installation and commissioning of a new fire alarm installation for the rooms as indicated on the drawings. The new fire alarm installation shall be installed and commissioned in compliance with I.S. 3218:2024.

Connecting to the existing fire alarm system in the building:

The Contractor shall allow for wiring and connecting the new fire alarm devices for the rooms to the existing fire alarm loop in the room. There is existing fire alarm cabling from the existing fire alarm system in the room and this cabling shall be extended to cater for the new fire alarm devices to be installed in the rooms.

Smoke detectors:

The Contractor shall allow for the supply and installation of all smoke detectors throughout the rooms as indicated on the drawing. All new detector heads shall include a condition indicating LED light and the smoke detectors sensors shall be complete with bases. The Contractor shall supply necessary address flags and address labels for all devices.

All new automatic fire detectors shall generally be of the optical smoke detectors type. These detectors shall have an address code setting and shall be addressable and suitable for an addressable fire alarm system. Separate addressable plugs for each detector shall be provided.



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The Contractor shall label each detector and base with address number. The colour of detectors shall be white.

Detectors to be of the optical point type unless otherwise indicated on the drawings and shall be in accordance with B.S. 5446-1, I.S. EN 54-7 and I.S. 3218:2024.

Sensitivity of the smoke detectors shall be set by the main panel control software. Wiring used for detectors shall be in compliance with I.S. 3218:2024.

Smoke detectors shall adhere to the following specifications:

- Type: Addressable optical smoke detector
- Sensor Method: Light Scatter
- Sensor Element: IR Diode
- Conditioning light: Yes
- Operating Voltage: 20V d.c. to 35V d.c.
- System Voltage: 35V d.c.
- Quiescent Current: 200µA
- Alarm Current: 5mA
- Operating Temp: -10°C to + 55°C
- Storage Temp: -20°C to + 60°C
- Charging Time: 4 minutes
- Relative Humidity <RH95% non-condensing.
- I.P. Rating: IP40
- Addressing Method: Soft addressing, Non-Volatile EEPROM.
- Material: ABS
- EMC Conformance: EMC conformance to BSEN50130-4.
- CE Conformity: Yes
- Certification: EN54-7 / LPCB 041, BS 5446-1, IS EN 54-7.





Combined smoke detectors and sounders:

A number of new sounders shall be combined with smoke detectors as indicated on the drawings. The Contractor shall allow for the supply and installation of all new addressable combined smoke detector and sounder heads throughout the building.

Each head shall include a condition indicating LED light and a suitable base for the sounder. All new detector heads shall include a condition indicating LED light and the smoke detectors sensors shall be complete with bases.

See 'smoke detectors' section above for specification on smoke detectors.

The Contractor shall supply necessary address flags and address labels for all devices. Wiring used for detectors shall be in compliance with I.S. 3218:2024.

Combined smoke detectors and sounders shall adhere to the following specifications:

- Type: Addressable optical smoke detector and sounder
- Sounder Base: Yes
- Sound output: 96dB(A) at 1metre
- Sensor Method: Light Scatter
- Sensor Element: IR Diode
- Conditioning light: Yes
- Operating Voltage: 20V d.c. to 35V d.c.
- System Voltage: 35V d.c.
- Quiescent Current: 200µA
- Alarm Current: 5mA
- Operating Temp: -10°C to + 55°C
- Storage Temp: -20°C to + 60°C
- Charging Time: 4 minutes
- Relative Humidity: <RH95% non-condensing.
- I.P. Rating: IP40
- Addressing Method: Soft addressing, Non-Volatile EEPROM.
- Material: ABS
- EMC Conformance: EMC conformance to BSEN50130-4.
- CE Conformity: Yes
- Certification: EN54-7 / LPCB 041, BS 5446-1, IS EN 54-7, BSEN50130-4, EN54-7, EN54-2 and EN54-17.



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Void Detectors:

New void detectors shall be installed in the ceiling void in the building to protect the ceiling void as indicated on the drawings.

Smoke or heat detectors above the ceiling shall be complete with a remote monitoring indicating LED. The remote monitoring LED indicator lamp shall be installed below the ceiling so that users of the building will know if the void detector above the ceiling is in alarm.

Allow for installing detectors in the ceiling spaces and subsequent LED indicators in the ceiling below the detector.

See 'smoke detectors' section above for specification on smoke detectors. The Contractor shall supply necessary address flags and address labels for all devices.

Wiring used for detectors shall be in compliance with I.S. 3218:2024.



Manual Call points (break-glass units):

The Contractor shall allow for the supply and installation of all new manual call points in the rooms as indicated on the drawing.

Manual call points shall be surface mounted as indicated on the drawings. All points to be fully resettable type via key operation. Break glass units will not be accepted as all manual call points shall be PVC. All call points shall be supplied c/w surface mounting back box to suit.

Call points to be installed 1100mm from the finished floor level and 150mm from doorframes.



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Wiring used for manual call points shall be in compliance with I.S. 3218:2024.

Manual call points shall adhere to the following specifications:

- Type: Addressable manual call point
- Operating Method: Non Frangible, Resettable
- Operating Element: Microswitch
- Conditioning light: Yes
- Operating Voltage: 20V d.c. to 35V d.c.
- System Voltage: 35V d.c.
- Quiescent Current: 200µA
- Alarm Current: 2mA
- Operating Temp: -25°C to + 70°C
- Storage Temp: -25°C to + 70°C
- Charging Time: 1 minute
- Relative Humidity <RH95% non-condensing.
- I.P. Rating: IP24
- Addressing Method: 8 Way DIL switch
- Material: POM / Polycarbonate
- EMC Conformance: EMC conformance to BSEN50130-4.
- CE Conformity: EN54-11 & EN54-17 54-7.



General fire alarm interface units (I/O units):

The Contractor shall allow for the supply and installation of all standard fire alarm interface units as indicated on the drawing and for the linking of these to the relevant systems as indicated. Interface units (Input/Output models) shall be provided as indicated on the system drawings.

Short circuit isolators shall be installed where the loop wiring crossed a fire compartment wall and where the wiring enters another fire zone.

In addition to the items above, the following items shall be connected and interfaced to the fire alarm system and as a result interface I/O units will be required at all equipment:



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- Gas pressure proving panel
- Any other items described on the drawings.



Wiring/Cabling:

All new cabling used for the fire alarm system throughout the rooms shall meet classification 'PH120 Enhanced'.

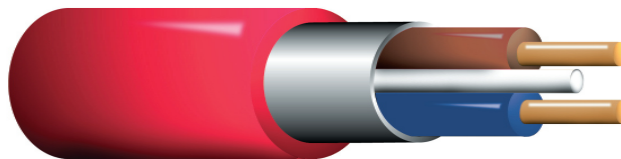
A fire-resistant cable with a lesser PH classification than PH120 and if not of enhanced grade status shall not be permitted on this project.

The entire fire alarm system shall be wired in 2 x 2.5mm² 'Prysmian FP Plus' fire alarm cabling (or equivalent) as specified below. Cabling shall be 2core and earth type.

The fire alarm cable shall be rated at 120mins in compliance with BS 8432-2 (flame, shock and water spray).

The fire-resisting cable shall have 2-hour fire rating according to IEC 331.

All cabling shall be manufactured by a BASEC approved manufacturer. Cables shall be installed strictly in accordance with the manufacturer's requirements.



The enhanced PH120 fire alarm cabling shall satisfy the following requirements for integrated water spray and mechanical shock:

Conductor:

Plain annealed copper. Solid 2 x 2.5mm² to meet the requirements of BS EN 60228 class 1 or class 2.

Insulation:



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High performance, damage resistant enhanced insulation to meet BS EN 50363-5, Type EI5.

Overall metallic screen and CPC:

Polyester backed laminated aluminium or copper tape bonded to outer sheath to provide overall screen. In contact with full sized, tinned annealed copper circuit protective conductor and laid-up with the cores to provide automatic screen earthing.

Sheath:

Robust thermoplastic low smoke, zero halogen and reduced flame propagation outer sheath. Suitable for outdoor installation with exposure to normal daylight UV.

Sheath shall be coloured 'Red' for Fire Alarm System wiring indication.

Standards, Tests & Approvals:

- I.S. 3218:2024
- BS 8432-2 (120 minutes)
- BS EN 50200 (PH 120)
- BS 7629-1 Enhanced 120
- BS 60332-1-2
- BS EN 60754-1
- BS EN 61034-2
- BS EN 50200 PH30, PH60, PH120
- BS 8434-2 Flame, impact & water test for 'enhanced' cable
- BS 5839-1, 6, 8 & 9 'enhanced' fire resisting cable
- BS 5266-1 'enhanced' fire resisting cable
- BS 8519 'Category 2' control cable
- BASEC approved
- LPCB approved (specific products & fire tests only)

The Contractor shall allow for all necessary power supplies to the new fire alarm devices and equipment.

The Contractor shall ensure that any other attendances or modifications required to the installation in order to leave the whole of the completed installation in a satisfactory condition are included in his tender.

All to the approval of the Employer's Representative.



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Testing & Commissioning:

The Contractor shall allow for the testing and commissioning of the fire alarm system throughout the rooms.

The Contractor shall test all items of equipment individually and shall commission the full installation as a unified system.

All testing and commissioning shall be carried out in the presence of and to the satisfaction of the engineer.

The Contractor shall give to the engineer seven days notice in writing before testing or commissioning is carried out. Commissioning shall comply with I.S. 3218:2024.

The Contractor shall allow for the following during the commissioning:

- Carry out a full test on the new fire alarm system in the building which includes all devices, panels, etc. to ensure that the items are fully operational.
- Test every device in situ including manual call points, sounders, detectors, interfaces, etc. To test each item the Contractor shall use appropriate test method/device.
- Confirm sound levels throughout the buildings. Audibility level readings shall be taken in each room using an instrument complying with BS 5969, type 2 with slow response and 'A' weighting.
- All trigger devices i.e. manual call points, heat, and smoke detectors shall be tested for correct operation.
- A mains failure test shall be carried out to verify and standby battery system complies with the requirements of this specification.

Certificates:

When completed, in compliance with I.S. 3218:2024, the Contractor shall provide the following certificates for the new fire alarm system for the rooms:

- Certificate of Installation as per Annex C2 on I.S. 3218:2024.
- Final Certificate of Commissioning as per Annex C3 on I.S. 3218:2024.
- Certificate of Handover as per Annex C6 on I.S. 3218:2024.

Cable Carrier for fire alarm cabling:

All new fire alarm cables and distribution shall be installed in a steel conduit/tray system. All fire alarm cables on trays above the ceiling shall be securely clipped to the tray via metal clips.



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A new cable carrier shall be installed for the new fire alarm installation throughout the rooms. A dedicated main run of galvanised steel cable tray shall be installed to distribute the fire alarm cabling throughout the rooms as indicated on the drawings.

Refer to the drawing for the routes, sizes, locations, etc. No other cabling shall be installed on the dedicated fire alarm tray.

All fire alarm cabling shall be independently separated from all other electrical cabling so that it is not mixed up with other cabling. All fire alarm cabling shall be distinguished and separated from all other electrical cabling.

Fire alarm cabling shall be installed on its own dedicated cable tray. In some instances (short runs in ceiling voids), the cabling can be clipped directly to the structure using metallic 'P' clips (to meet clause 26.2 of BS5839 for fixing of fire cable) to the underside of the floor slabs/structure or fixed to timber joists at 200mm intervals. (No other forms of fixing shall be acceptable).

Fire alarm cabling shall be at least 300mm apart from 230V mains cabling in all circumstances.

The primary cable tray routes for the fire alarm installation throughout the building are as indicated on the drawings but these electrical routes shall be finalised and decided by the Contractor in conjunction with the Engineer on site.

All new fire alarm cabling to be installed in the building shall be installed in metal conduit, trunking, tray, etc. as described below.

All new tray to be installed in the building shall be manufactured from pre-galvanised mild steel.

Tray systems shall meet the requirements of BS EN 61537:2007.

The new containment routes on the drawings for the building are indicative only. The Contractor shall allow for all necessary bends, offsets, crossovers, additional labour, etc. in installing the new cable containment in conjunction with the existing services and items in the building.

The Contractor shall allow for visiting the site during the tendering period to review all necessary works that are involved in supplying and installing the necessary cable containment for the new electrical services in the building.

The Contractor shall allow for all necessary brackets, unistrut, threaded rod, etc. in hanging the cable containment in the building. Cable containment shall be properly aligned and securely fixed at regular intervals at 1000mm on straight runs.



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Where bends, angles or offsets occur, additional fixings shall be supplied at a distance not exceeding 150mm on each side of the accessory.

A space factor of minimum 40% must be allowed in all carrier systems. Overloading and under sizing of the cable carrier system will not be permitted.

Where tray system pass through fire compartment boundaries, the Contractor is responsible for the internal fire stopping with a suitable approved material, and also the provision of a lid to cover cable tray at such points.

Cable tray systems shall be free of sharp corners, edges or burrs, where cable insulation could be damaged. Cables shall be installed in a manner that will not damage or put undue physical strain on them.



Conduits for fire alarm cabling:

All of the fire alarm installation below the ceiling in the building shall be surface mounted and as a result, all conduits shall be surface mounted throughout the building. All surface mounted conduit to be installed in the building shall be steel conduit.

Location of surface mounted conduits to be discussed on site.

All conduits shall be galvanised welded steel to BSS 31 Class E for heavy gauge tubing as manufactured by ASCM or approved equal. 16mm outside diameter is the minimum size to be used. All inlet boxes, conduits shall be plugged or capped whilst waiting for further items to be attached.



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The ends of every fitting, tube length or nipple are to be reamed and all threads to be coated with aluminium paint after assembly. All fittings shall be installed so as to facilitate easy re-wiring. Inspection fittings shall be fitted at all bends, tees and elbows.

Back entry elbows or tees shall be used, if necessary, to enable easy of accessibility without disturbing any plasterwork. Inspection fittings shall be flush with the plasterwork and floorboards over conduit fittings shall be screwed in position.

The complete conduit installation shall be finished before any wiring is pulled through.

The minimum spacing of conduit supports shall be as follows:

<u>Nominal Conduit Size</u>	<u>Spacing of Supports</u>
25 mm. and less	1.75 metres
25 mm. to 40 mm.	2.00 metres
Exceeding 40 mm.	2.50 metres



Hanging of cable containment:

The Contractor shall allow for hanging the new cable containment from the existing walls, roofs, trusses, etc. in the building and installing suitable supports in order for the tray/trunking to be installed.

Main runs of cable containment shall be installed on the ceiling or in the ceiling void in the building. Refer to the drawing for mounting heights.

Allow for all necessary fixings, bracings, bolts, etc. in order to secure the new main runs of cable containment to the existing structure in the building.

Clipping of fire alarm cabling on the cable carrier:



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All new fire alarm cables installed on the tray shall be securely clipped to the tray via non-combustible metal clips. The metal clips/ties shall be installed every 500mm.

Outside of ceiling voids, fire alarm cabling shall be enclosed in surface-mounted Class 4 galvanised steel conduit or clipped to a dedicated metal tray. In instances where fixed to wire tray, stainless steel cable ties shall be used.

68.03 Existing intruder alarm

The existing intruder alarm devices in the rooms shall be retained.