

**Kildangan National School,
Monasterevin,
Co. Kildare,
W34DR40.**

ROLL NUMBER: 18675I

ELECTRICAL SERVICES SPECIFICATION

VOLUME E1

**PARTICULAR SPECIFICATION
FOR THE ELECTRICAL INSTALLATION**

TENDER ISSUE (T1)

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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 construction of a new extension to Kildangan National School and a new fire alarm and PA system for the entire school building. The works includes for the supply and installation of new electrical services to the new extension. 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 deemed to have carried out a site visit of the site prior to the completion of his tender and 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. 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.

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.

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.
- xii) I.S. 3218:2024 – Fire Alarm Systems
- xiii) I.S. 3217:2023 - Emergency Lighting
- xiv) EN12464 - The Lighting of Workplaces

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:

*Mr. Gerd Benndorf,
Galileo Energy Services,
Unit A6,
M4 Business Park,
Celbridge,
Co. Kildare.
Tel: 01-6274103
E-mail: gerd@galileoenergy.ie
www.galileoenergy.ie*

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.

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.

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.

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.

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. 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.

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.

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:

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)
- 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.

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.



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Coronavirus (COVID-19)

The Contractor shall insure that all workers on site collaborate on implementing the HSE's guidelines on social distancing for construction sites in order to protect themselves from the Covid-19 virus. The Contractor and all his Employees and Sub-Contractors shall comply with HSE guidance to protect themselves from the Covid-19 virus.

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.

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

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 existing services in the existing buildings or in the existing buildings, the Electrical Contractor shall submit risk assessments for the works and method statements for the works to the Main Contractor for works in the existing buildings.

The Electrical Contractor shall allow for carrying out a risk assessment on all works and services to be installed in the new building and the existing buildings 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.

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 new extension building.
- Hot works in the existing buildings.

(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 electrical 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

The Electrical Contractor shall be responsible for liaising with the Main Contractor for co-ordinating the builders work and trenching required for all electrical site services. The Contractor shall be responsible for the final connections from the site services to the final equipment within the Building.

60.01 Electric Car Charging Points

The Contractor shall supply, install, connect, test and commission the electric car charging system as set out in the specification and on drawings. The electrical contractor shall install 2no. 7.2KW single phase electric car charging units as per EO Genius or equivalent. Each unit to be supplied with DC Leakage protection and associated 6no. radio frequency Identification Devices (RFID), Backend communication / App smartphone integration software and associated mounting poles.

The electrical contractor shall include for EO Pay Kiosk with post mounted instructional signage and associated EO pay chargers including the Beldin 9841 LSZH 600V cabling. Car charging System to be supplied by Carra Group, Carra House, 12 West Pier, Howth, Co. Dublin. Contact Niall Doonan (Mob +353 86 2694099) or equivalent.

61.0 ELECTRICITY CENTRE

Refer to sections 60.01 and 62.01 for further information.

62.0 POWER DISTRIBUTION SERVICES

62.01. Sub distribution board No.1 for extension of the building

General:

The Electrical Contractor shall allow for the supply and installation of a new sub distribution board (SDB-01) in the new building as indicated on the drawings.

The new sub distribution electrical board shall be located in the store room.

See electrical schematic for details on electrical board required.

Sub Distribution Board (SDB-01):

See drawings for location of the new sub distribution electrical board and the type of board required. The Electrical Contractor shall supply, install, connect, test and commission the new sub distribution electrical board (SDB-01) as indicated on the drawings.

The assembly of the board shall adhere to the following specifications and shall have the following specifications:

- Wall mounted.
- 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
- Incoming cables shall be bottom entry and outgoing cables shall be top exit.
- 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 main board shall be manufactured to 'Form 3B (Type 1)' separation in accordance with IS EN 60439.
- 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 '62.06'.

The Electrical Contractor shall provide with his tender the manufacturer's name and the overall dimensions of the main distribution board he proposes 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.

Acceptable board manufacturers are ABB, Davenham Engineering, LV Engineering or Jackson Switchgear, or equivalent.

Miniature Circuit Breakers (MCB's)/Residual Current Breakers with Over-Current (RCBO's):

The Electrical Contractor shall supply, install, connect, test and commission all the main circuit breakers as indicated for the new electrical board. Circuit breakers shall be type B, C and D to ISEN60898 to the following table:

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

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.

Moulded Case Circuit Breaker (MCCB's):

The Electrical Contractor shall supply, install, connect, test and commission all the moulded case circuit breakers as indicated for the new electrical board.

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 Electrical Contractor shall supply, install, connect, test and commission all the load break switches as indicated for the new 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. 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 modual. 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 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).

Cabling:

Glands and Sockets - To be provided by the installation Contractor and not by the switchgear manufacturer. Gland plates which shall be provided by the switchgear supplier, to be steel for multi-core cables and brass for single-core cables.

Load cables to ESB whole current meters or CT's must be of stranded copper conductor and not multi-stranded flexible cable. If multi-stranded flexible cables must be used they must be fitted with suitable copper ferrules.

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 ETCI Wiring Regulations.

New Incoming and Outgoing Sub-Mains Cables:

The Electrical Contractor shall supply, install, connect, test and commission the new incoming and outgoing sub-mains cabling to and from the new main-distribution electrical board 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.

Refer the sections 62.08 below for details on the sub-mains cabling required internally and externally.

62.02 Electronic surge protection

General:

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

Specification:

Surge protection shall be installed in line with I.S. EN 62305:2012 (Parts 1-4:2012). The services in the electrical boards will require surge protection devices (SPD's) and the type required are highlighted below:

- TP & N incomer on the new Sub Electrical Distribution Board (SDB.01) - (Type 1 & Type 2 combined lightning & SPD).

-
- TP & N incomer on all the new Sub-Distribution Board (Type 2 combined lightning & SPD).
 - SP & N incomer on the new Fire Alarm Panel – (Type 2 combined lightning & SPD).
 - SP & N incomer on the PV Panel supply – (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
- 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 an 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.
 - The values for the SPD must follow the definition 3.1.30 of the standard IEC 61643-12 (and also the definition 3.7 of IEC 61643-1), the SPDs protective components may be connected line to line or line to earth or line to neutral or neutral to earth and combination therefore. These paths are referred to as modes of protection. IEC 61643-1.
 - Accepted manufacturers of surge protection are Furse, Dehn & Sohn, or equivalent.

62.03 Cable carrier LV and ELV

General:

The Electrical Contractor shall allow for supplying and installing new cable containment and cable carrier system for the new electrical services in the building as indicated on the drawings.

Trunking and Tray:

The primary trunking and cable tray routes for the new extension 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 power, lightings, circuit wiring, etc. in the new building shall be installed in metal conduit, trunking, tray, etc. as described below. All sub-mains cabling in the new building 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 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 new building. Separate trunking shall be provided for data. Separate systems shall be segregated in accordance with the ETCI National Rules for Electrical Installations. 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 the ETCI Specifications. 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 new building shall be recessed into chased walls.

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

Spacing of Supports

25 mm. and less	1.75 metres
25 mm. to 40 mm.	2.00 metres
Exceeding 40 mm.	2.50 metres



Conduit Fixing and Fittings

Recessed 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 in attic space:

The Electrical Contractor shall allow for hanging the new cable containment for the Ground Floor within the attic space and installing suitable supports in order for the tray/trunking to be installed.

Main runs of cable containment shall be installed in the ceiling void. Refer to drawings for the size, quantity, layout and routes of the cable containment.

In order to install the cable containment at high level in the ceiling void, the Contractor shall allow for the following:

- Dropping 10mm threaded rod from the ceiling at 500mm distances over the length of the containment run. Allow for a drop of approximately 200mm.
- The threaded rod shall be hung from the existing steels/purlins via 10mm G-Clamps or supports shall be drilled into the ceiling for supports.
- The base supports for the cable containment shall be 41mm double channel unistrut. Supports shall be placed at 500mm distances over the length of the containment run. Allow for a drop of approximately 200mm.

Allow for connecting the threaded rods to the double-channel unistrut

62.04 Sub-mains cables – internal

The Electrical Contractor shall supply, install, connect, test and commission all new sub-mains distribution cables for the building.

Refer to drawing 61(E001) & 62(E003) for the information on the type and size of all sub-mains cabling to be provided from the electrical boards to the different items in the building.

For reference, the Electrical Contractor shall allow for the supply and installation of the following sub-mains cabling in the building:

- 4core 35mm² sub-mains cable incl. earth (sub-mains cable as specified below) from the existing main distribution electrical board (EX. MDB.01) in the existing building to feed new sub distribution electrical board (SDB.01) within the store Room of the new extension. Refer to the drawings for route and size of cable required.

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 Electrical 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-PVC XLPE SWA with separate CPC's for cables over 16.0 sq.mm, and 5 Core Cu-PVC SWA 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-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 Electrical Services Specialist shall comply with ET101 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 Electrical 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 Electrical 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 new building and the existing building.

Refer to section 62.03 for further information.

62.05 Electrical check meter

An electricity check meter shall be installed in the new sub electrical board as indicated on the drawings. This meter shall be digital and shall be supplied and installed by the Contractor.

The check meter shall be interfaced to the Buildings Management System for the purpose of gathering information on the buildings performance and energy monitoring. The Contractor shall include for all provisions in respect of the above, whether explicitly stated or not, regarding connection of meter and no claims for extras, resulting from a lack of sufficient information at tender stage, will be entertained at a later date.

Meters shall be as PowerLogic PM5000 series , or equivalent.



The digital meter shall have the following functions and capabilities:

- Three phases, neutral and ground to be monitored simultaneously
- Power quality measurements
- Data recording
- Graphical display, menus
- Text in 8 selectable languages
- Highly accurate devices with global billing certifications



Unit A6, M4 Business Park, Maynooth Road, Celbridge, Co. Kildare, W23 VFY7.
Tel: 01-6274103
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- IP52 front display
- Single 96 x 96 mm unit
- large characters and powerful backlighting
- Easy to understand 62.09 Internal sockets and spurs

62.06 Sockets and spurs

Standalone internal sockets:

The Electrical Contractor shall allow for the supply and installation of all new standalone internal sockets as indicated on the drawings. See drawings for quantities and the locations of the new power and general services that are to be installed for the building.

Sockets that are to be installed on dado trunking are highlighted in 62.07 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 areas. 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 new building shall be recessed. Therefore, all standalone electrical sockets, spurs, isolators, etc. shall be recessed.

All conduits below the ceiling throughout the refurbishment works area of the existing school building shall be exposed and surface mounted. Therefore, all standalone electrical sockets, spurs, isolators, etc. shall be surface mounted.

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

ASD Unit:

In the ASD part of the building, all conduits shall be recessed and hidden in the building fabric. The new electrical distribution system shall be installed in a steel conduit/trunking system throughout.

Flush mounted unswitched socket outlets to be MK Albany Plus K732 BSS (1 gang) or MK Albany Plus K773 BSS (2 gang), or equivalent. Mounting boxes to be 866 ZIC (1 gang) or 886 ZIC (2 gang), or equivalent. All double sockets shall have outboard rocker switches as highlighted in image below.

All sockets shall be of brushed stainless steel finish.

Refurbishment within existing school:

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 sockets shall adhere to Building Regulations Part M. Therefore, all 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.**



- **Under no circumstance will it be accepted by the engineers that sockets installed do not have outboard rocker switches with neon indicators and a contrast in colour.**
- **Any deviation to the above specification will result in the socket installation not complying with building controls regulations and will be corrected at the contractors expense. No sockets are to be installed on the project without formal technical submittal process and confirmation to proceed by the project engineer.**

Putty Pads on sockets and spur outlets in fire walls:

Where sockets are to be recessed into fire walls, the Electrical Contractor shall allow for supplying and fitting fire rated switch/sockets inserts into the knock out boxes to protect the fire protection.

The inserts shall be rated for a fire protection of 120 minutes and shall be tested to BS476 part 20/22:1987 for both the integrity and insulation. Inserts as 'Safire Fire Rated Switch Socket Inserts', or equivalent. Allow for the supply and installation of 30 no fire rated switch/sockets inserts.

Sockets below counters:

Where 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.

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.



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 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 units shall be 2 core 2.5mm² LSZH cable in trunking and conduit.



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 shall adhere to the following:

- 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 units shall be 2 core 2.5mm² LSZH cable in trunking and conduit.

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.



Wiring:

Wiring shall be carried out in 4mm sq. cables for radial circuits, and 2.5mm sq. cables for ring circuits. Refer to section 62.16 for details on the 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.

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.

62.07 Power installation on dado trunking

General:

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

The Electrical Contractor shall allow for the dado trunking arrangement at the teaching wall in each classroom as indicated on the drawings. Refer to the details on drawing 62(E001) for layout and arrangement of the dado trunking at each teaching wall.

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 to distribution board.



Sockets on dado trunking:

The Electrical Contractor shall supply, install, connect, test and commission the general service socket outlets on the dado trunking as indicated on the drawings and schedules. Refer to the drawings for quantities, locations and types of sockets required on the dado trunking. 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:

- Single socket shall be as MK Logic Plus K2757 WHI, or equivalent.
- Double socket shall be as MK Logic Plus K2746 WHI, or equivalent.
- All sockets shall be recessed into the dado trunking.
- All sockets shall be of white 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 indicators in the switch rockers to indicate that they are on.
- The rockers on the socket shall contrast with the colour on the socket

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.

62.08 Attendances to mechanical ventilation

The Electrical Contractor shall allow for the wiring of extract fans for the toilets as indicated on the drawings, which shall be supplied and fitted by the Mechanical Contractor.

Extract fans to be supplied and fitted by the Mechanical Contractor and subsequently wired by the Electrical Contractor.

Extract fans for toilets:

The Electrical Contractor shall allow for the wiring of all extract fans for the toilets as indicated on the drawings, which shall be supplied and fitted by the Mechanical Contractor. Extract fans to be supplied and fitted by the Mechanical Contractor in the toilets.

The Electrical Contractor shall allow for the following attendances in wiring each fan and sensor in each toilet:

- The extract fan and PIR sensor shall be supplied and installed by the Mechanical Contractor. However, the Electrical Contractor shall allow for the wiring of all the extract fan and associated PIR sensor as indicated on the drawings. Electrical power supplies to each 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 all extract fans from the new electrical board. Wiring to each extract fan shall be carried out using 2.5mm sq. in LSOH. Wiring shall be exactly to supplier's instructions. Refer to section 62.16 for details on cabling.
- All wiring from each fused spur to each extract fan shall be installed in steel conduit. Refer to section 62.03 for details on spur outlets.
- Each fan shall be controlled via a remote PIR sensor which shall be wired and connected to the fan. Control wiring from each extract fan to its associated remote PIR sensor shall be carried out using 2.5mm sq. in LSOH. Wiring shall be exactly to supplier's instructions. Refer to section 62.16 for details on cabling.
- The locations of the PIR sensors for all fans shall be discussed with the Engineer on site.
- All wiring from each PIR sensor to each extract fan shall be installed in steel conduit.
- Any other works deemed necessary for the wiring of the fans and the PIR sensors.

Cooker Extractor Hood:

The electrical contractor shall allow for the wiring of the 1no. extractor hood as indicated on the drawings, which shall be supplied and fitted by the Mechanical Contractor. Wiring shall be exactly to suppliers instructions.

Wiring to extract hoods shall be carried out using 2.5mm sq. in PVC. Provide a fused spur outlet at high level in the ceiling void above the cooker extractor hoods for each hood.

62.09 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 classroom 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 on the dado trunking at the teachers desk and a second ceiling mounted PAF plate (PAF2) shall be provided on the dado trunking drop at high level at the teachers desk.

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 in the dado trunking 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 USB socket.
- 1no Mini stereo jack plug audio input socket.
- Faceplates as supplied by Nexxia, or equivalent.



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

- 1no VGA socket
- 1no HDMI socket.
- 1no USB socket.
- L&R Audio-output Phono type sockets



The cables required to connect the PAFs shall be compatible with the types of data projectors being provided in the building and shall be as follows:

- VGA sockets in the PAFs shall be interlinked using suitable VGA cables.
- HDMI sockets in the PAFs shall be interlinked using suitable HDMI cables.
- USB sockets in the PAFs shall be interlinked using suitable USB cable.
- The mini stereo jack plug type input sockets shall be wired to the audio output phone sockets using suitably rated speaker cable.

62.10 Earthing and bonding

The electrical installation shall be effectively earthed and non-current carrying metalwork shall be bonded, all in accordance with ETCI 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 main distribution board.

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 the ETCI National Rules for Electrical Installations.
- 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.

Main bonding conductors shall be 1 x 95mm² G/Y PVC cable routed from the main earth terminal to mains water and electrical intake points, control panels, main plant and equipment items.

At least 1 no. copper or galvanised iron earth electrode shall be driven vertically at least 1800mm underground, outside the building, adjacent to the main board and the main earth cable shall be connected to this electrode in the ground. See detail on site services drawing ME(S001) for further information.

The earth lead shall be connected to the electrode by means of a substantial non-ferrous clamp to B.S. 951, which shall be protected against corrosion by denso tape. The resistance between any metals to the earth and the main earthing terminal shall not exceed 0.5 ohms. Sufficient electrodes spaced 3600 mm apart shall be used to obtain a satisfactory earth.

The main earth points shall be housed in a concrete surround and fitted with approved inspection covers giving access for disconnection of the earth lead for test purposes. The earth connections shall be fitted with a permanent indelible label engraved; **'SAFETY ELECTRICAL EARTH, DO NOT REMOVE'**. Bell couplings shall be installed where conduit is attached to trunking to ensure proper earth continuity.

62.11 Attendances to the mechanical installation

Motor Control Centre (MCC):

A new Motor Control Centre (MCC) shall be installed in the Plantroom as indicated on the drawings. The Contractor shall allow for connecting the existing sub-mains cable from the existing main electrical distribution board to the new MCC panel as indicated on the drawings.

All equipment relating to the MCC panel and controls package in the Plantroom shall be supplied by the Mechanical Contractor.

The MCC control panels, software and related controls shall be supplied, located on site and handed over free issue by the Mechanical Contractor to the Electrical Contractor for wiring.

The Electrical Contractor shall allow for the wiring of the controls package and control devices. The Contractor shall supply, install, connect, test and commission all power and control wiring associated with the mechanical installation in accordance with the detailed wiring diagrams supplied by the Mechanical Contractor. Wiring for the heating plant in the Plantroom shall be in PVC cable in steel conduit.

Most of the items relating to the MCC control panels in the Plantroom shall be located within the Plantroom. However, there are some items and control devices in the building that shall be located remotely to the panel and shall be located throughout the building. These devices are highlighted on the drawings and shall be wired back to the MCC controls panel in the Plantroom.

The Contractor shall supply and install all isolators and switched fuse spur outlets as necessary for the correct completion of the installation.

The Contractor shall include for wiring and connecting up all items handed over free issue by the mechanical Contractor.

All plant items in the Plantroom shall be provided with local and dedicated labelled isolation at each plant item. Final connections to the boiler, burner and pumps shall be via local IP54 isolators and flexible conduit connection.

The MCC (BMS) control system shall be connected and interfaced to the fire alarm system so that in the event of a fire activation, the MCC controls panel will shut down. Below is a brief summary of all plant and equipment but the Contractor shall include for wiring and connecting up all the relevant mechanical items and control items as indicated and any other items described in this specification or shown on the drawings.

Refer to drawing 51(M002) for information on wiring and connecting up all the relevant mechanical items and control items. The Contractor shall refer to the Mechanical Services drawings and specifications to ascertain the location of the mechanical plant control devices and equipment, which require electrical

services. The Contractor shall supply and install all isolators, emergency lock stop push buttons and switched fuse spur outlets as necessary for the correct completion of the installation.

All plant items shall be provided with local and **dedicated labelled isolation at each plant item**. Final connection to all plant items in IP54 isolators and flexible conduit connectors.

Boilers:

There are 2no boilers which shall be supplied and installed by the Mechanical Contractor in the plantroom as indicated on the drawings. The Electrical Contractor shall allow for all power supplies to the boilers which shall be a 230volt 13amp fused spur. Allow for connecting the power supply to each boiler. Final location of spur to be confirmed with the Mechanical Contractor.

Pumps:

There are 8no pumps which shall be supplied and installed by the Mechanical Contractor in the plantroom as indicated on the drawings. The Electrical Contractor shall allow for all power supplies to the boilers which shall be a 230volt 13amp fused spur. Allow for connecting the power supply to each pump set. Final location of spur to be confirmed with the Mechanical Contractor.

Power Wiring:

Wiring, unless stated otherwise, shall be carried out in 2-core 4mm sq. PVC cables plus earth. All wiring to control devices shall be carried out in Beldon 9534 4-core screened cable (or equivalent).

IT Wiring:

The BMS (MCC) control systems shall be provided with a web server that is capable of connecting to the buildings I.T. network via a Cat 6A connection.

Therefore, the BMS controls panel in the boilerhouse shall be connected to the buildings IT system by means of a CAT 6A cable. The Contractor shall allow for the supply and installation of a CAT 6A cable from the BMS controls panel to the buildings communications systems or nearest patch panel.

Control Wiring:

All control wiring shall be carried out in Beldon 9534 4-core screened cable, or equivalent.

62.12 Attendances to the two-port valves and local room stats

The Contractor shall allow for the wiring of all two-port valves and associated wall stats in the rooms as indicated on the drawings. Allow power supplies to all valves/thermostats and control wiring between all valves/thermostat. See drawings for the quantities and locations of all two-port valves and thermostats.

The Contractor shall include for the following electrical attendances to each 2-port valve and thermostat arrangement in the rooms as indicated (see drawings for quantities):

- 230V power supply via a 13 amp unswitched spur for the 2-port valve which shall be installed at high level in the ceiling void. Final location of spur to be confirmed with the system installer.
- 2-core 1.5mm² cable from the wall mounted thermostat to the 2-port valve in the ceiling void. The thermostat shall be located at 1100mm above finished floor level.
- 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 boards in the building which are indicated on the drawings.

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

62.13 Attendances to the gas detection system

General:

1no. gas detection system shall be installed for this project. The electrical Contractor shall allow for the wiring and electrical attendances to this 1no. new gas detection system in the boilerhouse. The gas detection system shall consist of a solenoid valve within the boiler house, control boxes for the system, gas detectors, and control cabling as indicated on the drawings. The gas detection panel shall be located within the boilerhouse and the gas slam shut valve and gas detectors shall be wired directly to this gas detection panel.

The Contractor shall include for the following electrical attendances to each gas detection system:

- 13amp single phase fused spur outlet to the gas detection panel. Location as indicated on the drawings. Power wiring as indicated below.
- 13amp single phase fused spur outlet to the gas solenoid valve. Location as indicated on the drawings. Power wiring as indicated below.

- Control cabling between the gas solenoid valve and the gas detection panel. Location as indicated on the drawings. Cabling as indicated below.
- Control cabling between the gas detector installed at low level in the boilerhouse and the gas detection panel. Location as indicated on the drawings. Cabling as indicated below.
- All control and power wiring shall be installed in steel conduit. Include for all necessary cable containment.
- Wiring shall be taken from the new electrical boards in the building which are indicated on the drawings.

All items shall be located in each boilerhouse.

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. Power wiring shall be carried out in 2.5mm sq. LSOH cables.

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

Fire Alarm Wiring:

The new gas detection system in the boilerhouse shall be connected and interfaced to the fire alarm system in the building. Allow for all necessary conduit, tray etc. and all other accessories to carry out this work. Refer to section 68.01 for further information on cabling and interfaces required.

62.14 PV installation

General:

The Electrical Contractor shall allow for the supply and installation of photovoltaic panels (PV panels) on the roof of the building for supplementary electrical supply to the building.

The Electrical Contractor shall employ a specialist PV installer to install the PV panel array as indicated on the drawings. The PV installer must include for the coordination works associated with the installation of this PV system and liaising with ESB Networks Ireland.

The PV installer shall be a SEAI registered installer for the supply and installation of the PV Panels.

Our recommended PV specialist would be as follows:

Prosolar,
Sneem Road,
Kenmare,
Co.Kerry
Tel: [064 770 2000](tel:0647702000)
Contact: Mr. John Hayes
E-mail: jhayes@prosolar.ie

PV Arrangement:

The specialist PV installer shall allow for the supply and installation of 12no photovoltaic panels (PV panels) on the roof of the building for supplementary electrical supply to the building.

The PV panels shall be located on the roof as indicated on the drawing 62(E002).

The PV panels shall be installed on the roof in a south east facing orientation.

The specialist PV installer shall allow for the supply and installation of the 12no PV panels and they shall be installed in 1no row with 12no. PV panels as per the drawings.

It is a condition of this tender that the labour is not to be outsourced to subcontractors by specialist PV installer. The specialist PV installer must prepare and supply a structural analysis report factoring in Wind and Snow Loading. The specialist PV installer must include for the Lifting of all equipment to the roof, offloading of all equipment, AC cabling to the electrical distribution board and installation of cable management.

Survey:

The PV panel specialist shall allow for carrying out a site survey and investigation of the building before any PV panels or equipment are ordered.

PV panels:

Performance & Design:

The PV panels shall be a high-performance solar module. The PV panels shall have a performance output of up to 450Wp and shall have a static front load of

up to 6,000Pa. The contractor shall also require that the panels shall have a warrantee of 25 years.

The contractor shall ensure that the busbars on the panels are located on the rear of the cells and this will ensure that the front of the cells are fully exposed to light. This shall also allow for additional busbars to be installed on each module instead of the busbar being installed on the front of the PV panels.

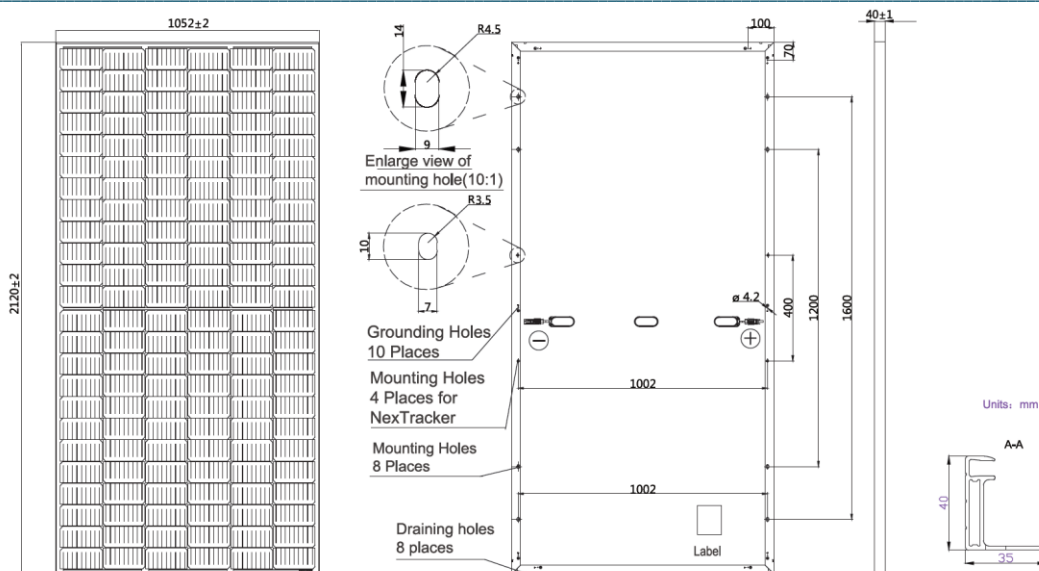
Mechanical Properties:

Cells:	6 x 24
Cell Vendor:	JA Solar
Cell type:	Monocrystalline/N-type
Cell dimensions:	161.7 x 161.7mm
No. of busbars:	30 (Multi Ribbon Busbar)
Dimensions:	2,120 x 1,052 x 40mm
Front Load:	6,000Pa
Rear Load:	5,400Pa
Weight:	25kg
Connector Type:	QC4, 10-35
Junction Box:	IP68 with 3 Diodes
Glass:	High transmission tempered glass
Frame:	Anodized Aluminium

Electrical Properties:

Model:	JAM72S20-450/MR
Maximum Power (PMax):	450W
MPP Voltage (Vmpp):	41.52V
MPP Current (Impp):	11.36A
Open circuit current (Voc):	49.7V
Short circuit current (Isc):	11.36A
Module Efficiency:	20.2%
Operating temperature:	-40 ~ +85
Maximum system voltage:	1,000V
Maximum series fuse rating:	20A
Power tolerance:	0 ~ +3

Dimensions



Inverter:

The contractor shall allow for the installation of the inverter alongside the main electrical board in the electrical board in the location as indicated on the drawings. The inverter shall be a three phase inverter and shall be supplied as part of the PV package. The inverter shall meet the following criteria which is as follows:

Output:

Rated AC power output:	5400 VA
Maximum AC power output:	5400 VA
AC output Voltage – Line to Line:	380/220 ; 400/230 Vac
AC output power – Line to Neutral:	184 – 264.5 Vac
AC Frequency:	50/60 ± 5 Hz
Maximum continuous output current:	10A
Grids supported – Three phase:	3/N/PE (WYE with Neutral)
Utility Monitoring Islanding protection:	Yes

Input:

Maximum DC power (Module STC):	14800W
Transformer-less Ungrounded:	Yes
Maximum Input Voltage:	900 Vdc
Nominal DC Input Voltage:	750 Vdc
Maximum input current:	10 Adc
Reverse-Polarity protection:	Yes
Ground-Fault isolation detection:	700kΩ Sensitivity
Maximum Inverter Efficiency:	98%

European Weighted Efficiency:	97.3%
Nighttime power consumption:	< 2.5 W

Additional Features:

Supported communication Interfaces:	RS485, Ethernet, Wi-Fi (requires antenna), ZigBee (Optional), Cellular (optional).
Smart Energy Management:	Export Limitation, Home Energy Management (Device Control).
Inverter Commissioning:	With the setup mobile application using built-in Wi-Fi access point for local connection.

Standard compliance:

Safety:	IEC-62103 (EN50178), IEC-62109
Grid Connection Standards:	VDE 0126-1-1, VDE-AR-N-4105, AS-4777, G83/G59
Emissions:	IEC61000-6-2, IEC61000-3-11, IEC61000-3-12, FCC part15 class B
RoHS:	Yes

Installation Specification:

AC Output:	Cable Gland -diameter 15-21 mm
DC Input:	2 MC4 pairs
Dimensions:	540 x 315 x 191 mm
Weight:	16.4mm
Operating Temperature Range:	-40 to +60 °C
Cooling:	Internal Fan
Noise:	< 40 dBA
Protection Rating:	IP65 – Outdoor and Indoor
Mounting:	Brackets Provided

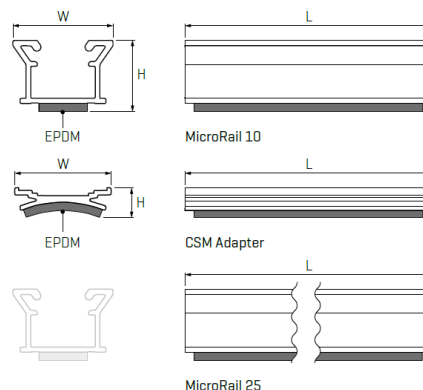
The inverter shall be on the type **Solaredge SE6K** as specified above.

Bracketing system:

The PV specialist contractor shall allow for installation of a K2 MicroRail system suitable for a trapezoidal type roof with a 5°degree roof.

Technical data

	MicroRail System
Scope of application	Pitched roofs with corrugated/trapezoidal sheet metal or sandwich panels Roof inclination: 5 - 75°
Fastening type / roof fixture	Screws in roofing with self-tapping thin sheet screws
Requirements	• Sheet thickness: ≥ 0.4 mm steel or ≥ 0.5 mm aluminium • Sandwich panel: Approval from manufacturer required • Trapezoidal sheet crest width: ≥ 22 mm * • Trapezoidal sheet flush area surrounding bore hole: $\varnothing \geq 20$ mm • Corrugated sheet radiuses: 22-45mm • Module frame height: 30-50mm
Module orientation	Horizontal / landscape
Material	Aluminium (EN AW-6063 T66 / EN AW-6082 T6); EPDM
Dimensions W×H×L [mm]	
• MicroRail 10 / 25	37×26×92 / 242
• MicroRail CSM	36×11×92



* The project-specific minimum high crest width dimension can be found in the Base report.

62.15 Hand-dryers

N/A

62.16 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 62.03 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. 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).
4. All cables shall be 450/750 volt rated and no cable less than 1.5 sq. mm in cross section shall be used without the permission in writing of the Engineer.

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5. 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.
 6. 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.
 7. 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 cabling shall be LSZH sheathed cable. 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

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).

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 1.5 sq. mm. 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.

Cable sizes shall be as follows:

a) Lighting final circuits	1.5 sq. mm
b) Emergency light fittings	1.5 sq. mm
c) Socket outlets ring circuits	2.5 sq. mm
d) Socket outlets ring circuits	4.0 sq. mm
e) Undersink electric water heaters	2.5 sq. mm
f) Hand-dryers	2.5 sq. mm

See also electrical schematics for specific cable sizes.

Sub-mains cabling:

Refer to section 62.04 above.

Conduits

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.

The minimum spacing of conduit supports shall be as follows:

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

Trunking & Tray:

Refer to Section 62.03 above.

62.17 3-Phase isolators and Single phase isolators

The electrical contractor shall include for the wiring on a separate final circuit as indicated on the drawings. The machines shall be supplied by others. Wiring shall be carried out to the following standard:

32A 3-phase supply

Use 10mm² cable to isolator. Use 10mm² flexible cable in flexible conduit and terminate at machine. 25mm steel conduit to be installed under the floor as appropriate. Footstops to be wired to machine supplier's recommendations.

20A single phase supply

Wiring shall be carried out using 2.5mm sq. cable. Final connection to machines shall be via 20A double pole switch with neon indicator (spur outlet), flexible cable & conduit as appropriate. The contractor shall liaise with the supplier regarding installation of equipment

62.18 CO₂ Monitors

General:

The Electrical Contractor shall allow for the supply and installation of a CO₂ monitors as indicated on the drawings.

All teaching spaces shall be fitted with a CO₂ monitor that shall include an LED display. 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 school staff are provided with full user training and demonstration of these systems as part of the handover requirements. See sample label in Appendix A. 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.

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; 18 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	



62.19 Data Projector Isolation Switch

In each classroom, there is a double socket installed at high level on the dado trunking arrangement at the teachers wall as indicated on the drawings. This

double socket is for future power supply to the data projector (which shall be installed by others).

However, this socket is located at high level and out of reach for the teacher. As a result, a double pole isolation switch shall be installed at low level on the dado trunking arrangement for isolation power to the socket at high level.

All isolators shall be as manufactured by MK Logic Plus and finished in white plastic, or equivalent.

All double pole isolation switch shall adhere to the following:

- Isolation switch shall be as K370 WHI, or equivalent. All switches shall be of white plastic 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.
- Mounting frames/boxes shall be VCT-121 WHI (1 gang), or equivalent.



62.20 Electric shower

General:

The Contractor shall allow for the wiring of an electric shower as indicated on the drawings. Due allowance for this item must be allowed for in the tender price.

Final location for the electrical attendances to the shower shall be confirmed on site with the Mechanical Contractor. The electric showers shall be supplied and installed by the Mechanical Contractor but shall be wired by the Electrical Contractor.

Electric shower shall be wired using 10mm sq. cable. For concealed connections, connect a fixed or flexible cable from the rear directly to the terminal block. Final wiring details to be advised by the supplier.

Allow for wiring and installation of the pull cord that is to be supplied with the electric showers.

62.21 Cooker points

N/A

62.22 Wiring in Multi-Activity room

In the Multi-Activity room, a number of spur outlets shall be wired back to a 12-gang socket control panel for the switching of equipment in this room. The layout and list of equipment for this room is to be finalised with the Client. These spurs shall be wired back to the wall mounted control panel to facilitate independent control of each piece of equipment and each spur shall be individually switched from this panel. The spurs shall be located at different heights above floor level and these heights shall be confirmed on site. Allow for installing and wiring the number of spurs for this room as indicated back to a wall mounted 12-gang switch grid/panel. The grid shall be from the MK Albany Plus range and shall be finished in stainless steel. Wiring shall be carried out in 2.5mm sq. from each socket back to the 12-gang grid.

There are electrical double sockets to be installed in this room also but these sockets shall be wired back and connected to the main electrical board for that area.

62.23 Attendances to the heat recovery units

Heat recovery units to be supplied and installed by the Mechanical Contractor. However, the Electrical Contractor shall allow for all necessary electrical attendances to each recovery unit as indicated on the drawings.

Each heat recovery unit shall be installed in the location as indicated on the drawings. See drawings for quantities and locations.

The Contractor shall allow for the electrical attendances to each heat recovery system which shall be as follows:

- 230V single phase power supply via a 13-amp fused spur outlet to each heat recovery unit. The fused 13-amp spur outlet shall be located as indicated on the drawing. Final location of fused spur outlet to be confirmed with the heat recovery unit installer.

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

62.24 Testing and commissioning

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 Employer's Representative. The Contractor shall give to the Employer's Representative seven days notice in writing before testing or commissioning is carried out.

63.0 LIGHTING SERVICES

63.01 Internal task lighting

General:

The Contractor shall, install, connect, test and commission the whole of the new lighting installation as shown on the drawings and as described in the Specification. See drawings for the locations in the unit where new lighting services are to be installed. This includes all light fittings, cabling, containment, etc.

The type of luminaire required for each location is specified in the appropriate schedules. The Contractor shall supply and install these new luminaires at the locations shown on the drawings. The lighting system shall be fed from the existing main electrical board in the existing school indicated on the. The exact location of each luminaire shall be determined on site in consultation with the Employer's Representative.

The Contractor shall allow for the supply and installation of all light fittings for the building. See the lighting schedule below for further information on all light fittings to be supplied and installed.

The design parameters are those defined in the Chartered Institution of Building Services Engineers lighting code.

Final connections to each light fitting shall be made in heat resistant cable.

All luminaires shall comply with BS4533. Incandescent lamps shall comply with BS1101. All luminaires shall be supplied complete with lamps. All surface mounted luminaires shall be fixed to surface mounted conduit boxes at their rear, unless stated otherwise or recommended by the manufacturer. Ceiling roses where required shall be of the semi-recessed white pattern mounted on suitable back outlet boxes, the lower end of the box being flush with the ceiling.

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.

Average working plane illumination levels shall generally be as follows:

- Offices: 400lux at 700mm AFFL
- General spaces: 300lux at 700mm AFFL
- Meeting Rooms: 300lux at 700mm AFFL
- Circulation: 120lux at 700mm AFFL
- Toilets: 120lux at 700mm AFFL
- Disabled toilets: 200lux at 700mm AFFL

63.02 Lighting switches for the General areas of the building

General:

The Electrical Contractor shall allow for the supply and installation of a number of light switches in the building as indicated on the drawings. All new light switches to be installed in the new extension shall be 'Push-to-Make' retractive light switches.

Refer to drawings for locations and quantities.

Momentary (Push-To-Make) retractive light switches:

The lighting in the majority of 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 light switches to be installed in the new extension shall be 'Push-to-Make' retractive light switches. Refer to the drawings for quantities and locations of all momentary (push-to-make) retractive light switches required in the building.

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

Momentary (push-to-make) retractive light switches as required 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 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.



Mounting heights and cable containment for all light switches:

ASD Unit

All new lighting switches installed in the new ASD unit building, unless stated otherwise, shall be recessed. All lighting switches, unless stated otherwise, shall be located 1100mm generally above finished floor level.

All new cabling to the light switches shall be installed in recessed steel conduit. All conduit supplies to the back box for all the recessed light switches.

Refer to section 62.03 below for further information on the conduit and cable containment required.

Extension in existing school

All new lighting switches installed in the new extension, unless stated otherwise, shall be surface mounted. All lighting switches, unless stated otherwise, shall be located 1100mm 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 62.03 below for further information on the conduit and cable containment required.

Wiring:

Refer to section 62.16 for further information on cabling required for the lighting installation.

63.03 Lighting controls

General Classrooms, Science Room, Prep Room and corridor areas:

General:

Automatic lighting controls shall be installed for all these areas in the new building 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 all these rooms in the building 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 all these rooms for the lighting circuits in these areas (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.

In addition to the retractive 'Push-to-Make' switches provided in classrooms, manual switching shall be provided on the row of light fittings nearest the teaching wall so that the teacher may switch these off where local glare on the whiteboard may be a problem.

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

Operation of lighting system in areas:

- The user will enter the room/area 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/area is occupied AND the photocell senses that there is an inadequate lighting level in the room/area.

- The lights will remain on while the room/area is occupied. There is no time limit to this.
- Once the room/area is vacated, the system will time out and switch the lights off. This timeout period shall be set to 15 minutes.
- If the room/area is entered before the lights have timed out, the system will reset and stay on until once again the room/area is vacated.
- If the room/area 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 300 lux for General Classrooms and 500 lux for Science Rooms. 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 areas:

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

- *Type:* Philips Occuswitch LRM1080, or equivalent
- *Accessories:* Include for wireland cable as LCC1070 for each sensor, or equivalent.
- *Colour:* White
- *Mounting:* Recessed into the ceiling
- *Detection range:* 360°
- *Voltage:* 230V AC

See drawings for quantities and locations.



Toilet\Stores:

General:

Automatic lighting controls shall be installed for all the light fittings in these areas as indicated on the drawings. The light fittings in these areas shall be controlled via motion detection. The lighting controls in these areas are to be based on motion detection to turn on the lights when motion is sensed and to turn off lights when no presence is detected after 15 minutes. Settings shall be set up as identified above.

There is no requirement to install light switches for these areas as the lights in these areas/rooms shall be switched on by the presence detector and will also be switched off by the presence detector.

A remote sensor or sensor incorporated into the light fitting 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. Refer to the drawings for further information.

Operation of lighting system in these areas:

- The user will enter the room and the lights shall then turn on.
- 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.
- 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.

Remote motion/presence detector for these areas:

The Electrical Contractor shall allow for the supply and installation of a remote sensor to control the light fittings in these areas as indicated on the drawings. Please note that the majority of light fittings for these areas shall have the sensor incorporated into the light fitting and shall be supplied with the light fitting. However, some light fittings in these areas will require a remote sensor as indicated on the drawings. Refer to drawings for quantities and locations. Allow for the necessary control wiring between the light fittings and the relevant sensor in each area/room.

Refer to the drawings for further information.

All motion/presence detectors shall be as follows or equivalent:

- *Type:* Philips Occuswitch LRM1080, or equivalent
- *Accessories:* Include for wireland cable as LCC1070 for each sensor, or equivalent.
- *Colour:* White
- *Mounting:* Recessed into the ceiling.
- *Detection range:* 360°
- *Voltage:* 230V AC

See drawings for quantities and locations.



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 main wiring from the new electrical boards to all the new light fittings as indicated on the drawings. Mains wiring for the new internal lighting circuits shall be run in 2.5mm², with 2.5mm² earth throughout the installation. 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 Electrical Contractor shall include for all mains power supply cabling to the new light fittings in these rooms in 2.5mm² cable as indicated. The Electrical Contractor shall also include for 2-core 1.5mm² low voltage cabling from the sensor to all the light fittings in that room.

- For the rooms where there is presence detection installed, the Electrical Contractor shall allow for the wiring as per detail on the drawings so refer to that. The Electrical Contractor shall include for all mains power supply cabling to the new light fittings in these rooms in 2.5mm² cable as indicated. The Electrical Contractor shall also include for 2-core 1.5mm² low voltage cabling from the sensor to all the light fittings in that room.

Refer to section 62.16 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 building 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 building.

The lighting system in each 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.

63.04 Cable carrier systems

See section 62.03 for further information.

63.05 Schedule of light fittings to be provided by the Contractor

General:

All the light fittings for the project shall be supplied and installed by the Contractor. **It must be noted that this project must achieve NZEB compliance and electrical contractor must be cognisant of this fact when pricing installation.**

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 appropriate schedules. The Electrical Contractor shall install these luminaires at the locations shown on the drawings. The lighting system shall be fed from the new electrical boards for the building as indicated 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.

All light fittings shall be CE Marked.

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

Samples:

The 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 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 Contractor shall allow for factoring the cost of providing samples of the light fittings into his tender costs.

Light fittings to be supplied and installed by the Contractor:

See drawings for quantities and locations of all light fittings.

All light fittings shall be supplied by Thorn, or equivalent.

<u>Internal and wall mounted external light fittings</u>	
Type	Description
A 	Wall / Ceiling mounted 16watt 307mm Ø LED light fitting. Light fitting shall adhere to the following: • height 58mm • IP65 and IK10 rated • Electrical class II. Anti tamper screws as standard, a security bezel. • Body and bezel: polycarbonate, white • Diffuser: polycarbonate, white, diffuse • 000K LEDs • 5-year warranty for all components. • CE Marked. The proposed lighting fitting is <u>Thorn Katona LED (96629367 KAT RD 2000-840 HF)</u> (or equivalent).

Type	Description
BD 	Surface mounted 37watt 1520mm x 217mm x 90mm LED light fitting. Light fitting shall adhere to the following: • Surface mounted fitting. • 37watt LED • IP44 rated below ceiling. • Body: white painted steel. End caps: white polycarbonate with a curved, precision extruded clear prismatic polycarbonate diffuser. • Ø21.5mm cable entry hole in the centre of the back spine with optional cable entry through each end cap. • 4000K LEDs • Dimmable • 5-year warranty for all components. • CE Marked. The proposed lighting fitting is <u>Thorn College Prismatic LED (96628920 COLLEGE LED4650-840 HFIX L1500)</u> (or equivalent).

Type	Description
C 	Surface mounted 35W LED, 1100mm x 92mm x 90 mm. Light fitting shall adhere to the following: • IP66, dust and moisture resistant LED luminaire. • Electronic, fixed output control gear with 3 hour, manual test, emergency lighting circuit. With medium beam distribution. • Class I electrical. Canopy: light grey polycarbonate. • Diffuser: high transmission opal polycarbonate with refraction prisms. • 4000K LEDs • 5-year warranty for all components. • CE Marked. The proposed lighting fitting is <u>Thorn Aquaforce Pro LED (92901916 AQFPRO S LED4300-840 PC WB HF)</u> (or equivalent).
<u>D</u>	Recess mounted 23.7watt LED 600 x 600mm light fitting. Light fitting shall adhere to the following: • Recess mounted LED light fitting • 23.7watt LED • IP40 rated • Steel sheet, finished white body • UV stabilised polycarbonate microprismatic optic diffuser

	• 4000K LEDs • Suitable for dimming • 5-year warranty for all components. • CE Marked. The proposed lighting fitting shall be as <u>Thorn Omega Pro 2 LED</u> (or equivalent).
Type	Description
F	Twin 1500mm LED ultraviolet light fitting, surface mounted c/w all fittings as necessary.
<u>Emergency Light Fittings</u>	
Type	Description
X1E 	Wall mounted 25W LED, 381mm x 196mm x 305 mm. Light fitting shall adhere to the following: • IP66, dust and moisture resistant LED luminaire • Electronic, fixed output control gear with 3 hour, manual test, emergency lighting circuit. • Back plate: die-cast aluminium, painted anthracite. • Body: anthracite polycarbonate. Ø20mm cable entry via rear or side conduit entries • BESA compatible. • IP65, IK10. • 4000K LED.

	• 5-year warranty for all components. • CE Marked. The proposed lighting fitting is <u>Thorn Piazza II LED</u> (or equivalent).
Type	Description
<u>E1</u>  Single /Double sided ceiling 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: • Ceiling 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) - 4.8V 1.3A/h Ni-Cd • IP40. • Finish shall be white (RAL 9016) • 4 watt LED in total. • Built-in downlighter (60 lumens) • Three-hour maintained. • 6-year warranty • 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 Multilux Blade</u> (or equivalent).



Unit A6, M4 Business Park, Maynooth Road, Celbridge, Co. Kildare, W23 VFY7.
Tel: 01-6274103
www.galileoenergy.ie

Type	Description
<u>E2</u>	New self-contained standalone recessed 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. Allow for remote control unit for standalone light fitting. Light fitting shall adhere to the following:



**Recessed fitting
with
'Open Area' lens**

- Recessed for open area version. Supplied with the open plan lens (symmetrical light pattern).
- Self-contained.
- 3 watt CREE LED
- Lamp colour - 4500K.
- 180 lumens in emergency
- Material of lamp head - flame retardant polycarbonate plastic.
- Remote bag - silicone coated fibre glass bag.
- Batteries (self-contained) - 4.8V 4.5A/h Ni-Cd
- Non-Maintained 3 hour duration
- Class I.
- IP20
- Colour shall be white RAL 9016
- Status indicator to indicate operational condition.
- 6-year warranty.
- CE marked.
- Fully compliant to EN 60598.2.22

The proposed lighting fitting is **Ventilux Optilens (Area Version)** (or equivalent).

Type	Description
<u>E3</u>	New self-contained standalone recessed LED emergency light downlighter (<u>Escape Route 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. Allow for remote control unit for standalone light fitting.

 Recessed fitting with 'Escape Route' lens	Light fitting shall adhere to the following: • Recessed for escape route version. Supplied with the escape route lens (asymmetrical light pattern). • Self-contained. • 3 watt CREE LED • Lamp colour - 4500K. • 180 lumens in emergency • Material of lamp head - flame retardant polycarbonate plastic. • Remote bag - silicone coated fibre glass bag. • Batteries (self-contained) - 4.8V 4.5A/h Ni-Cd • Non-Maintained 3 hour duration • Class I. • IP20 • Colour shall be white RAL 9016 • Status indicator to indicate operational condition. • 6-year warranty. • CE marked. • Fully compliant to EN 60598.2.22 The proposed lighting fitting is <u>Ventilux Optilens (Escape Route Version)</u> (or equivalent).
Type	Description
<u>E4</u>	New IP67 rated 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 IP67 rated
emergency exit sign**

- Wall mounted.
- Housing - flame retardant grey ABS plastic.
- Panel - flame retardant clear polycarbonate plastic.
- Gear tray - powder coated sheet steel.
- Batteries (self-contained) - 4.8V 1.3A/h.
- IP67.
- Finish shall be grey (RAL 7044)
- 1 watt LED in total.
- 120lumens in emergency
- Lamp colour - 5000K
- Three-hour maintained.
- 6-year warranty
- The light fitting shall conform to the current BS ISO 3864-1, IS 1838:2013 & ISO 7010S standards.
- CE marked

The proposed lighting fitting is **Ventilux Exlux IP67** (or equivalent).

All luminaires shall be complete with all necessary control units that shall be used in conjunction with the LED light fittings. Ensure lighting supplier has included for all remote control units.

All luminaires to be complete with lamps, spare lamps and necessary items as per specification.

All luminaires shall comply with BS4533. All luminaires' photometric data shall comply with BS 5225. All luminaires shall be in accordance with IS EN 60598.

The Electrical Contractor shall ensure that luminaires of similar type have same photometric performance as published data within the tolerances defined by BS

5225. All hazardous area luminaires shall comply with IS EN 60079, and IS EN 50014; IS EN 50018 or IS EN 50020 as appropriate.

Final connection to luminaires shall be via a "KLIK" type connector junction box with 3 core 1.5sq.mm heat resistant flex (maximum length 0.75m) as final connection. Luminaires erected prior to the completion of wall, floor and ceiling finishes must be sealed from dust/dirt and protected from damage. Such luminaires may not be used for temporary lighting of the works unless approved.

Luminaires erected prior to the completion of wall, floor and ceiling finishes must be sealed from dust/dirt and protected from damage. Such luminaires may not be used for temporary lighting of the works unless approved.

63.06 Emergency Lighting

General:

The Contractor shall supply, install, connect, test and commission a fully comprehensive operational emergency/escape lighting systems for the building as indicated on the drawings. The emergency lighting installation shall be installed in conjunction with the fire alarm system. All emergency light fittings for the building shall be supplied, tested and commissioned by the Contractor.

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

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 Contractor shall supply and install the emergency lighting system and emergency light fittings in compliance with IS 3217:2013, 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 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

See section 62.03 above and drawing for further information on containment required.

New Electrical Boards:

All the new emergency light fittings shall be wired on the same circuits as the new general lighting in the building as indicated on the drawings. All the new general lighting in on each floor shall be wired from the new electrical boards on each floor in the building.

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

An emergency lighting test unit shall be provided in each electrical board 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 2 x 1.5 sq. mm. cables in conduit from a separate circuit on the lighting MCB board. See item 62.03 for cable carrier details and section 62.16 for information on type of cabling required.

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. 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 Contractor shall supply, test and commission all the emergency light fittings throughout the building. Refer to section 63.06 for further information on all emergency light fittings to be supplied and installed. The 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.

The Contractor shall ensure that all emergency signs shall be compatible with the emergency lighting test system, to allow these devices to be incorporated into the building-wide testing regime.

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).

LED Downlighter & Control Module

The surface mounted and recessed LED Downlighters shall operate in 3 hour non-maintained mode using a 4W high output LED.

It shall have a status indicator LED to display test results.

It shall be supplied with a 300mm flying lead terminated in a RJ11 plug for connection to a LED Control Module.

The light output of the LED shall be at least 200 lumens for the full duration of 3 hours.

The LED Control Module shall monitor the local mains and will operate the lamp in the event of mains failure.

It shall use Nickel Metal Hydride batteries contained within its enclosure for operation of the LED in emergency mode.

All connections shall be by a proprietary plug and socket arrangement with latching catches to prevent accidental disconnection.

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

Refer to section 62.16 for details on the cabling and wiring required.

Wherever possible, cables pre-wired with connectors shall be used to connect devices together. All cable carrying mains voltage shall be LSZH, coloured red to differentiate from standard wiring.

Wiring to new exit signs shall be in 2 x 1.5 sq. mm. LSZH in conduit to a surface/flush outlet box over which the fitting shall be mounted.

All new cables shall be supplied from the new electrical distribution boards in the building. Quantity and locations as indicated on the drawings.

Commissioning

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

The Electrical Contractor shall allow for fully testing and commissioning the emergency lighting system throughout each building 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 building:

- Carry out a full test on the emergency lighting system in the building. 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 building. 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 building.
- Check all emergency light fittings in the building 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 building 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 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 building. Results shall be recorded and any discrepancies highlighted.

After the test is completed, the Electrical Contractor shall confirm that all areas in the building 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.

Labelling:

The Contractor shall allow for labelling, numbering and identifying all the new emergency light fittings in the building. 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. For example, if an emergency light fitting is wired from the main electrical distribution board MDB-01, it should be labelled; MDB.01-EL-01 and MDB.01-EL-02 for the second fitting and so on. The unique label shall be highlighted on the record drawing as highlighted below.

Record Drawing:

The Contractor shall allow for preparing a record drawing of the installed emergency lighting system in the building which shall include all locations of emergency light fittings throughout the building.

The Contractor shall also highlight on this drawing the location, type and ID of light fitting for each building. This record drawing shall be included in the O&M manual. It is the responsibility of the Contractor who installs the system to produce a relevant record drawing to the satisfaction of the Engineer.

Certificates:

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

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

63.07 External lighting attached to the building

External lighting attached to the building shall be installed as per the drawings. The Contractor shall allow for the cabling and power to these new light fittings.

Supply and fit external lighting as per the drawings and specifications. Lighting circuits shall be as indicated on the drawings. All external lighting mounted on the building shall be carried out in 2.5mm² LSF cable run in conduit or trunking.

All external wall mounted light fittings shall be controlled by a photocell & analogue timeclock arrangement c/w hand-off-auto switch located inside the new sub distribution electrical board as indicated on the drawings.

Include for cabling and wiring all new external wall mounted light fittings back to the new sub electrical board (SDB.01) for the building. Location as indicated on the drawings. Cabling requirements as highlighted above.

Demonstration to be given to the Employer's Representative for setting of time clocks at future date. All times to be agreed with Client. Demonstration to be given to Client for setting of time clocks at future date.

See section 'Schedule of Light Fittings' in Section 63.06 below for information on the external wall mounted light fittings.

63.08 Cabling, wiring and cable sizes

Refer to section 62.16 for information on cabling and cable carrier.

63.09 Testing & Commissioning

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 Employer's Representative. The 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 ICT system

General:

The new extension shall be provided with a new independent CAT 6A UTP structured computer wiring system as per the drawings. The system as described below shall be installed in accordance with ISO 11801 and EN 50173. All equipment provided shall be from the same manufacturer to ensure optimum performance. The installed system shall be certified by the specialist Contractor with a twenty-year performance and components warranty.

All new structural wiring shall be terminated in new intermediate data cabinet which shall be located the store room as identified on the electrical drawings.

The new intermediate data cabinet shall be linked back and connected to the existing main distribution communications cabinet in the main school building as indicated on the drawings site services drawings.

The Contractor shall allow for the following to link the two comms cabinets:

- The Contractor shall allow for the supply and installation of a 4-Core OM3 50/125 multi-mode optical fibre optic cable between both cabinets. The distance between the comms cabinets is 135 metres.
- Supply and installation of 1no Gigabyte switches with fibre optic and multicore connector at each cabinet for the fibre optic cable.
- Connection of the fibre optic cable to each cabinet
- All other items of equipment deemed necessary to complete the installation as specified

Fibre optic cabling:

Unless stated otherwise all new fibre optic cabling shall adhere to the following specification:

- 4-Core OM3 50/125 multi-mode fibre optic cable
- Sheath shall be black colour.
- Fire retardant LSZH jacket
- Water and UV resistant
- Internal or external use
- 25-year warranty



The Contractor shall allow for the installation of the required number of patch panels for the new IT points in this new intermediate data cabinet and the supply and connection of data cabling from these patch panels to the new IT and telephone points.

All structural wiring shall be terminated in the new intermediate data cabinet as identified on the electrical drawings. All wiring terminations shall be RJ45 presentation. All new IT and telephone points shall be wired back and connected to this new intermediate comms cabinet. Allow for punching down the data cables.

In some instances, the IT points shall be installed in 3-compartment trunking, provide for 35mm deep back boxes (Single: VTS/60.35 WHI, twin: VTS/70.35 WHI from Mk Prestige Plus Range) and RJ 45 outlets (Single: K3827 WHI, twin K3828 from Mk Prestige Plus Range) at all IT points as indicated on the drawings. For surface mounted IT points, provide for surface steel conduit drop, draw wire, MK Metal clad Plus back boxes K8891 and RJ45 outlets.

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.

The Contractor shall allow for the following:

- The supply, installation, testing, commissioning and handover of a complete fully compliant Cat 6A structured cabling network for the new extension building as outlined in this specification and drawings.
- Supply, installation and commissioning of all IT cabling.
- Supply and installation of necessary face plates, comms cabinets, IT points, patch panels, etc. for the successful installation of the IT system.
- The punch down at each end of each of the Cat 6A cable for voice/data.

-
- Supply and installation of an intermediate comms cabinets in the Design & Communication Room as indicated on the drawings. See drawings for quantities and locations of all cabinets.
 - New fibre optic cable connecting and linking of the new intermediate comms cabinet in the Design & Communication Room in the new extension building back to the main comms cabinet in the main building.
 - All associated labour
 - All associated testing, labelling and Certification
 - All associated client training
 - All associated client handover documentation
 - All other items of equipment deemed necessary to complete the installation as specified

Wiring and Patch Panels:

The Contractor shall allow for the following wiring, cabling and patch panels for the IT installation:

- 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.
- Adequate number of UTP RJ45 Cat6A 24-port patch panels to suit number of IT points required in the building. See drawings for quantities of data/IT points required in the building. Allow for adequate number of 24-port patch panels to suit the number if IT points required.
- Adequate number of UTP RJ45 Cat6A outlets to suit number of IT points. See drawings for quantities of data/IT points required in the building.
- Adequate number of UTP RJ45 Cat6A patch cords to suit number of IT points as highlighted on the drawings. See drawings for quantities of data/IT points required in the building.
- Every second patch panel shall have a 2U horizontal cable management bracket mounted underneath.

Floor mounted intermediate comms cabinets in store room.

The Contractor shall allow for the supply and installation of a floor mounted comms cabinet which shall be for all the general IT, IT points for the CCTV system, door access systems, intercoms, etc.

The cabinet shall be as follows:

- IP 21 rated, 42U floor standing 800mm wide x 1000mm deep x 1968mm high cabinet.
- Cabinet shall be a 120-way, Cat 6A, RJ45 presentation in a 42U lockable enclosure. Cabinet shall be installed such that all equipment, including patch panels may be installed and serviced from the front. The Contractor shall provide MOF's as indicated on the electrical drawings (size to be confirmed by Specialised IT Contractor).
- Provide a 10-way 230V 3-pin power block within each cabinet. All cabinets shall be provided with an in built extract fan to allow hot air to escape.
- Front door shall have 4mm bronzed toughened glass
- Rear door shall be a vented steel door.
- Frame shall be of minimum 2 mm steel, doors and panels of minimum 1.5mm sheet steel, seam-welded.
- Fully removable steel sides
- Lockable doors front and rear. The cabinets shall be fitted with quick release front and rear perforated doors (approximately 60% open), fitted with lockable swing handles.
- Adjustable 19" mounting profiles front and rear
- High quality paint finish (Black powder coat)
- 800 kg static load capacity
- Supplied fully assembled
- The comms cabinets shall adhere to the following standards IEC 297-2, DIN 41494-7, DIN 41491-1, BS 5850/3192



IT points for CCTV system, door access systems and intercoms:

All the cabling for the IT points that are to be installed for the CCTV system, door access systems and intercoms shall be wired back and connected to the comms cabinet.

Allow for punching down the cabling to all IT points for the CCTV system, door access systems and intercoms at both ends.

Horizontal backbone system:

The data horizontal cabling shall consist of CAT 6A UTP (unshielded twisted pair) cable complying with EIA-TIA 568 up to and including 155 Mps. All cable runs on a system of cable trays/conduit to be supplied by the Electrical Contractor.

Each data outlet shall be connected to the RJ45 patch panel. Connect equipment via the above cable in a star topology format.

The length of each run shall not exceed 90m and total length from network device to network device including any leads must not exceed 100mts. If necessary, additional cross connects must be provided. UTP cable shall comply with EIA/TIA 568 (SPZ 840A) ISO 11801 and EN 50173 standards. UTP cables from each user locations shall be terminated at the comms cabinet in each location as indicated.

Work location system:

The data equipment shall be connected to RJ45 socket outlets via Category 6A device cables to EIA/TIA 568A, (SP 2840A), ISO IS 11801 and EN 50178 standards. Cables shall be terminated in RJ45 plugs and shall be 3m long.

The data outlets shall be supplied and fitted under this contract and shall be modular universals applications RJ45 type to EIA/TIA 568A, ISO IS 11801 and EN 50173 Category 6A.

Faceplates on dado/skirting trunking shall be selected to match exactly MK dado compartment trunking system as specified earlier in this document. They shall be flush mounted and be of an exact matching colour. Stand-alone RJ45 points shall be fitted with faceplates to match the finish of the electrical sockets as detailed earlier in this specification.

Quad faceplates in PVC WHI to match trunking as described above.

Punch-down and testing:

The specialist IT structured wiring contractor shall be responsible for punch down at each end of each Voice/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 specialist IT structured wiring contractor shall provide the engineer with three copies of Operating and maintenance manuals consisting generally of As-Installed Drawings, Hardware Manuals, Test Sheets, Port Plans, Certification and Warranty.

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.

Cable identification and labelling:

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

Training and Demonstration:

The Contractor shall include for demonstration and client training. Adequate notice shall be given to the client and, at an agreed time and in the presence of the engineer a training and demonstration event shall be provided.

64.02 Attendances to the installation of the telephony System

Not Applicable.

64.03 PA System

A new PA system to cater for the entire building shall be installed throughout the building. The PA console shall be installed in the principals office. The Contractor shall allow for the supply and installation of all new Public Address (PA) System

equipment required for all areas as indicated on the drawings including all speakers, cabling, and for re-routing any cabling to the new location in order to leave a complete working installation throughout.

A specialist sub-contractor shall be employed by the Contractor in order carry out all the final connections, testing and commissioning of the system.

The Contractor shall allow for the supply, installation, testing and commissioning of a complete public address for the entire building as indicated on the drawings and for re-routing the existing system. All areas as indicated on the drawing shall be linked back to a new independent public address control panel which shall be located in the Principals Office.

The supply of equipment, final connection of devices and commissioning shall be by the specialist supplier below with all other works performed by the Contractor. The Contractor shall allow for a complete installation within the tender price. All equipment as supplied by SKS Communications, or equivalent.

A new PA system Console shall be provided and installed in the principals office and all PA speakers shall be wired back to this console. The contractor shall allow for all equipment and attendances in supplying a complete system.

Zoning/Switching:

Classroom Switching:

The PA system shall be wired so that the Principal can independently speak to each classroom and office area throughout the building and subsequently, that each classroom and office area can talk back to the Principal. The PA system shall be a 2-way communication system.

Therefore, there shall be a dedicated switch for each classroom and office on the main PA console in the Principals Office so that the Principal and flick this switch and talk independently to a specific classroom throughout the building without other classrooms or areas hearing the conservation.

Subsequently, there shall be a switch on each PA speaker in all Classrooms, Offices, etc. that shall allow the teacher in each room to speak independently to the Principal if required.

In total, there is approximately 6no new speakers that the PA system will need to talk independently to from the Principals Office.

General Area Switching:

Apart from the switching highlighted above, the PA system shall be zoned so that certain areas are grouped together.

A separate switch for each zone (zones highlighted below) shall be installed on the main PA console so that the Principal can speak to all the zones separately.

Announcements for all Areas:

A single switch shall be installed on the PA system console that the Principal can activate so that when activated, the Principal can make an announcement to all the PA speakers throughout the School Building.

Zoning:

Apart from each classroom and office being independently switched, the PA system shall be zoned as follows:

1. External Areas (Zone 1)
2. Corridors (Zone 2)

Equipment:

The system shall consist of the following elements:

a) **Wall mounted PA Speakers in Classrooms, Quiet Space rooms, Offices, etc.**

Wall mounted speakers shall be installed in all SET rooms, Offices, Staffroom, etc. as shown on the drawings, allowing **2-way communication** from the main console in the Principals Office to these rooms throughout the building. Speakers shall also have a volume control switch so that the teacher can adjust the volume as required.

Speakers shall be vandal resistant loudspeakers and shall be mounted 1600mm above finished floor level. Final location of speakers to be agreed with the Employers Representative. These speakers will be 6watt with power tape of 3/1.5/.75/.3 Watts as a minimum.

The speakers will be constructed of metal and shall be white colour. Wall mounted speakers to be mounted 1600mm above finished floor level to be CES WAS-6061, or equivalent. Speakers shall be located at the teachers wall.

b) **Wall mounted PA Speakers for Corridors**

Wall mounted speakers shall be installed in all corridors allowing only **1-way communication** from the main console in the Principals Office to all corridors throughout the building.

Speakers shall be vandal resistant loudspeakers and shall be mounted 2100mm above finished floor level. Final location of speakers to be agreed with the Employers Representative. These speakers will be 6watt with power tap of 3/1.5/.75/.3 Watts as a minimum. The speakers will be constructed of metal and shall be white colour.

Wall mounted speakers within corridors shall be as CES WAS-6061. Speakers to be mounted 2100mm above finished floor level.

c) **External PA Speakers:**

External horn type weatherproof loudspeakers shall be installed for the external areas as indicated on the drawings.

The external speakers will be at least 15Watt horn type and be mounted at 3m AFFL in the locations outlined on the drawings. These speakers will be constructed of ABS plastic and must be IP64 rated. To be CES PRH-10301/8, or equivalent. Protective galvanised steel caging required. Speakers to be mounted 2100mm above ground level.

- d) CD player/tuner for the PA system, as Bosch LBB-1961/00 CD player/tuner, or equivalent. Allow for connecting the cabling for the PA speakers in the new Extension to the new main console. The new main console shall be located in the Principals Office.
- e) Power amplifier for the PA system, as Bosch LBB-1938/00 plena booster 720/480W, or equivalent.
- f) Paging microphone on desk stand with 'press-to-talk' button for the PA system to be located within the Principals Office as Bosch LBB-1946 6 zone call station, or equivalent. Final location to be agreed with the Client.
- g) Integral class change timer unit integrated into the PA system.
- h) All control equipment to be housed in 19" rack in the Principal's Office.

Wiring:

Cabling to each new speaker indicated throughout the building from the main console in the Principals Office shall be wired in a 2 x 1.5mm² screened speaker cable as Procab LS15W/1. Each conductor shall be fitted with a highly flexible jacket made of PVC and the whole inner section shall be packed by a paper foil

into a highly flexible outer jacket made of PVC. Cable shall be 100 Volt rated cable.

If applicable, in order to reduce the number of cables and reduce the space needed for cable containment, the Contractor shall allow for bringing the cabling as indicated above in a multi-core cable to certain parts of the building and splitting to the relevant rooms one in that area of the building.

The wiring to each new speaker shall be housed in a steel conduit system. Main runs of cable throughout the building shall be installed on a suitable cable tray which shall be installed surface mounted on the existing purlins in the corridor. See cable containment drawing for further information. Cabling to the main console in the Principals Office shall be terminated at a DIN rail within a junction box located adjacent to the cabinet rack in the Office. These cables will be terminated in a junction box installed no greater than 2m from the final console location.

64.04 Telephone point to passenger lift

Not Applicable.

64.05 Induction Loop System

A suitable Audio Frequency Induction Loop System (AFILS) shall be provided for the following areas as indicated on the drawings:

- Classroom 1
- Classroom 2
- Classroom 3

Allow for supplying and installing an independent Audio Frequency Induction Loop System (AFILS) for the areas identified above as AKM1 system from C-TEC, or equivalent.

Each system shall consist of the following:

- Audio input signal (e.g. microphone or other audio source) as APM plated microphone
- 'AFILS fitted' sticker
- Induction loop amplifier as PDA200E
- Induction loop cabling/tape
- Suitable Microphone
- Wall mounted metal enclosure

The induction loop shall be linked to a dedicated amplifier shall be installed in the room. The amplifier shall incorporate a minimum of two audio input sockets, one for the permanent link via the audio socket to the fire alarm voice activation system while the other one is available for a link to a stand.

A specialist AFILS provider should be consulted to design the optimum system for each class base. The layout of each system shall be designed to ensure that any spill over from one loop will not affect any other loops in the facility. This may require the installation of phased loop systems. Where applicable the installations shall be low spill array type loop systems in order to avoid cross talk between adjacent rooms. The induction loops shall comprise of a dual loop array installed beneath the finished floor covering at each area. The cable shall be an insulated flat copper foil tape.

- Type: Current Thinking ETFC. The loop drivers shall be Current Thinking ET-Secure amplifiers with dual loop array phase shifted drivers

Please note that all required equipment to supply a fully function system shall be provided for each system. (Source –Amplification –Loop)

The following points from BS7593-2006 shall be considered as a minimum requirement.

- Magnetic field strength produced by the loop (including the minimum compression to EN60268-3 0.56A m +/- 3dB
- Frequency response – 100Hz to 5kHz
- Distortion- Within IS EN 60118.1.1981 minimum.



65.0 RESERVED

66.0 TRANSPORT SERVICES

Not Applicable.

67.0 RESERVED

68.0 SECURITY AND PROTECTION

68.01 Fire alarm system

General:

A new fire alarm installation shall be installed for the building. The new fire alarm system shall be installed and commissioned in compliance with I.S. 3218:2024.

The existing fire alarm system within the existing school building shall be decommissioned.

All new devices shall be wired back and connected to the new main fire alarm panel in the main school building which shall be located as indicated on the drawings.

A fully addressable L2/L3 type fire alarm system fully in accordance with I.S. 3218:2024. and as identified in the drawings shall be provided for the entire school building.

The system shall comprise ionisation and optical smoke detectors, heat detectors, combined heat detectors, combined smoke detectors, alarm beacons/sounders, visual alarm devices, manual call points, fire alarm interfaces, short circuit isolators and similar alarm input devices, located as shown on the drawings.

The devices shall be connected in loops to the compact wall mounted addressable control and indicator fire alarm panel in the building. Located as indicated on the drawings.

Fire alarm systems by the following companies is acceptable:

1. Sidemen's
2. Tyco
3. Morley
4. Nulli Fire
5. Menveir Limited

The Fire Alarm System for the building shall be an 'Open Protocol' system with unrestricted access to replacement components and software so that there is no impediment to its future maintenance by companies selected by the Client.

Should any device within the building go into alarm or fault, the precise zone and state of that device shall be displayed in alphanumeric form on the liquid crystal display of the main fire alarm panel.

The recommended maximum mounting heights for the control panel is 1800mm to the upper edge of the cabinet and 1400mm to the bottom of the cabinet.

A dedicated 20amp clean power supply shall be provided to the fire alarm panel from the existing main electrical board in the building. The switch for the fire alarm panel shall be coloured Red, labelled "**Fire Alarm - Do not switch off**".

The main fire alarm panel shall adhere to the following specification:

- Type: Continuously monitoring panel complete with zone fault and alarm indication, test and supervisory internal sounder, mains healthy and power failure, and muting facilities.
- Battery: Panel shall be complete with an integral power supply unit with 72-hour battery standby. Battery shall be a minimum 24V 18Ah
- Display: White backlit 240 x 64 graphical LCD
- Technology: Dual flash-based processors with real-time clock, trace diagnostics, programmable languages and character sets
- LED Indicators: 22 red (1 x Fire, 1 x More Alarms, 20 x Zonal Programmable), 1 green (Power), 13 amber and 12 bi-colour (Fault & System)
- Controls: Alpha numeric keypad allowing navigation, reset, mute, silence, evacuate & 4no programmable push buttons
- Number of Fire Zones
Number of Loops
Devices per Loop: 2000 (200 per individual panel)
- Number

-
- of Loops: 2 loop control panel
 - Loop Current: 500mA per loop
 - On-Board Sounder Circuits: 2 x 1 Amp programmable
 - On-Board Relays: 2 x 1 Amp 30v AC/DC programmable (10mA, 5v min)
- expandable to 4
 - Auxiliary Supply: 1 x 24v 500mA
 - Programmable Input: 1 x monitored programmable input on-board
 - Mains Supply: 240V, 1.4A max
 - Serial ports: 1 x on-board RS232 connection for PC, modem, IP or portable printer
 - USB Interface: 1 x USB B type connection for PC communication
 - Programming: On-board keypad or PC running Windows tools
 - Event Log: 5000 Event & Diagnostic + 500 Fire
 - Enclosure: Steel IP30
 - Approvals: I.S. 3218:2024, EN 54-2:1998, EN 54-4:1998 and EN 54-13:2005

Smoke detectors:

The Contractor shall allow for the supply and installation of all smoke detectors throughout the new building as indicated on the drawing. All new detector heads in the new building 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.

The Electrical 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 BS 5446-1, IS EN 54-7 and IS3218. Sensitivity of the smoke detectors shall be set by the main panel control software.

Wiring used for detectors shall be in compliance with IS 3218:2013.

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, I.S. 3218:2024, BS 5446-1, IS EN 54-7.



Heat detectors:

The Contractor shall allow for the supply and installation of all new heat detectors throughout the new building as indicated on the drawing. All new detector heads shall include a condition indicating LED light and the heat 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.

The Electrical 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 BS 5446-1, IS EN 54-7 and IS3218. Sensitivity of the smoke detectors shall be set by the main panel control software.

Wiring used for detectors shall be in compliance with IS 3218:2013. Heat detectors shall adhere to the following specifications:

- Type: Addressable heat detector
- Sensor Method: Thermistor
- Sensor Element: Thermistor
- 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 + 80°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: EN54-5 / LPCB 041, I.S. 3218:2024, BS 5446-2, 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 new 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 IS 3218:2013.

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, I.S. 3218:2024, BS 5446-1, IS EN 54-7, BSEN50130-4, EN54-7, EN54-2 and EN54-17.



Combined heat detectors and sounders:

A number of new sounders shall be combined with heat detectors as indicated on the drawings. The Contractor shall allow for the supply and installation of all new addressable combined heat detector and sounder heads throughout the new 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 heat detectors sensors shall be complete with bases. See 'heat detectors' section above for specification on heat detectors.

The Contractor shall supply necessary address flags and address labels for all devices.

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

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

- Type: Addressable heat detector and sounder
- Sounder Base: Yes
- Sound output: 96dB(A) at 1metre
- Sensor Method: Thermistor
- Sensor Element: Thermistor
- 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 + 80°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: EN54-5 / LPCB 041, I.S. 3218:2024, BS 5446-2, IS EN 54-7, BSEN50130-4, EN54-7, EN54-2 and EN54-17.



Void Detectors:

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

Wiring used for manual call points shall be in compliance with IS 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.



External Alarm Sounder and Beacon:

A suitable weather resistant LED beacon and electronic bell sounder shall be supplied and installed by the Contractor at front of the new building as indicated on the drawing. External fire alarm sounders must have a distinct sound to any other sound activating unit such as intruder alarm system.

The sounders shall automatically silence after a period of 15minutes but the visual indicator on the external sounder shall continue to operate until the panel is reset. Sounders shall adhere to the following specifications:

- Type: Weather resistant flasher & electronic bell sounder
- Sound level: 109dBa
- Operating Voltage: 18V d.c. to 35V d.c.
- Number of tones: 32
- Operating frequency: 440Hz to 2900Hz
- Flash rate: c. 1Hz
- Operating Temp: -20°C to + 70°C
- I.P. Rating: IP65
- CE Conformity: EN54-11 & EN54-17



Combined smoke detector, sounder and Visual Alarm Devices (VAD's):

Some smoke detectors in the new building shall be combined with visual aid devices (VAD's) as indicated on the drawing as indicated on the drawings.

The Contractor shall allow for the supply and installation of all addressable combined smoke detectors and VAD's throughout the new building. All new detector heads shall include a condition indicating LED light.

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 combined detectors and VAD's shall be in compliance with IS 3218:2024.

The combined detector and VAD unit shall be ceiling mounted and shall be EN54-23 Compliant VAD and shall have low current consumption. The combined detector and VAD unit shall adhere to the following specifications:

- Mounting Height: 3m
- Mounting type: Ceiling mounted
- Sounder Base: Yes
- Sound output: 96dB(A) at 1metre
- Operating Temp: -20°C to + 50°C
- Ingress protection: IP21C
- Isolator: Yes
- Flash rate: Once per second
- Operating Voltage: 17-60V DC Polarity Sensitive
- Monitoring: Reverse Polarity
- Body Colour: White
- Flash Colour: White
- EN54-23 Coverage Code: C-3-8
- Coverage area: 8m cylinder diameter coverage
- Compliant with standards: EN54 Part 5, 7, 17 and 23
AS7240 15 (5&7) & 23
CE marked

Wiring used for devices shall be in compliance with IS 3218:2024.



Internal Magnetic Door Contacts:

The Contractor shall include for the supply and fitting of new magnetic door holders on fire doors as indicated on the drawings. All new magnetic door contacts shall be linked/interfaced to the fire alarm system and power supply units as required. All magnetic door holders shall be complete with manual over-

ride switches and power supply units. See drawing for quantity and location of magnetic door contacts.

Door holders shall hold fire doors in the open position in normal operation, releasing the door to swing closed on fire alarm activation or loss of mains power. Door holders shall be wall mounted magnetic type, metal robust construction, supplied with 12 or 24 volt transformer and incorporating a release switch accessible from floor level. Each door holder shall be supplied with a receiver to be mounted on the door, with an articulated joint to ensure holding of the door by the wall magnet.

Door holders shall be suitable for releasing fire doors, with rated power size of 4 for an 100mm door leaf with shear force of 80kg in accordance with European Standards BS-EN: 1155.

Wiring used for devices shall be in compliance with IS 3218:2024.



Aspiration smoke detection system for the lift:

Not Applicable.

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:

- MCC controls panel.
- Gas detection panel.
- Door access controllers.
- Any other items described on the drawings.



Drawing/Map:

The Contractor shall allow for installing a laminated A3 drawing of the new fire alarm system installation and devices in the new building at the new fire alarm panel location to indicate where all fire alarm devices are located throughout the new building.

This drawing shall indicate and identify the location of the fire alarm devices throughout the building i.e. on the alarm panel if it identifies that the device 45 has gone into alarm, you should be able to see on the drawing where device 45 is located.

Wiring:

All new cabling used for the fire alarm system throughout the new building and the existing school building shall meet classification 'PH120 Enhanced'.

The entire fire alarm system shall be wired in 2 x 2.5 sq. mm 'Prysmian FP Plus' fire alarm cabling (or equivalent) as specified below.

The fire alarm cable shall be rated at 120mins in compliance with BS 8432-2 (flame, shock and water spray). 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 2.5 sq. mm to meet the requirements of BS EN 60228 class 1 or class 2.

Insulation:

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 colour shall be red.

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

The Electrical 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.

Testing & Commissioning:

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 IS 3218:2024.

The Contractor shall allow for the following during the commissioning:

- Carry out a full test on the new fire alarm system 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 new building.
- Confirm that the new fire alarm system in the new building is linked to the existing fire alarm system in the existing building.
- The Contractor must confirm that the entire system all components operate satisfactorily. The Contractor shall test for:
 - Operation of each device function
 - Operation of integral indicators (LED's, etc)
 - Fire alarm panel indications and functions
 - Network functions

Certificates:

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

- 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:

A new cable carrier shall be installed for the new fire alarm installation in the building. A system of galvanised steel cable tray shall be installed to distribute the fire alarm cabling throughout the building. Cable containment shall be Uni-trunk or equivalent. Refer to section 62.03 below for further information on cable containment.

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. The majority of main runs of the cable containment shall be installed at high level above the ceiling in the ceiling void, and as a result, shall be hidden. Refer to the drawings for further information.

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

Where trunking or cable tray systems 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.

68.02 Emergency call systems

3no. accessible toilet shall be installed in the building as indicated on the drawings. For these toilet, the Contractor shall allow for the supply and installation of an emergency call system consisting of an alarm cord, reset button and over door buzzer/light, for the accessible toilet as indicated on the drawings.

The reset button for each toilet shall be installed within each WC to ensure the assistant check the room prior to resetting the alarm. The pull cord for the alarm shall be installed in the immediate vicinity of the WC in the toilet, to allow the users to call for help. The over door buzzer/light for the alarm shall be installed in a place adjacent to the toilets, where it is highly visible.

A remote zone controller shall be installed to monitor the emergency call system in each toilet and this shall be located in the main lobby. Wiring shall be carried out in 4-core security cable. See detail on drawing for further information.

The Contractor shall allow for the supply and installation of the following for **each** accessible toilet in the building:

- 1no 'One Zone' controller
- 1no Ceiling pull cords
- 1no Overdoor light with sounder
- 1no Reset button (located within the toilet)
- 1no Accessible WC sticker
- 1no Call latch module
- 1no 12volt power supply unit to cater for each system.

Allow for a 230Volt 13amp fused spur switch at the location of the zone controller.

See drawings for quantity of emergency call systems required.

Acceptable systems are Robus RDPTA-01, CTec NC951, or equivalent.



68.03 Disabled refuge system

Not Applicable.

68.04 Intruder alarm system

General:

A new intruder alarm installation shall be installed for the new extension as indicated on the drawings.

All new intruder alarm devices as indicated for the new building shall be wired back and connected to the new intermediate intruder alarm panel in the new building which shall be located as indicated on the drawings. The new intermediate intruder alarm panel shall then in turn be linked and connected to the existing main intruder alarm panel in the existing building as indicated on the drawings.

See drawings for the locations in the new building where new intruder alarm system devices shall be installed and also for the location of the existing main intruder alarm panel in the existing school building.

All cabling shall be run in galvanised steel conduit. The Contractor shall be completely responsible for the supply, installation, testing, commissioning and handover all elements of the security installation.

A new intruder alarm system shall be installed throughout the new building comprising of passive infrared (PIR) dual tech movement detectors and window/door contacts as indicated on the drawing.

The entire intruder alarm system and devices shall be supplied and installed by the Electrical Contractor. The Electrical Contractor shall provide a 3 gang 220-volt 13-Amp fused spur outlet with neon indicator at all necessary equipment positions such as panels, etc. Spur outlets shall be located at the equipment positions as required.

Proposed equipment layouts are as shown on the drawings, however all precise locations to be confirmed on site with the Employer's Representative. The systems installed shall also comply fully with IS 199:1987, ISO: 9002: 1987, DD243:2004 (sequential verification of alarms) and all subsequent amendments.

Intruder alarm installations shall be installed in compliance with EN50131/1 Intruder Alarm Systems.

The Electrical Contractor shall employ a suitably qualified ISIA company to install the Intruder Alarm system. The specialised Contractor shall design, install and commission a fully operational intruder alarm system, which shall comply to IS199. The specialised Security Contractor must be a suitably qualified ISIA company and shall be NSAI accredited. A certificate of compliance shall be required on completion of the works as will a unique reference number from the Garda Authority for monitoring purposes.

Intermediate intruder alarm control panel:

The new intermediate intruder alarm control panel shall be as follows:

- Multiple Alarm Zones individually monitored.
- Full Alpha-numerical display (programmable).
- Exit/entry timers (programmable)
- Anti-false alarm features.
- System programmable for employer's initial requirements and reprogrammable for continued expansion of system.
- Standby power supply.
- Compatible with the existing intruder alarm system in the existing school building.
- Multiple Alarm Zones individually monitored.
- Full Alpha-numerical display (programmable).
- Exit/entry timers (programmable)
- Anti-false alarm features.
- BS8243 and PD6662:2010 Compliant
- EN 50131-1 Grade 2
- Environmental Class II

Integral alarm output facilities (software/hardware) to interface with separate remote monitoring systems (which will incorporate text & graphics displays) to indicate status/alarm/fault conditions of, and to control of each detection component of the intruder alarm system.

The system shall have the topology to provide individually addressed selection of each contact and sensor via a local address modules connected to the central monitoring panel by dedicated communications bus.

The Contractor shall size the system proposed such that each sensor and contact may be individually addressed, monitored and controlled from the Control Panel.

Each communications bus line and component to the local address module link shall be continually monitored for alarm, tamper or fault conditions.

The control panel shall be protected – hardware by anti-tamper sensors; software by password protection (a minimum of two levels of access).

The system shall incorporate a standby power supply – battery and charger unit (input power supply 230V, 50 Hz) – to sustain the complete system for up to 12 hours of active usage.

The Contractor shall allow space for a minimum of 2 no. future detection loops in the intruder alarm panel.

Indication shall be presented at the local keypad of the status of each local zone. The system shall be arranged so that all alarm bells are sounded and zone indication is given at the control panel. The Electrical Contractor shall be responsible for the correct operation of the system and all components. Should a fault develop on any part of the system within the twelve months maintenance period, the Electrical Contractor shall replace the faulty section/component free of charge (no charge to be made for materials, labour and/or expenses.) Should any component in the system have repeated faults/failures, the Contractor shall replace the component

Install an 'Aritech' (or equivalent) type panel with a facility for a minimum of 2 no. remote keypads.

The Electrical Contractor shall install 100 meters of cabling linking the existing main intruder alarm panel in the main school building to the new intermediate intruder alarm panel located in the new extension building as per the drawing 19-096 62(E004).

External Sounders:

New external sounders:

New external sounders shall be standard security version comprising 2 tone sounder and strobe light. Sounders shall be tamper proof, corrosion proof, with battery state monitoring system at the control panel. Battery life a minimum of 8 hours.

To allow programmable options for use of strobe and sounder. Sounder to have automatic cut off facility conforming with noise regulations. External sounders shall be configured to silence after 30 minutes in operation. Strobe lights shall continue in activation until reset manually. External sounders to be fitted with galvanized steel mesh cages to be supplied and fitted by the Contractor.

The external alarm unit shall be housed in a weatherproof cabinet which shall incorporate battery standby and be fitted with flashing strobe protected by a weatherproof wire cage.

External sounders shall be as 'HKC SABB' low profile external sounder complete with strobe (or equivalent). Sounders shall be configured to silence after 30 minutes in operation.

External sounders shall adhere to the following specification:

- Polycarbonate housing in white
- Strobe lens in blue
- Electronics potted in epoxy resin
- Diagnostics mode for ease of fault finding
- Selectable LED patterns
- EN50131-4
- EN Grade 2
- Environmental Class IV

Cage:

Include for a steel cage to protect the HKC SABB (or equivalent) external sounders from physical damage as HKC HN8-SAB-CAGE (or equivalent).

Key Pads:

The existing key pad shall be retained.

Movement Detectors:

The Electrical Contractor shall allow for the supply and installation of all PIR movement detectors as indicated on the drawings. Detectors shall be dual technology type incorporating passive infra-red and microwave technologies, and remote walk test facility to enable routine testing. Movement detectors shall be of the Passive Infra-Red/Microwave 'Dual Tec' type of sufficient range and coverage for areas indicated. They shall be suitable for Wall or Truss Mounting as appropriate. The sensor shall be suitable for the coverage of the perimeter window areas as indicated on the drawing. All alarm sensors shall be suitable for the areas and locations which they are installed and shall include full anti-tamper facilities.

Dual technology sensors shall adhere to the following specifications:

- Dual element pyro-electric sensor
- X-band DRO based microwave
- Optional lenses 18m and 30metre
- Anti-masking detection
- 0-1m adjustable mask detection
- Selectable EOL (End Of Line) resistors
- AND/OR technology

-
- Patented Independent Floating Thresholds (IFT)
 - Blue wave technology
 - Auto sensitivity feature
 - Digital temperature compensation
 - Triple LED indication
 - Sealed optics
 - Tamper proof brackets included
 - ABS plastic
 - Tested and certified to IS EN 50131-2-4

Internal Sounders c/w flash:

The Electrical Contractor shall allow for the supply and installation of all internal sounders as indicated on the drawings. Internal sounders shall be 12volt d.c. electronic 'SQR Sounder'. As 'HKC HN8-ECHOFLR' low profile sounder complete with strobe (or equivalent). Sounders shall be configured to silence after 30 minutes in operation.

Internal sounders shall adhere to the following specification:

- High output dual piezo
- Variable volume control
- Housing with tamper switches
- Sounder shall come with strobe (red or blue). Strobe and sounder shall adhere to the following specifications:
 - Strobe Current: 120mA
 - Siren Current: 135mA
 - Strobe: 1W
 - Siren: 104dB at 1m
 - Weight: 150g
 - Size: 150mm x 100mm x 36mm
 - EN50131-4
 - EN Grade 2
 - Environmental Class II

Magnetic Reed Door Contacts/Inertia Sensors:

The Electrical Contractor shall allow for the supply and installation of all magnetic reed door contacts and magnetic reed window contacts as indicated on the drawings. Magnetic reed contacts for external doors and windows where indicated on the drawings shall be of the double reed magnetic type with shock sensors as required.

Cable containment:

A new cable carrier shall be installed for all cabling to the intruder alarm system throughout the building as indicated on the drawings. All new cabling for the intruder alarm system installation shall be installed in a steel conduit/trunking system. See section 62.03 for further information on cable carrier.

Connection to the existing main intruder alarm panel:

The Electrical Contractor shall ensure that the new intruder alarm panel in the new building is linked to the existing main intruder alarm panel in the existing building.

The Contractor shall ensure that the new intruder alarm system in the new building is monitored via being linked to the existing main intruder alarm system in the main building.

Commissioning:

Allow for commissioning and testing of the entire intruder alarm installation once all works have been completed. Commissioning Certificates to be included within as fitted manuals. The intruder alarm panel shall be fully labelled and the zone charts handed over to the Client before the system is fully commissioned.

A certificate of commissioning shall be forwarded to the Employers Representative on the day after commissioning. Commissioning Certificates to be included within 'As-Built' O&M manuals.

Intruder alarm cabling:

All intruder alarm cabling to devices and between intruder alarm panels shall be 6-core security alarm cable and shall adhere to the following specifications:

- 6-cores
- White jacket colour
- Maximum Resistance less than 155 Ohm/km
- BS4737-3.30: 2015 Type 3 (Yellow Rip Cord)
- Voltage Rating 50Vrms
- Jacket Material Lead and Tin Free PVC
- PVC Insulation – BS EN 50636-3 TI 1
- PVC Sheathing - BS EN 50636-4.1 TM1
- Conductor Material Tinned Copper
- External Diameter 3.8mm (nominal)

68.05 Door & Gate access systems (Internal & External)

General:

New door and gate access systems shall be supplied, installed and commissioned by the Electrical Contractor in the building as indicated on the drawings.

The Electrical Contractor shall allow for supplying all necessary power supplies and cabling to the door access system installation as indicated on the drawings. Quantities and locations of all door access devices are as indicated on the drawings.

Electrical attendances:

The Electrical Contractor shall allow for providing the following electrical attendances to the door access installation. Quantities and locations of all electrical attendances are as indicated on the drawings:

- 13amp 230volt fused spur outlet power supply at high level above the door where each door access system is to be installed. This is for the power supply to the door access system controller. Height of the fused spur is highlighted on the drawings. Final location of the spur outlet to be confirmed in conjunction with the door access system specialist on site.
- 1no CAT6 data point terminated in a RJ45 outlet to each door access system. Height of the data point is highlighted on the drawings. The CAT6 data point to each door access system shall be supplied from the comms cabinet in the store room. The data point for the door access system shall be wired in series back to the comms cabinet in conjunction with all the other data points for the door access systems. Final location of data point to be confirmed in conjunction with the door access system specialist on site.
- 1no fire alarm interface (I/O unit) from the fire alarm system to each door access controller at high level above the ceiling. Refer to section 68.01 for further information on the fire alarm interfaces. The door release facility for each system shall also be linked to the fire alarm system so that in the event of fire activation the respective doors shall release.
- All necessary cable containment for all electrical attendances to each door access system.
- For each door access system the Contractor shall allow for installing the necessary back boxes for the door release button, emergency break glass unit and proximity reader. See drawings for quantities and locations.
- For each door access system the contractor shall allow for installing the necessary conduit to the back boxes for the door release button, emergency break glass unit and proximity reader. See drawings for quantities and locations.

Door /gate access equipment to be supplied and installed:

The Electrical Contractor shall allow for the following quantities per door access system for the internal doors:

Readers:

- 1no. proximity readers as 'Paxton Proximity P50 reader', (or equivalent).
- 1no. mounting brackets and plate for proximity readers.
- 4no 'Paxton Net2 Plus' one door ACU's with 2A PSU's in plastic cabinet, (or equivalent).

Software:

- Paxton Net2 standard software to suit the networked door access system, (or equivalent).

Door release buttons:

- 1no Single gang door release buttons as 'AEB2 Flush vandal resistant Press-To-Exit button' (or equivalent). Button shall have 'PRESS TO EXIT' printed on the screen.
- 1no suitable MK gang back boxes for the door release buttons which shall be flush mounted.

Emergency break glasses:

- 1no Green resettable call points as 'AKA-MCP4A-GF' (or equivalent).
- 1no suitable MK back boxes for the call points which shall be flush mounted.

Magnetic locks and power supplies:

- 1no 2amp 12VDC single output switch mode boxed PSU 13.8v charging circuits for the access systems. 7AH BB.
- 1no 12/24vDC magnetic door locks for the doors as 'Deedlock AEM10020 Single Monitored Magnet' (or equivalent).
- 1no 'L' & 'Z' bracket kits for the mini-mag locks.
- Lock shall be suitable for a single door with a holding force of 1200lbs.
- The finish on the lock shall be satin anodised aluminium finish.
- Include for safety bolts which prevent magnet from detaching from bracket.
- Include for 6no power supply units for the magnetic door release.

Fobs:

- 50no. proximity keyfobs for use with above as Paxton Net2 proximity keyfobs (or equivalent).

Power supplies:

- A 13amp 230volt single phase fused spur outlet to each power supply unit for the door access system (4no in total).

Cable carrier:

A new cable carrier shall be installed for the new electrical attendances to the door access system throughout the building as indicated on the drawings. All new cabling shall be installed in a steel conduit/trunking system. See section 62.03 for further information on cable carrier.

68.06 CCTV system

General

The Electrical Contractor shall be responsible for the supply, cabling, installation, testing and commissioning of the complete CCTV system for the extension building as indicated on the drawings. The CCTV system shall be an IP networked CCTV system and shall be installed and commissioned by the contractor. The new CCTV system shall be connected to the existing CCTV system

The Electrical Contractor shall allow for supplying all necessary power supplies and data points to the CCTV system installation as indicated on the drawings. Quantities and locations of all CCTV camera, monitors and recorders are as indicated on the drawings.

A fully digital closed circuit television system shall be provided to ISEN50131/1 and IS199. Camera positions and type shall be as indicated on the drawings and as specified in these documents. Recording equipment shall be located in the Admin office as indicated on the drawings. The Contractor shall employ a suitably qualified ISIA company to install the CCTV system. The specialised CCTV Contractor shall design, install and commission a fully digital closed circuit television system, which shall comply to ISO EN50131/1 and IS199. The specialised CCTV Contractor must be a suitably qualified ISIA company and NSAI accredited.

Electrical attendances:

The Electrical Contractor shall allow for providing the following electrical attendances to the CCTV system:

Internal cameras in the Building:

-
- 1no CAT6 data point terminated in a RJ45 outlet to each internal CCTV camera. Height of the data point is highlighted on the drawings. The CAT6 data point to each CCTV camera shall be supplied from the comms cabinet in the store room as indicated on the drawings. Final location of data point to be confirmed by the CCTV system installer.
 - Supply and installation of the CCTV camera and final connection of power supply and IT cable to the camera.

External cameras on the Building:

- 1no CAT6 data point terminated in a RJ45 outlet to each internal CCTV camera. Height of the data point is highlighted on the drawings. The CAT6 data point to each CCTV camera shall be supplied from the comms cabinet in the storeroom as indicated on the drawings. Final location of data point to be confirmed by the CCTV system installer.
- Supply and installation of the CCTV camera and final connection of power supply and IT cable to the camera.

Wall mounted CCTV monitor in the Building:

- Existing wall mounted monitor within the principal office shall be retained.

All cabling shall be run in galvanised steel conduit. Refer to the drawings for the location of all the CCTV equipment in the building.

Conduit runs serving wall mounted CCTV devices shall terminate in the devices own box.

A 13A-power fused spur outlet with neon indicator shall be provided at each of the CCTV cameras, monitors, multiplexer/recorder and video positions indicated on the drawings. CCTV cabling and devices shall be supplied and installed by the Electrical Contractor.

The Electrical Contractor shall co-ordinate and optimise the location of the external light fittings with the external CCTV cameras. Where possible, the light source should be above and behind the camera. If this is not possible, the light source shall be at 90° to the main viewing axis of the camera.

Proposed equipment layouts are as shown on the drawings, however all precise locations to be confirmed on site with the Employer's Representative. All mounting structures and brackets for all devices shall be included for in the tenderer's price.

Cable containment:

A new cable carrier shall be installed for all cabling to the CCTV system throughout the building as indicated on the drawings. All new IT cables and power supplies to the CCTV system installation shall be installed in a steel conduit/trunking system. See section 62.03 for further information on cable carrier.

General areas:

In the General areas of the building, all electrical containment (conduits, tray, trunking, etc.) shall be recess mounted. The new electrical distribution system shall be installed in a steel conduit/trunking system throughout the general area which shall be located concealed at high level.

Cameras:

Internal CCTV cameras

Fit internal network dome cameras in the building with the following specifications (refer to drawings for quantities):

- Type: 4MP high resolution network dome camera
- Network: Yes
- POE: Yes
- IP rating: IP67
- Housing Colour: Ivory or White
- Image Resolution: 2688 H x 1520V
- Image Sensor: 1/2.9" Progressive Scan CMOS
- Day and night: IR cut filter with auto switch
- Min. Scene Illumination: 0.01lux @ (F1.2,AGC ON),0lux with IR
- DNR: 3D DNR
- Wide dynamic range: 120db
- Iris: F2.0
- Shutter time: 1/3 s to 1/100,000 s
- Lens: 4mm
- Synchronisation: Internal synchronisation
- Communication Interface: 1 RJ45 10M/100M self-adaptive ethernet port
- Auto gain: Low/Middle/High/Off
- D/N mode: Colour/BW/EXT
- White balance: Auto/manual
- Privacy mask: On/Off
- Motion detection: On/Off
- Integrated IR Lighting: Yes (IR LEDs)

-
- | | |
|--------------------------|------------------------------------|
| • Infrared: | Yes |
| • IR distance: | 30metres |
| • Iris Mode: | AES only |
| • Power Source: | 12V DC |
| • Power Consumption: | 5.0W |
| • Approximate Dimension: | 115mm (diameter) x 83mm (height) |
| • Approximate Weight: | 500g |
| • Operating Temperature: | -30° C to 60° C |
| • Humidity: | 0% to 95% relative, non-condensing |
| • Notes: | Compatible with network system |
| • Camera manufacturer: | Hikvision, or equivalent. |

Allow for supplying the following in conjunction with the camera:

- The necessary brackets for wall or ceiling mounting the camera.
- Allow for supplying and installing all junction boxes and all necessary accessories for installing all the cameras
- Any other items that the Contractor deems necessary.



External CCTV cameras

Fit external network bullet cameras in the building with the following specifications (refer to drawings for quantities):

- | | |
|----------------------------|---|
| • Type: | 4MP high resolution network bullet camera |
| • Network: | Yes |
| • POE: | Yes |
| • IP rating: | IP67 |
| • Housing Colour: | Ivory or White |
| • Image Resolution: | 2688 H x 1520V |
| • Image Sensor: | 1/2.9" Progressive Scan CMOS |
| • Day and night: | IR cut filter with auto switch |
| • Min. Scene Illumination: | 0.01lux @ (F1.2,AGC ON),0lux with IR |
| • DNR: | 3D DNR |
| • Wide dynamic range: | 120db |

-
- Iris: F2.0
 - Shutter time: 1/3 s to 1/100,000 s
 - Lens: 2.8 - 12 mm @ F1.4, motorized lens (-Z), angle of view: 112°~33.8°
 - Synchronisation: Internal synchronisation
 - Communication Interface: 1 RJ45 10M/100M self-adaptive ethernet port
 - Auto gain: Low/Middle/High/Off
 - D/N mode: Colour/BW/EXT
 - White balance: Auto/manual
 - Privacy mask: On/Off
 - Motion detection: On/Off
 - Integrated IR Lighting: Yes (IR LEDs)
 - Infrared: Yes
 - IR distance: 30metres
 - Iris Mode: AES only
 - Power Source: 12V DC, POE
 - Power Consumption: 5.5W
 - Approximate Dimension: 95mm x 105mm x 260mm.
 - Approximate Weight: 1200g
 - Operating Temperature: -30° C to 60° C
 - Humidity: 0% to 95% relative, non-condensing
 - Notes: Compatible with network system
 - Camera manufacturer: Hikvision, or equivalent.

Allow for supplying the following in conjunction with the camera:

- The necessary brackets for wall mounting or pole mounting the camera as advised by the supplier.
- Allow for supplying and installing all junction boxes and all necessary accessories for installing all the cameras
- Any other items that the Contractor deems necessary



Specification:

The installation shall comply fully with IS EN 50132, IS EN 50131, IS 199:1987 and ISO: 9002: 1987 and all subsequent amendments. The specialised CCTV Contractor that the Contractor employs must be ISIA qualified and NSAI registered.

Monitors:

The Contractor shall allow for the supply and installation of 2no. 22" LCD flat panel colour monitors in the following areas:

1. New ASD Unit store room.
2. Existing office

All flat panel monitors shall adhere to the following specifications:

- LED backlit technology with full HD 1920x1080
- Wide view angle: 170° (H)/160° (V)
- 3D comb filter
- 3D De-interlace
- 3D noise reduction
- Multiple inputs: HDMi, VGA, audio in,
- Built-in speaker.

Final locations of the monitors within the rooms are to be agreed with the Employer's Representative.

Digital Recorder:

The existing digital recorder within the school principal office shall be retained.

New ASD unit Area

Supply and install a 16-Camera NVR to receive video output from all cameras.

The digital recorder shall be a network recorder and shall be set up so that the system can be accessed via phones and computers.

The proposed NVR is a Hikivision DS-9600NI-I8, or equivalent.

Digital recorder for this project shall adhere to the following specifications:

Video/Audio Input:

- Audio input: 32-channel
- Two Way Audio: 1-ch, RCA (2.0 Vp-p, 1 K Ω) (using audio input)
- Audio Input Interface: 4-ch, RCA (2.0 Vp-p, 1 K Ω)

Network:

- Incoming bandwidth 320 Mbps
- Outgoing bandwidth 256 Mbps

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- Remote connection: 128

Video/Audio Output:

- HDMI Output: 4K (3840 x 2160)/60 Hz
- Recording resolution: 12MP
- Frame rate: 8 MP@8fps
- Audio Output: 2-ch, RCA (Linear, 1 kΩ)
- Playback Resolution: 12MP
- Synchronous playback: 16-channel

Hard disk driver:

- Interface type: 8 SATA Interfaces
- Capacity: Up to 6TB capacity for each HDD
- E-SATA Interface: 1 eSATA interface

External interface

- Network interface: 2; RJ-45 10/100/1000 Mbps self-adaptive Ethernet interface
- USB Interface: 2 USB 2.0 Interface on the front panel
1 USB 3.0 Interface on the rear panel
- Alarm input: 16-channel
- Alarm Output: 4-channel

General information:

- Power Source: 230V
- Power Consumption: 30W
- IP rating: IP66
- Approximate Dimension: 450mm x 470mm x 90mm
- Approximate Weight: 700g
- Operating Temperature: -10° C to 55° C
- Humidity: 10% to 90% relative, non-condensing
- Notes: Compatible with network system

69.0 COMMISSIONING, INSTRUCTION TO CLIENT AND HANDOVER

69.01 Commissioning of systems

Scope

Testing, Commissioning, Certification (TCC) and handover of the works specified.

Standards

- The sections of any standard specified for these works, that dictate testing, commissioning and/or certification formats or procedures
- RECI

Procedures

All systems and equipment must be fully tested and commissioned by the Contractor in accordance with the standards specified, the manufacturer's instructions and the specific requirements of these specifications. Spot testing will not be acceptable for any systems.

The Contractor shall supply, at his own expense, any and all equipment, labour and materials necessary to carry out these works as specified.

Practical Completion shall be withheld until all TCC is complete.

Prepare a schedule of all TCC works required for the project and proposed dates for the execution of same. the Engineer shall be informed of all TCC works a minimum of 3 working days in advance.

Submit written confirmation of all tests executed. Present clearly written or typed commissioning reports and provide original certificates where available.

Testing and Commissioning

Carry out testing and commissioning as follows:

- To all manufacturers specifications.
- For all cable systems (By installer of cable systems).

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- Fully test and commission fire alarm panel and all devices individually (By system supplier).
 - For addressable systems, verify addresses by confirming same during device test activation (By system supplier).
 - Test battery back-up operation (by system supplier).
 - Perform audibility test throughout facility. Provide written confirmation of test results (by system supplier).
 - Test all external interfaces with the fire alarm system (e.g. HVAC panel, gas detection, etc.) and confirm results in writing. Overall responsibility for this test is with the Electrical Contractor. The Systems Supplier will also be involved.
 - Perform sounder sequencing tests and confirm operation of sounders is in full accordance with the specifications.

Certification

- To IS 3218: 2009, 4 part Model Form.
- RECI Certificate as required.
- Systems/components certification.

Commissioning Records and Reports

All checks, measurements and adjustments must be recorded in writing at the time they are made by the commissioning staff, and copies made available immediately to the Engineer. The form that this report will take shall be agreed with the Engineer prior to commissioning.

When the Contractor is satisfied that the plant and systems have been correctly commissioned, he shall submit a final report to the Engineer, setting out all matters relevant. The final format of this report shall be agreed with the Engineer before completion.

Handover of systems

When the Contractor has satisfied the Engineer that all commissioning has been completed satisfactorily, that the Clients staff have been adequately briefed on all plant and in all maintenance procedures, that all spares have been duly handed over and placed in stores, and that all instruction and maintenance manuals, together with all record drawings, have been delivered to the Client and the Engineer, the Engineer shall issue Completion Certificates to the Contractor. Each

section of the plant shall then be handed over to the Clients representative in the presence of the Engineer.

69.02 O&M Manuals

The Contractor shall provide a Class D Operating & Maintenance manual.

To facilitate submission of record drawings, the Contractor shall keep on site a complete set of all drawings used on the Contract Works, on which he shall mark alterations to the designs shown thereon as such alterations are carried out. THIS PROCEDURE SHALL BE STRICTLY ADHERED TO.

Three prints shall be supplied of each drawing in addition to 3no compact disks containing all drawings in AutoCAD 2008 Format.

All operation and maintenance manuals along with their associated record drawings shall be prepared in accordance with the requirements of BSRIA document 1/ 871 Operating and Maintenance Manuals for Building Services Installations.

Three complete sets of Operating and Maintenance Manuals and record drawings shall be supplied to enable the Employer to operate and maintain the systems correctly. The manuals must therefore contain all necessary technical information on each item of equipment and the associated components which have been used to assemble and construct the system(s). Three no. hard copies and three no. soft copies of the final approved O&M documentation will be required.

In addition, manuals for each system must contain information on the design intent of the system, commissioning and testing results and reports of how the components of the system are adjusted to achieve the design intent, line diagrams to show how the system is arranged in the building giving the location of all equipment and components, its control system, how the system must be set in the normal operating mode and in the event of any emergency, routine check that must be made and a list of spares which should be kept and a list of any special tools which may be required.

The manuals must be prepared in such a way that an Engineer without any previous knowledge of the Project may use them to operate and maintain the system.

Contents of Manual

The Operating and Maintenance Manual shall be specific in respect of the complete Contract Works and shall include the following sections:

➤ Section 1	Description
➤ Section 2	Plant and Engineering Systems
➤ Section 3	Lighting Control Systems
➤ Section 4	Operating and Maintenance Procedures
➤ Section 5	Commissioning and Testing
➤ Section 6	As-Built drawings

Section 1 – Description

This section shall comprise:

- A detailed description of each building services system
- General description of all plant and equipment
- A detailed description of the automatic lighting control system
- Design data for the system and for each item of plant which affects the performance of the system

Section 2 - Plant and Engineering Systems

This section shall comprise:

- Detailed technical information as published.
- Manufacturers drawings (where applicable) showing all components of the plant item with each component number in accordance with the parts list
- Parts list for each item of plant
- Manufacturers addresses and telephone numbers
- Complete instructions for ordering replacement parts in a manner that will prevent errors or misunderstanding including order number for each plant
- Installation instructions as provided by manufacturer
- Colour coding identification schedule for each building services system
- Detailed schematics of the installed electrical boards, including manufactures details, board charts, etc.

Section 3 - Lighting Controls System

This section shall comprise:

- Wiring diagrams of lighting and lighting control systems.
- Parts list for each different type of item.

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- Manufacturer's addresses and telephone numbers.
 - Complete instructions for ordering replacement parts in a manner that will prevent errors or misunderstanding, including order number for each component item.
 - Installation instructions as provided by manufacturers.

Section 4 - Operating and Maintenance Procedures

- A step-by-step method of starting, operating and shutting down a system and how this affects other systems. The procedure for an emergency shut-down.
- A list of routine checks that should be made and the frequency of the checks.
- A comprehensive schedule of routine maintenance based on Manufacturer's recommendations for items of plant etc. This program should state clearly what work should be done for each day, week, month, year or given number of hours.
- A list of tools and keys which will be required in the operation and maintenance of the systems.
- Fault finding procedures.

Section 5 - Commissioning and Test Report

The report for each system shall contain a record of all the parameters which affect the performance of the system at the time of commissioning. A similar report shall be prepared for tests which have been made. The report shall be comprehensive and shall contain a record of the settings of all valves and controls and any other adjustable components so that the system may be reset to the commissioned state by reference to the report.

Presentation:

- Indexing System

Each volume shall be numbered and shall be divided into sections using an appropriate numbering system

- Paper Sizes

The manual will contain manufacturer's literature which will be different sizes. Large pages will be folded and small pages will be fitted in plastic pockets with a reinforced edge punched for filing in A4 lever arch files. The page size shall be standardised for all volumes using A4 paper (210 x 297mm) with four holes punched centrally in the longer side 80mm apart

Diagrams shall be prepared on A4 or A3 (297 x 420mm) paper

- Section Dividers

Stiff cardboard section dividers with extended tabs shall be used; these shall be SUMMIT Ring Book Guides or equal and approved.

- Files for Manual

A4 lever arch files with rigid plastic coated covers shall be used which shall be EMGEE or equal and approved

Inlaid lettering on the front cover shall indicate the title, i.e. Operating and Maintenance Manual, the Name of the Project and Volume Number. A label shall be fitted in the window on the spine of the file listing its contents.

The Trade Contractor is advised that all Record Drawings and O & M Manuals in the form described herein must be handed over to the Engineer prior to the issue of a Practical Completion Certificate for the Trade Contract Works. Failure to issue these Record Drawings and O & M Manuals will also defer the issue of the Practical Completion Certificate until such time as they are received.

If the Trade Contractor fails to issue such documentation on time, then the Engineer will have the right to engage such other third parties to prepare these Record Drawings and O & M Manuals and any resultant cost incurred by him shall be borne and set against the Contract.

Identification of Services and Plant

All cable trays and trunking shall be labelled clearly with colour coded bands which identifies it content.

Section 6 – As-built Drawings

The Contractor shall include for a complete set of as-built drawings which shall incorporate all works carried out and completed by the Contractor. All services, trunking/tray, routes and circuits within the building shall be identified on these drawings.

To facilitate submission of record drawings, the Contractor shall keep on site a complete set of all drawings used on the Contract Works, on which he shall mark alterations to the designs shown thereon as such alterations are carried out.



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