

# BUILDING & CIVIL ENGINEERING SPECIFICATION

Energy upgrades

at

Unit 1I - Scioból na bhFear Gaoth Dobhair

For

ÚDARÁS NA GAELTACHTA

PÁIRC GHNÓ GHAOTH DOBHAIR,  
DOIRÍ BEAGA,  
Co, DHÚN Na nGALL.

Carr Consulting Engineers  
Unit 1, Northern Point Business Park,  
Ballybofey, Co., Donegal

Tel (074) 9131060  
Email [michael@carrandco.ie](mailto:michael@carrandco.ie)

## Document Approval

|                  |                                                              |           |
|------------------|--------------------------------------------------------------|-----------|
| Project          | Energy upgrades to Unit II - Scioból na bhFear Gaoth Dobhair |           |
| Client & Job No. | ÚDARÁS NA GAELTACHTA                                         | CC25-1832 |
| Document Title   | Building and Civil Engineering Specification                 |           |

| <b>Issue</b>                                                                                                                                        | <b>Prepared by</b>                 | <b>Checked by</b>                   | <b>Approved by</b>                 |
|-----------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------|-------------------------------------|------------------------------------|
| July 2026<br>Tender                                                                                                                                 | Michael Carr<br>Principal Engineer | Desmond McCarry<br>Project Engineer | Michael Carr<br>Principal Engineer |
| Carr Consulting Engineers Ltd.,<br>Unit I, Northern Point Business Park, Ballybofey, Co., Donegal<br>Tel. (074) 9131060 email: michael@carrandco.ie |                                    |                                     |                                    |

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## **I.0 GENERAL CONDITIONS AND PRELIMINARIES**

### **I.0 DESCRIPTION OF WORKS:**

Proposed Energy upgrades to Unit 11 - Scioból na bhFear Gaoth Dobhair, located in Unit 11 in Aonad Eargail, Eastát Tionscail, An Bun Beag, Gaoth Dobhair, Contae Dhún na nGall.

The project comprises upgrading the energy performance of the factory unit occupied by the men's shed and included:

- Construct a protected stairway to the mezzanine level.
- Construct an accessible toilet.
- Remove redundant M&E equipment.
- Upgrade ventilation, airtightness, lighting and heating.
- Improve the insulation to the heated spaces.

### **I.1 EMPLOYER :**

Údarás na Gaeltachta.  
Gweedore Industrial Estate, Derrybeg, Co. Donegal.

### **I.2 LOCATION OF SITE**

Unit 11 in Aonad Eargail, Eastát Tionscail, An Bun Beag, Gaoth Dobhair, Contae Dhún na nGall.

### **I.3 LOWEST TENDER**

The employer does not bind themselves to accept the lowest or any tender.

### **I.4 CONDITIONS OF CONTRACT**

The conditions of contract are for a works contractor and PSCS using PW-CF6 short public works contract.

The Contractor will be deemed to have examined these Conditions and to have priced the items in accordance therewith, and also to have included for all of the Conditions in the Contract Documents.

Where any statement or clause in a tender or contract document contradicts a requirement contained in the conditions of contract, the conditions of contract shall take precedence.

In order to comply with Safety, Health & Welfare at Work (Construction) Acts and Regulations current at the date of tender, contractor should take note of the following:

- (a) Include for complying with the Safety, Health and Welfare at work Acts and Regulations current at the date of tender.
- (b) The contractor shall be appointed by the client under a collateral agreement to the main contract as Project Supervisor for the Construction Stage in respect of the project pursuant to the Safety, Health & Welfare at Work (Construction) Regulations 2013. The contractor shall include all costs for the provision of the services of Project Supervisor for the Construction Stage pursuant to Regulations 6 and 7 of the regulations.
- (c) The contractor shall include for procuring that the insurance cover required to be obtained and maintained by the contractor pursuant to Clause 21 of the main contract shall provide indemnity in respect of any claim for bodily injury or property damage which the contract may incur by reason of the performance of the functions and duties of the Project Supervisor for the Construction Stage of the project.
- (d) The contractor shall include for providing all necessary information as requested by the Project Supervisor for the Construction Stage to enable the preparation and completion of the Safety File excluding drawings and specifications which shall be provided by the appropriate member of the

Design Team and relevant nominated duties of the Project Supervisor for the Construction Stage of the Project.

- (e) The contractor shall include for assembly of product information and as-built drawings in preparing for inclusion in the Safety File.

## **1.5 SUMMARY OF MAIN CONDITIONS**

Refer to the tender and schedule and instruction to tenderers for key tender and project dates, retention and liquidated damages details etc.

## **1.6 CONTRACT AND OTHER DRAWINGS**

The Contract Documents to be signed by the Contractor and the works are to be executed in strict conformance therewith and also in accordance with such further Drawings and instructions which may be issued by the Architect from time to time. Further Detail Drawings will be supplied for various parts of the works and the Contractor shall obtain these Drawings before putting the works in hand.

## **1.7 WORK NOT DESCRIBED**

Should there appear on the Drawings any work not described in the Specification, or if described therein, is not shown on the Drawings, such work shall be taken as if both shown and described and executed part of the work contracted for. In case of any discrepancy between the Drawings and Specification, the Architect shall determine which shall be followed.

## **1.8 DESCRIPTIONS BINDING ON THE CONTRACTOR**

The description of written particulars on the Drawings are to be actually binding as if contained in the Specification, and everything is to be done that is usual or necessary in completion of same on what may be reasonably implied from the Drawings and Specification. The Architect shall describe those which shall be followed.

## **1.10 PROGRESS OF WORK**

The Contractor whose tender is accepted will be required to commence work within one (1) week of being given possession of the works, to proceed continually and to complete works within the time agreed upon at the beginning of the Contract. The works shall not be deemed to be complete until certified by the Architect to that effect. When the Architect has certified the works to be complete, the Contractor shall hand over possession of the building to the Employer, and shall forthwith remove all tools, plant, scaffolding, surplus materials, and rubbish from the site.

## **1.11 CONTRACTORS VISIT**

Contractor's tendering must make and will be deemed to have made a thorough examination of the site, adjoining premises and property and other things affecting the proposed works, to ascertain the nature and extent of same and the conditions under which the works will have to be executed and shall include for incidental and contingent works which they consider necessary to proceed and complete all work.

## **1.12 ARCHITECT TO HAVE ACCESS TO WORKS**

The Architect shall have at all times access to the works, or the materials intended for the works whether they are in progress or in preparation and the Contractor shall provide facilities for inspection.

## **1.13 COMPETENT WORKMEN**

None but fully competent and qualified tradesmen together with their necessary helpers and labourers shall be employed on the works and the whole shall be carried out and completed in the best and most substantial manner.

## **1.14 WORK NOT TO BE COVERED-UP**

No work of any kind to be covered up without first being inspected and passed by the Architect, and any variation therein measured by the Quantity Surveyor or Architect.

Work covered in contravention of this Clause must be Un-covered if so, required under the Conditions set forth in the Conditions of Contract.

**I.15 SUB-LETING**

No portion of the works is to be sub-let without the Architect's consent in writing and the parties or party appointed are to be subject to his approval.

**I.16 P.C. ITEMS**

Where goods are the subject of a P.C. Sum (as defined in the Conditions), such sums shall be taken to include delivery to site unless otherwise stated.

The work 'fixing' where used in connection with such goods shall be taken to include the actual fixing in position and also unloading, getting in, unpacking, storing and returning empties, carriage paid, to the merchant.

The Architect reserves the right to allow the Contractor a maximum of 2.50% discount for cash where such discount is allowed by the merchant to the Contractor or as otherwise agreed by the contractor and client. In case of a greater cash discount being allowed, the Employer shall benefit by the difference.

**I.17 PROVISIONAL SUMS**

All provisional sums or amounts in the Specification or Bill of Quantities, whether in money or in quantity, are to be at the disposal of the Architect, who may alter, add to or deduct from same as he may think fit. Differences to be adjusted at the settlement of accounts. All vouchers received by the Contractor in respect of P.C. Items or provisional sums shall be produced when called for by the Architect. In case of a Contractor's inability to show to the Architect's satisfaction the net amount paid by him in respect of these items, the Architect shall have the power to allow such sums as he shall deem fit and his decision shall be final and binding. The Architect shall retain the right of selecting the firm who shall supply, or select or approve, as he may decide, all or any of the material for which a P.C. price or provisional sum has been included.

**I.18 PAYMENTS**

Payments will be made from time to time during the progress of the works upon a Certificate of the Architect to an extent not exceeding 95% of the works executed and fixed until the works are complete, when a further 2.5% will be paid when the Architect shall think fit. In all cases at least 2.5% of the Contract amount shall be held as retention money until the maintenance period of 12 month expires and a Certificate has been issued by the Architect that the amount so retained may be paid in accordance with the contract.

**I.19 SCAFFOLDING AND PLANT**

The contractor is to provide all and every kind of scaffolding, ladders, tools, hoists, machinery, rods, stakes and measuring boxes and everything else in the nature of plant and to pay all charges and carriage costs incidental or necessary thereto and to the works. The scaffolding used throughout is to be of the safest kind.

**I.20 SHEDS AND LATRINES**

Provide all sheds required for storage of cement and all perishable goods, provide and maintain latrines for the use of the workmen and so maintain them that they should cause no nuisance. Remove on completion and deodorize the ground affected.

**I.21 NOTICES**

Provide for giving all notices required to Authorities or any other person. Make all necessary application and pay all fees legally required by them.

**I.22 BY-LAWS**

The Contractor shall confirm to all acts passed or adopted by the Oireachtas which may in any way affect the works and shall observe all regulations and bye-laws of the Local Authority and shall indemnify the Employer against all claims or liabilities.

**I.23 SETTING OUT**

Allow for setting out and keeping correct the works, errors in setting out shall be put right at the Contractor's own expense.

**I.25 CASING UP AND PROTECTION**

Allow where necessary for casing up and protection of work by other tradesmen and make good any work which may suffer for the want of this protection.

**I.26 FOREMAN**

Allow for keeping on the works during the whole of the program a competent foreman who shall be approved by the Architect and who shall not be changed without the latter's consent. The foreman shall represent the Contractor and all directions given to him shall be binding as if given to the Contractor. The Contractor shall give personal supervision to the work and shall report to the Architect any error or inconsistency in Drawings and Specifications. The contractor shall keep accurate measurements of excavations, concrete, etc., in accessible places and shall furnish the Quantity Surveyor with all particulars demanded.

**I.27 RESPONSIBILITY**

Allow for taking charge of the works from the commencement to the completion of same and to be responsible for and make good all injuries, damages and repairs occasioned or rendered necessary by cause over which the Contractor shall have control and hold the Employer harmless and indemnified against all claims on the part of such persons or their representatives. He shall also insure against all Third Party risks arising out of the execution of the works and shall hold the Employer as above against Third Party Claims.

**I.28 FIRE**

The Contractor shall insure the whole of the works against Insurance: loss or damage by fire at the office of an approved Insurance Company. The Policy shall be in the joint names of the Employer and Contractor and the works shall be insured from the date of commencement until the completion of same. All policies, receipts for premiums etc. to be produced at the Architect's request. Provide for the paying of all charges for writing and premiums.

**I.29 PROTECTION FROM INCLEMENT WEATHER**

Allow for this or as necessary including the covering of from walls, concrete, etc., Provide temporary screens to openings, etc., of walls, and concrete flat surfaces are to be covered with felt or tarpaulin at all times when work is not in progress and every evening after work. The felt, etc., is to be removed as may be necessary from time to time.

**I.30 WATCHING AND LIGHTING**

Allow for all watching and lighting during the progress of works and allow for any damage occasioned by lack of sufficient watching and lighting. All regulations of the Fire Insurance Co. are to be complied with.

**I.31 ATTENDANCE**

Allow for each trade attending upon all other trades.

**I.32 VARIATIONS**

No variations shall violate the Contract. All authorized alterations, whether by deductions or additions, shall be measured by the Engineer and at the rates set forth in the Bill of Quantities, or in cases where those do not apply, at a proportionate rate.

**I.33 WAGE AND PRICE VARIATIONS**

Fixed Price Contract.

**I.34 DAYWORKS**

No work of any kind, except when authorized in writing by the Architect, shall be carried out on a time and material basis. The Contractor shall in such cases be paid as follows:

(1) At the rates, if any, in the Schedule of Rates.

(2) When no such rates have been inserted, at the rates in the Schedule of Day work Charges agreed between the Royal Institute of Chartered Surveyors (Republic of Ireland Branch) and the Construction Industry Federation, and approved by the Royal Institute of the Architects of Ireland.

Vouchers specifying the time for each day (and, if required by the Architect, the workmen's names) and materials employed shall be delivered for verification to the Architect or his authorized representative at or before the end of the week following that in which the work has been executed.

**I.35 WATER SUPPLY FOR WORKS**

The Contractor is to supply at all times a sufficient supply of clean, fresh water and to allow for all temporary plumbing and storage in connection therewith.

**I.36 ARTIFICIAL LIGHTING**

The contractor is responsible for the supply of artificial lighting for works.

**I.37 MAINTENANCE**

The work shall be maintained by the Contractor in perfect condition for 6 months after the issue of the Architect's Certificate that the works are complete and any work exhibiting defects due to faulty workmanship or materials during that period shall be made good at the Contractor's own expense.

**I.39 DETERMINING OF CONTRACT**

If at any time during the course of this Contract, the Employer shall be of the opinion that this Contract shall be determined, the Employer may determine this agreement by giving the Contractor 15 day's notice in writing and thereupon at the expiration of the 15 day's notice mentioned, such agreement shall absolutely determine. Before the expiration of the 15 day's notice mentioned in such notice, the Contractor shall take all necessary and proper precautions to protect and preserve from all possible risks (other than war risks) the work already executed and the materials so delivered on the site and so hand over same to the employer.

The Contractor shall be entitled to remove all his scaffolding and plant and other property provided under the conditions set forth in the Conditions of Contract for service to the works and the, charges for such removal shall be ascertained in accordance with current rates and prices.

The Contractor shall be paid in full for all work executed and for all materials delivered on the site up to the date when this agreement shall be determined, as aforesaid, upon a Certificate from the Architect as to the amount due.

## 2.0 DEMOLITIONS

### 2.1 GENERAL REQUIREMENTS

#### 2.1.1 CONDITION SURVEY [PHOTOGRAPHIC SURVEY]

Before starting demolition work, examine all available information if deemed necessary the Contractor shall carry out a record survey of the structures to be retained and all other adjacent properties, the site and surrounding area. Submit a copy of any such condition survey report including a full photographic record to Architect upon completion.

#### 2.1.2 METHOD STATEMENTS

Before starting demolition work, examine all available information and produce Method Statements covering:

- form, condition and demolition methods of the structures
- form, location and removal methods of any toxic or hazardous materials
- type and location of adjoining or surrounding premises which may be adversely affected by noise, vibration, dust or removal of structure
- Identification and location of services above and below ground, including those required for the Contractor's own use. Arrangements for disconnection and removal of services.
- sequence and method of demolition including details of any specific pre-weakening
- arrangements for protection of personnel and public including exclusion of unauthorised persons
- Arrangements for control of site transport and traffic.

#### 2.1.3 VARIATIONS TO METHODS

- Do not vary methods on site from the agreed method statement without prior approval.
- Give 14 days' notice of any proposed variation to the method statement. Minor variations may from time to time be agreed as appropriate.
- Should the work on site expose any item which either requires or makes appropriate a variation from the agreed method, notify the Engineer Representative at once. Accept responsibility for any further work in such an area before approval.
- The submission to, and scrutiny by, the Engineer of any programme or details of methods and any checking by the Engineer of the stability and safety of the structures in all stages of demolition shall not relieve the Contractor of his obligations under the Contract and his sole responsibility for the temporary works and the safety of the structure in all stages of demolition.

#### 2.1.4 EXTENT OF DEMOLITION

Subject to the retention of features, facades, structures, retaining walls etc. specified elsewhere, demolish the structures down to ground bearing slab level. This may be at upper ground level or at lower floor level as noted on the drawings.

#### 2.1.5 GROUNDWORKS:

- Break out old foundations, slabs and the like to the levels indicated in the drawings.

## **2.2 SERVICES AFFECTED BY DEMOLITION**

### **2.2.1 SERVICES REGULATIONS**

Any work carried out to or which affects new or existing services must be in accordance with the byelaws or regulations of the relevant Statutory Authority.

### **2.2.2 LOCATION OF SERVICES**

Refer to Services record plans showing location of public and privately owned services. The accuracy and completeness of these plans is not warranted. Locate and mark the positions of all services affected by the work. Arrange with the Arctic Fish representatives for the location and marking of the positions of mains services.

### **2.2.3 DISCONNECTION OF DRAINS**

Locate and disconnect all disused drain connections. Seal within the site to approval.

### **2.2.4 DRAINS IN USE**

Protect, manholes, gullies, vent pipes and fittings still in use and ensure that they are kept free of debris at all times. Make good any damage arising from demolition work. Leave clean and in working order at completion.

### **2.2.5 BYPASS CONNECTIONS**

Provide as necessary to maintain continuity of services to other areas of the same property. Give a minimum 72 hours' notice to occupiers if shutdown is necessary during the changeover.

## **2.3 DEMOLITION WORK**

### **2.3.1 WORKMANSHIP GENERALLY**

- Demolish structures in accordance with BS 6187.
- Operatives must be appropriately skilled and experienced for the type of work and hold or be training to obtain relevant CITB Certificates of Competence.
- Site staff responsible for supervision and control of the work are to be experienced in the assessment of the risks involved and in the methods of demolition to be used.

### **2.3.2 TEMPORARY WORKS**

- Design and be responsible for all temporary works at all times and at all stages including subsequent dismantling where relevant. All calculations and details in connection with the temporary works shall be submitted for comment. Allow 14 days from the date of receipt by the Carlsberg Representative for this.
- Design temporary works in accordance with relevant Standards and Codes of Practice, particularly BS EN 12811-1 'Temporary works equipment. Part 1: Scaffolds. Performance requirements and general design' and in accordance with good practice. The design shall include foundations or other appropriate support. Accept responsibility for any inspection or opening-up required to enable the design of the temporary works to be carried out.
- Give the Engineer reasonable opportunity to view such inspection or opening-up.

### **2.3.3 GAS OR VAPOUR RISKS**

Take adequate precautions to prevent fire or explosion caused by gas or vapour.

**2.3.4 FLAME CUTTING**

- Where flame cutting of existing metal is required, take all necessary precautions to prevent the outbreak of fire(s) or causing explosion of noxious gases from any adjacent combustible or ignitable materials such as timber, paper, paint, or adjacent gaseous or flammable liquids in pipes, tanks, contaminated ground etc.
- Remove petrol and oil storage tanks and tanks that have been used for the storage of gaseous, flammable or toxic liquids in conformity with statutory regulations.

**2.3.5 DUST**

Allow for any measures for the control of dust such as periodically spraying demolition works with water.

**2.3.6 HEALTH HAZARDS**

Take adequate precautions to protect site operatives and the general public from health hazards associated with dangerous fumes and dust arising during the course of the Works.

**2.3.7 ADJOINING BUILDINGS AND STRUCTURES**

- When demolishing structures against adjoining property leave adequate temporary support and protection at each stage. Maintain and alter temporary supports and protection as necessary as work progresses.
- Demolish structures causing a minimum of damage to adjoining property
- leave no unnecessary or unstable projections
- make good to ensure safety, stability, weather protection and security
- Do not disturb support to foundations of adjoining property unless otherwise instructed.
- Report any defects exposed or becoming apparent.
- Promptly repair any damage caused to adjoining property by demolition work.

**2.3.8 STRUCTURE(S) TO BE RETAINED**

- Adequately protect parts of existing structures that are to be kept in place.
- Cut away and strip out with care to reduce the amount of making good to minimum.
- Prevent debris from overloading any part of the structure that is not to be demolished.

**2.3.9 PARTLY DEMOLISHED STRUCTURES**

Leave in a stable condition with adequate temporary support at each stage to prevent risk of uncontrolled collapse. Keep safe outside working hours. Prevent debris from overloading the structure, scaffold platforms or other temporary works. Prevent access of unauthorised persons.

**2.3.10 DANGEROUS OPENINGS**

- Illuminate and protect as necessary.
- Keep safe outside working hours.

**2.3.12 ASBESTOS-BASED MATERIALS**

The contractor shall give notice immediately of any suspected asbestos based materials discovered during demolition work, which has not been previously identified. Avoid disturbing such materials. Submit details of methods for safe removal.

**2.3.13 UNFORESEEN HAZARDS**

Notify any unrecorded tanks, chemicals etc discovered during demolition work. Submit details of methods for safe removal, filling etc. Any work to unforeseen hazards shall not be at additional cost to the Contract.

**2.3.14 SITE CONDITION AT COMPLETION**

Clear away all rubbish, debris and surplus materials and leave the whole site clean and in a tidy condition.

### **2.3.15 SITE SURFACE AT COMPLETION**

Grade the site area to follow the levels of adjacent areas as show in the drawings.  
Infill voids with suitable compacted material to achieve the grade specified.

## **2.4 MATERIALS ARISING**

### **2.4.1 CONTRACTOR'S PROPERTY**

Except for assets identified to be retained by Arctic Fish, or to be removed by Arctic Fish, components and materials arising from the demolition work are the property of the Contractor. Remove from site as work proceeds.

### **2.4.2 EMPLOYER'S PROPERTY**

Components and materials to remain the property of the Employer:

Assets to be removed by Arctic Fish.

Assets to be retained by Arctic Fish

Protect until removed by the Employer, reused in the Works or at the end of the Contract.

### **2.4.3 RECYCLED MATERIALS**

Surplus suitable clean demolition material, may be crushed, graded to a 6C grading in accordance with the NRA Specification for Roadwork's. The contractor shall provide certification indicating that the retained material is suitable for use and graded to . Allow 7 days for Engineers's approval.

## 3.0 EXCAVATIONS AND FILLING

### 3.1 GENERAL

Excavation shall be carried out in accordance with BS 6031 "Code of Practice for Earthworks". The Contractor shall excavate to the extent shown on the drawings. Should there be any excavation in excess of that required for the Works; contractor shall make good the ground as directed and according to circumstances: note that reinstatement with lean-mix concrete may be ordered.

### 3.2 SETTING OUT

Set out the excavations as stated in the appropriate structural work section and excavate to the required depths and profiles. The Contractor shall be entirely responsible for accurately setting out all the work, regardless of whether the Engineer has checked the setting out or not. He shall at his own expense make good any defect arising from errors in lines or levels.

### 3.3 SAFETY OF THE EXCAVATIONS

Contractor shall adopt the following procedures during excavations:

1. Take whatever precautions necessary to eliminate any risk of collapse of the sides of the any excavations. This is a Contractor's risk and if any damage occurs he shall undertake any repair work as necessary or as directed.
2. Protect structures, utilities, footpaths and other structures from damage caused by settlement, lateral movement, undermining, washout and other hazards created by earthwork operations.
3. Keep raised soil well back from edges of excavations.
4. Barricade open excavations occurring as part of this work and post with warning lights where members of the public may encounter such excavations. Prevent vehicles, plant, spoil or anything approaching the area adjacent to the edges of excavations; being a recommended distance of not less than the depth of the excavation in stable soil.

### 3.4 SHORING OF EXCAVATIONS

The term planking and strutting will be deemed to cover whatever methods the Contractor elects to adopt for upholding the sides of excavations. The Contractor will be held responsible for upholding the sides of all excavations and no claims for additional excavation, concrete or other material will be considered in this respect. Plank and strut as may be required to the side of all excavations to reduce levels.

### 3.5 EXCAVATIONS IN HARD MATERIAL

The contractor is responsible for provision of suitable rock breaking hammers and equipment to ensure timely and efficient removal of hard material such as existing concrete foundations or rock as indicated in the drawings. The contractor shall review the site and site investigation report and shall carry any other tests deemed necessary to ascertain the type of soil and materials likely to be encountered during excavation works.

### 3.5 FOUNDATIONS

Excavation for foundations shall be carried out in accordance with BS 6031 "Code of Practice for Earthworks". The Contractor shall excavate to the extent shown on the drawings. For spread footings the soil bearing capacity shall be inspected and approved by the Engineer prior to concrete placement.

Excess excavation:

Should there be any excavation in excess of that required for the Works, make good the ground as directed and according to circumstances: note that reinstatement with lean-mix concrete may be ordered.

### 3.6 EXCAVATION FOR TRENCHES

Procedures for normal trench excavations shall include the following:

- a) The trench is opened by a machine that produces a clean sided trench of the correct trench width.
- b) The trench is unsupported, the bottom is scraped clean level by machine and drain plus filling is immediately placed to fill the trench.
- c) If the trench bottom level is more than 1.2m below the ground level, fix temporary shoring to uphold the sides as necessary.
- d) Give adequate notice of when the work is to be undertaken in order that inspections can be made.

Surface and ground water: Keep the site generally, and the excavations in particular, free from water arising from any cause: adopt the following procedures and precautions:

- a) Use methods that cause no harm or nuisance.
- b) Do not discharge water into any watercourses or drains without approval from the relevant authorities. Ensure that discharged water does not affect the stability of buildings on or off the site.
- c) Do not pump or use any other method that draws fine material from adjacent ground.
- d) If sumps are formed, backfill them and reinstate ground to original condition.

### 3.7 UNEXPECTED SITUATIONS

Record any circumstances not anticipated by the drawings or otherwise; seek instructions if the Works are affected in any way.

**Obstructions in the ground:** Break up and remove surface beds and pavings, old foundations, disused drains and manholes and all other obstructions in the ground.

**Voids in the ground:** Report any voids, tanks or other potential hazards encountered and seek instructions. Backfill any voids caused by removing obstructions with hard-core/..... thoroughly compacted.

**Toxic substances:** Refer to Engineer.

**Disused drains:** Plug any pipes cut off at the perimeter of excavations with foundation grade concrete rammed in to refusal (but not less than 300 mm).

**Existing live services:** Report as soon as encountered and protect pending instructions: notify all authorities concerned. If work proceeds adjacent to live pipes and cables etc., excavate by hand and provide all necessary temporary support and protection. Backfill and compact with equal care.

Excavating for drains and services: See Drainage section.

### 3.8 DISPOSAL OF EXCAVATED AND DEMOLITION MATERIALS

Vegetation, topsoil and materials deemed unsuitable for filling are to be removed and disposed of by the contractor. Dispose of excavated materials, etc. as follows:

- a) Unsuitable demolition materials and soils to be removed from the site and disposed off in accordance with current waste disposal legislation and planning law.

### 3.9 FILLING

**General filling to make up levels:**

Spread selected material arising from the excavations: compact in approx. 250 mm layers: level or grade to slopes as required.

Compaction: Compact all fill materials in layers as specified and in accordance with the following general requirements:

- a) Undertake all compaction with suitable mechanical plant.

- b) Compact around structures with an unsupported side (e.g. retaining walls) in thin layers and with care: otherwise fill and compact both sides together.
- c) Compact hard fill (e.g. hardcore) in layers of thickness approx. one third more than the max nominal particle size of the fill: continue compaction until there is no surface movement ahead of the roller, all surface voids are filled and the surface is smooth and level or graded as required.
- d) Undertake initial compaction over drains and ducts, etc. with care to avoid fractures.

**Inspection:**

Do not backfill around foundations, etc. until inspected and approved.

Frozen material or ground:

Do not undertake any filling when this situation occurs.

**Backfilling excavations:**

Backfill around foundations with selected material arising from the excavations carefully compact in approx. 250 mm layers.

## 4.0 CONCRETE WORK

### 4.1 Concrete

Manufactured concrete blocks shall consist of dense concrete of the specified strength made with natural aggregates and complying with the harmonised standard I.S. EN 206-1. The aggregate used in the manufacture of this concrete shall comply with the harmonised standard IS EN 12620 and the guidance for their use in Ireland provided in S.R. 16.

#### 4.1.1 Compressive Strength

The Contractor must satisfy the Engineer that all concrete mixes have the required minimum compressive strength. The strength class of the concrete to be used in the various sections of the work shall be as stated herein and on the drawings.

### 4.2 Certificates

Prior to commencing any work the contractor shall supply the following documentation from the manufacturer of the blocks:

- (a) Mix design certificate confirming the constituents of the proposed concrete mix for each concrete strength class. The concrete mix design shall state the relevant properties of fresh and hardened concrete together with the constituents and their proportions. Concrete mixes shall be certified by a third party or shall have a documented track record indicating compliance with the strength class specified.
- (b) Certification that the concrete and all of the constituent aggregates used to make this concrete complies with the appropriate harmonised standards.

### 4.3 Verification & Testing

The contractor shall supply a certificate with each delivery stating the concrete mix type or number. The contractor shall sample and test the concrete for fresh and hardened properties in accordance with the requirements of clause 4.7 below.

### 4.4 Constituent Materials

#### 4.4.1 Cement

The cement shall be Ordinary Portland Cement certified as complying with IS EN 197-1 (Cement type CEM I, CEM II or CEM III). Manufacturer's certificate of compliance with the standard shall be provided when requested by the engineer.

#### 4.4.2 General

All aggregates shall comply with the requirements of the latest version of Series 800 of the Specification for Roadworks published by Transport Infrastructure Ireland (TII).

##### 4.4.2.1 Fine Aggregates / Sand

Sand and fine aggregate are to be clean and sharp and from an approved pit, and shall comply with the requirements of IS EN 12620.

##### 4.4.2.2 Coarse Aggregates / Gravel

Coarse Aggregates shall consist of natural pit gravel or crushed stone. They shall be hard, strong and durable and shall be clean and free from clay films and other adherent coatings and shall be washed if so directed. The coarse aggregate is to have a nominal maximum size of 20mm unless shown otherwise. Coarse aggregates shall conform to IS EN 12620.

##### 4.4.2.3 Certificates & CE Marking

The contractor shall furnish the CE Mark including the Declaration of Performance for all aggregates to be used in the concrete.

#### 4.4.4 Water

Clean fresh water shall be used and shall be free from deleterious material.

#### 4.4.5 Admixtures

Admixtures may be used in the concrete at the contractors discretion in accordance with the manufacturer's instructions and best practice and shall comply with the requirements of or latest applicable BS EN 934-2

- 4.5** The concrete mixes in the various sections of the works shall be designed mixes in accordance with BS 8500 and IS EN 206:

| Mix Designation                                | Mix "A"                                     | Mix "B"                               | Mix "C"                               |
|------------------------------------------------|---------------------------------------------|---------------------------------------|---------------------------------------|
| Concrete Class<br>(Cube Strength)              | 17/20<br>(20N/mm <sup>2</sup> )<br>Lean Mix | 28/35<br>(35N/mm <sup>2</sup> )       | 32/40 AE<br>(40 N/mm <sup>2</sup> )   |
| Exposure class                                 | n/a                                         | <b>XC2</b>                            | <b>XS1/XF4/XC4</b>                    |
| Cement Type &<br>Strength Class                | CEM I or II<br>42.5 N/mm <sup>2</sup>       | CEM I or II<br>42.5 N/mm <sup>2</sup> | CEM I or II<br>42.5 N/mm <sup>2</sup> |
| Nominal Maximum<br>Aggregate size              | 20                                          | 20/10                                 | 20                                    |
| Minimum Cement<br>Content (kg/m <sup>3</sup> ) | 180                                         | 300                                   | 350                                   |
| Maximum free water<br>/cement ratio (by mass)  | 0.75                                        | 0.6                                   | 0.50                                  |
| Consistence Class<br>(contractor to confirm)   | S4                                          | S3                                    | S2                                    |
| Admixture                                      | Please advise                               | Please advise                         | 4% Air<br>Entrainment                 |
| Placement Method<br>(contractor to confirm)    | Usually Direct                              | Pump                                  | As requested                          |

**Table 4.2**

#### Mix Classes and proposed uses

- Mix "A" Class C20/25** (Cube strength 25N/mm<sup>2</sup> at 28 days),  
**Proposed Use:** *In-fill lean mix concrete to raise foundation levels from bearing surface.*
- Mix "B" Class C28/35** (Cube strength 35 N/mm<sup>2</sup> at 28 days)  
**Proposed Use:** *Structural concrete in core hole underpinning*
- Mix "C" Class C32/40** 4% air entrained (Cube strength 40 N/mm<sup>2</sup> at 28 days)  
**Proposed Use:** *Structural concrete for external yard area.*

#### Notes:

- If mix use is to be varied from that stated above the contractor shall request updated mix parameters from the Engineer.
- Depending on the selected method of placement maximum aggregate size and consistency may be varied provided that the concrete strength grade is maintained as the approved by the Engineer during submission of mixes, refer to clause 4.5.1 below.

#### 4.5.1 Submission of Mixes by Contractor

Contractor shall supply the name of ready-mix concrete supplier and mix proportions for each mix proposed for use on the project, to the structural engineer a minimum of one week prior to commencing work.

**4.6 Sampling and Testing of concrete**

1. The Sampling, Curing and Testing of concrete fresh or hardened shall be carried out by the contractor in accordance with IS EN 12350-1 to 6 and IS EN 12390-1 to 7.

The rate of sampling for testing shall be as follows:

| Recommended minimum rate of sampling of concrete |                                |
|--------------------------------------------------|--------------------------------|
| One Sample of concrete per                       |                                |
| 10 cu.m                                          | Columns and cantilevers        |
| 30 cu.m                                          | Walls, Beams and Slabs         |
| 50 cu.m                                          | Foundations & large slab areas |

**Table 4.3**

2. From each sample a consistency test shall be carried out initially, air content and density tests shall also be completed as agreed with the Engineer. In addition at least three test specimens (cubes) shall be prepared in accordance with IS EN 12350 and laboratory cured under water maintained at 20°C until tested. Test one specimen at seven (7) days in compression as a guide to strength gain of concrete. Test two (2) specimens at 28 days in compression and the average of the two tests shall be taken as the test result.

3. Testing to be performed by a qualified independent testing laboratory utilizing up to date calibrated equipment. A copy of the calibration certificate shall be forwarded to the Engineer upon request. Copies of all test reports shall be sent directly to Architect/Engineer.

**4.6.1 Compliance with the Characteristic Strength,  $f_k$** 

Compliance with the Characteristic strength shall be assumed if the strength determined from any test result is not less than the specified  $f_k - 4 \text{ N/mm}^2$  with an minimum mean strength of  $f_k + 1$  or  $2 \text{ N/mm}^2$  of in accordance with the requirements of IS EN 206-1 unless agreed otherwise by Engineer prior to commencing work.

**4.6.2 Tests on Fresh Concrete IS EN 12350****Consistence of Concrete**

The consistence of concrete shall be as stated in the mix design parameters given above. The contractor shall verify that the consistency of the concrete is verified by testing of the fresh concrete on-site using one or more of the appropriate test methods presented in IS EN 12350.

**Air Content of Air Entrained Concrete**

The air content of air entrained concrete shall be as specified herein and in accordance with IS EN 206-1. Air entrained fresh concrete shall be tested for compliance with the specification by using one or more of the appropriate test methods presented in IS EN 12350.

**Wet Density of Normal Concrete Mixes**

The density of the fully compacted normally concrete shall not be less than 2350 kg/cu.m, unless otherwise stated in this specification. Wet density of the concrete shall be verified by the contractor in accordance with IS EN 12350. Wet density for other mixes such as air entrained concrete mixes shall be agreed with the supplier during mix submissions.

**4.7 Joints in concrete****4.7.1 Construction Joints**

Floor slabs and wall panels shall be laid in continuous pours between extremities and construction joints shall be incorporated as shown in the drawings. The surface of concrete against which new concrete is to be cast shall be free from laitance and shall be roughened to the extent that the large aggregate is exposed but not disturbed. The joint surface shall be cleaned immediately before fresh concrete is placed against it. Where practicable such preparation of horizontal and vertical joint faces shall be carried out when the concrete has set but not hardened. Dowels shall be used as shown in the drawings.

**4.7.2 Contraction Joints**

Contraction joints shall be formed or cut in all sections of floor slab or wall greater than 6m in length as approved by the Engineer. Typical contraction joint details are shown in the drawings.

- (i) Partial contraction joints (PCJ) - 50% of the main reinforcing steel shall pass through the joint.
- (ii) Total Contraction Joint (TCJ) – 0% of main reinforcing steel shall pass through the joint. However Sleeved dowels are generally used across the joint for continuity.

**4.7.3 Expansion Joints**

Expansion joints are provided to allow for expansion movements of continuous members generally in excess of 50m in length. Typical expansion joint details are shown in the drawings.

**4.7.4 Isolation Joints**

Isolation joints are generally formed between certain members to prevent bonding of concrete to other surfaces and provide for relative movements. Typical isolation joint details are shown in the drawings.

**4.8 Formwork**

The formwork shall be of sufficient rigidity to support the concrete without deflection and shall be securely wedged and supported. Care must be taken in striking to avoid injury to the surface.

The Contractor shall be responsible for supplying, erecting, maintaining, striking and clearing away all formwork and for forming all moulds for precast work and for ensuring that it is of adequate strength and without deflection or movement when bearing load. All formwork shall receive an application of mould oil before concrete is poured.

**4.9 Concrete finish****4.9.1 Formed Finish**

Formed surfaces to members shall be finished as follows:

| Member                     | Class Finish |
|----------------------------|--------------|
| Foundations                | F1           |
| Walls and Piers            | F2           |
| Soffits to slabs and beams | F3           |

**Table 5.6.1**

**4.9.2 Unformed Finish**

Unformed surfaces in floor slabs shall be finished in accordance with the requirements of EN 13670 as follows:

**Ordinary Finish**

The concrete shall be levelled, screeded to produce a level plain surface and then shall be floated under light pressure to eliminate surface irregularities to produce a level uniform surface.

**Plain Finish**

The concrete shall be levelled and screeded to produce a level plain surface and then shall be floated under light pressure to eliminate surface irregularities. When the moisture film has disappeared and the concrete has hardened sufficiently, the surface shall be hard trowelled under firm pressure to produce a dense, smooth surface free from travel marks.

**Special Finish - Brush Texture**

Finish is achieved by pulling a brush over the surface of the wet concrete after the surfaced has been levelled and screeded.

Unformed concrete surfaces shall be finished as follows:

| Member                                  | Class Finish to EN 13670                                                                              |
|-----------------------------------------|-------------------------------------------------------------------------------------------------------|
| Sub-floor to cold store                 | Ordinary Finish                                                                                       |
| Finished Floor Slab to cold store       | Special finish<br>An ordinary finish with a small amount of hard trowelling without a polished finish |
| Finished Floor Slab to marshalling area | Special Finish<br>A plain hard trowelled finish with an approved shake-on hardener.                   |
| Welfare areas                           | Plain Finish                                                                                          |
| Outside Yard Areas                      | Special Finish<br>Ordinary finish with a brush texture                                                |

**Table 5.6.2**

**5.8.1 Specialist finishes to concrete surfaces:**

Refer to Architects Specification

**5.8.2 Edges and sharp arises**

Sharp arises are to be avoided in the exposed surfaces of the exposed columns, beams and walls. A 25mm chamfer shall be constructed on the exposed corners of all columns, beams and walls.

**5.10 Placing**

Concrete shall be placed from the truck by an approved method and carefully deposited into the formwork, levelled and consolidated by tamping, ramming, or mechanical vibration. The concrete shall be placed in such a way so as to minimize segregation of the mix and shall not be dropped nor poured from a height nor made flow in the formwork. Concrete shall be placed within 60 minutes of the truck arriving at the site or 90 minutes of water being added to mix.

**5.11 General Curing of concrete**

After being placed, concrete shall not be jarred, walked on or otherwise disturbed during setting. Concrete shall be protected from inclement weather, and no concreting to be proceeded with when the temperature drops below 2C. Where temperature is expected to fall overnight recently placed concrete shall be protected from freezing; insulating blankets and heaters shall be supplied by the contractor. Striking of supporting concrete structures shall be delayed during cold weather to account for slow strength gain of concrete due to low temperatures.

In hot weather and during high winds, freshly placed concrete must be kept watered and protected by wet hessian and polythene or other approved method for at least seven days after placing.

All concrete slabs and wall surfaces shall be sprayed with an approved curing membrane (90% efficiency) after final set or removal of formwork.

Precast concrete shall be protected similarly for a period of seven days and then stacked in the open air to cure for a further period of fourteen days before being built into position.

#### **4.10 Reinforcement**

Steel bars used for reinforcement shall comply with BS EN 10138 as applicable to high yield steel designation H and B with  $f_y = 500\text{N/mm}^2$ . In general bars designated H shall be used in RC structures not subjected to cyclic load from process equipment, while bars designated B shall be used for RC structures subjected to cyclic loading from process equipment.

##### **Condition**

Bars shall be free from all loose rust, scale, grease or oil.

##### **Fixing**

Reinforcing steel bars shall be securely tied in position as shown in the drawings so as not to deflect due concrete placement. On no account shall bars be welded.

##### **Nominal Cover**

Nominal concrete cover to reinforcing steel shall be as follows :

|               |                                    |
|---------------|------------------------------------|
| foundations : | 60 mm top and bottom and sides     |
| slabs         | 40 mm top and bottom               |
| walls         | 50 mm inside face and outside face |

Unless noted otherwise on the drawings.

## 5.0 STEELWORK SPECIFICATION

### 5.1 DESCRIPTION OF THE STRUCTURAL WORKS

The engineering drawings and specification describe the works to be undertaken. All structural steelwork shown on the drawings and described in the specification has been designed to IS EN 1993.

### 5.2 FABRICATION

#### 5.2.1 Structural Steelwork:

Fabricate and erect steelwork as shown on the drawings and in accordance with approved fabrication drawings. Structural steelwork must have a CE Marking in conformance with BS EN 1090-1 and BS EN 1090-2. Fabricated steelwork shall comply with the National Structural Steelwork Specification (NSSS) for Building Construction 5<sup>th</sup> Edition CE Marking version.

**Execution Class** in accordance with BS EN 1090-2 for fabrication of the structural steelwork for this project is EXC2

**5.2.2 Connections:** Contractor to prepare preliminary design of connections and submit details for approval by the Engineer.

**5.2.3 Drawings:** Submit a full set of assembly drawings for review and approval by the Engineer.

### 5.3 MATERIALS & TOLERANCES

#### 5.3.1 Hot Rolled Sections - Dimensions and Tolerances

|                             |    |                         |
|-----------------------------|----|-------------------------|
| Plates and Bars             | to | BS EN 10025/ IS EN10111 |
| Hot Rolled Sections         | to | BS EN10025/ BS 4-1      |
| Angles                      | to | BS EN10025/ BS EN10056  |
| Hollow Sections             | to | BS EN10210-1            |
| Cold Rolled Sections        | to | BS EN 10130             |
| Cold Formed Hollow sections | to | BS EN10219-1            |
| Pre-Galvanised steel sheet  | to | BS EN10147              |

Structural steelwork must have a CE Marking in conformance with the above referenced standards.

#### 5.3.2 Steel grade and subgrade

All hot rolled steel to be of the following grades:

##### A. Steelwork inside freezer units

Main beams and stanchions: S355JO (max plate thickness 25mm)

##### B. Steelwork outside freezer units

Secondary beams bracing and ties: S275JR or S355JO (Max. plate thickness 25mm)

All in accordance with EN 10025-2

#### 5.3.3 External cladding system

**Roof:** 40mm KS1000RW on M175065150 purlins generally at 1200mmc/c

**Walls:** 40mm KS1000RW on M175065150 purlins generally at 1200mmc/c

**Colour:** goosewing grey (as agreed with the client)

Insulated gutters and all associated trims, flashings and attachments to be provided by Kingspan. All cladding details to be in accordance with the Kingspan model specification details as approved by the Architect.

#### **5.3.4 Condition of steel**

Steel for fabrication is not to be more heavily pitted or rusted than Grade C of Swedish Standard 05 59 00.

#### **2.3.5 Corrosion Protection Systems (as indicated on the drawings)**

##### **Galvanized Steel**

Structural Steel to be hot dip galvanized with a minimum zinc coating DFT of 85µm.

#### **5.3.6 Structural Fasteners**

##### **Bolts & Nuts**

Bolts and Nuts shall be to BS 3692, Grade 8.8 unless otherwise noted.

Washers shall be to BS 4320.

##### **Fixing Screws**

Fixing screws shall be Primary fasteners: High threaded screws with bonded washers.

Type(s), size(s) and drilling capacity:

As recommended by fastener manufacturer to suit type and thickness of supports, and thickness of cladding panels.

Screw material: Screw material: Grade 304 Austenitic Stainless Steel

Washer material: Non-ferrous

Washer size: 19 mm diameter. Heads: Coloured plastic heads

#### **5.3.7 Surface Finish**

Bolt assemblies are to be galvanized in accordance with BS 729.

#### **5.3.8 Welding**

Welding consumables are to comply with BS 5135.

*Mechanical properties:* Welding consumables and procedures are to give mechanical properties of for the deposited weld metal, fusion line and heat affected zone not less than the minima specified for the parent metal.

#### **5.3.9 Identification, storage and handling**

Mark and document all materials to ensure that they are used as specified.

*Holding areas:* lay out steelwork in holding areas and keep clean.

*Support:* steelwork to be adequately supported clear of the ground with individual piece markings are visible.

*Transport and Handling:* Transport and handle steelwork in a manner designed to prevent damage to the steelwork and any protective coating.

#### **5.3.10 Cutting and Dressing**

*Process:* cut steel by an automatic or semi-automatic process

*Hand flame cutting:* use only where it is impractical to use machine flame cutting.

*Dressing and Grinding:* Dress edges of all plate cut by flame to remove slag, scale and irregularities. Remove burrs, sharp arises and ragged edges by grinding.

#### **5.3.11 Stiffeners**

Cut and grind bearing stiffeners to ensure a tight bearing along edges in contact with flanges.

#### **5.3.12 Accuracy of fabrication**

**Accuracy:** Fabricate steelwork to an accuracy that will enable erection within the specified limits to take place without inducing excessive stresses, deflection or distortion into the structure.

**Length:** Members with both ends prepared for contact bearing are not to deviate from the detailed length by more than 2 mm.

Members without ends prepared for contact bearing, which are to be framed to other parts of the structure, are not to deviate from the detailed length by more than 3 mm for members less than 10 m length, and 5 mm for members greater than 10 m in length.

**Bow:** the deviation of steelwork due to bow distortion is not to exceed the greater of 3 mm or 0.1%.

**Camber:** The deviation of steelwork due to camber is not to exceed the greater of 12 mm or 0.1% of the length of the member.

## 5.4 WORKMANSHIP

### 5.4.1 Bolting

**Holes:** drill or punch and ream all holes unless otherwise agreed.

**Size:** holes not more than 2 mm greater than dia. of bolt up to 20 mm

holes not more than 3 mm greater than dia. of bolt up to 24 mm

**Holes in Hollow Sections:** seal bolt holes and vent hollow sections to prevent build-up of moisture.

**Condition of Bolts:** bolt assemblies are to be in such condition immediately before installation that the nut turns freely on the bolt.

**Washers:** Each bolt assembly is to contain at least one washer placed under the part being rotated.

**Limits to Length:** the length of bolt is to be such that at least one clear thread shows above the nut after tightening, and at least one thread plus the thread run out is clear between the nut and unthreaded shank of the bolt.

**Bolt Tightening:** bolts and nut assemblies shall be tightened to BS 5950: part 2.

### 5.4.2 Welding

**Arc Welding :** Arc welding of carbon and carbon manganese steels shall comply with BS 5135.

**Qualifications :** All welding is to be carried out under the direction of a head welder with appropriate qualifications as required by the Engineer.

All welders approval tested to BS 4871 : part 1.

**Welding procedures :** to BS 4870 : part 1.

**Distortion :** Welding procedures and sequence of fabrication are to be such that distortion is reduced to a minimum.

**Consumables :** Store, handle and use in accordance with manufacturers recommendations.

**Tack Welding :** to comply with BS 5135

**Butt Welds :** edges of plates to be butt welded to be prepared in accordance with best practice. Where possible, use run-on and run-off plates in making butt welds to ensure full throat thickness at ends.

**Removal of Slag :** Remove slag by light hammering, wire brushing or other methods that do not deform the surface of the weld.

### 5.4.3 Erection

**General :** Check before erection of any steel work that work abutting the steelwork has been correctly placed in position and level.

**Foundation bolts :** Steelwork contractor to provide general contractor with bolt base templates or drawings prior to foundation work. Care shall be taken not to damage holding down bolts prior to erection.

**Temporary Works :** Ensure that the steelwork is adequately braced or restrained to withstand all loadings liable to be encountered during construction without inducing excessive stresses, deflection or distortion in the structure.

Alignment : align each part of the structure as soon as practicable after it has been erected. Do not make permanent connections between members until sufficient of the structure has been aligned, levelled, plumbed and temporarily connected to ensure that members will not be displaced during the subsequent erection or alignment of the remainder of the structure.

***Accuracy of construction: shall be as follows***

|                          |                                         |
|--------------------------|-----------------------------------------|
| Cast in foundation bolts | ± 5 mm                                  |
| Base of column           | ± 12 mm                                 |
| Level of baseplate       | ± 12 mm                                 |
| Space beneath baseplate  | not less than 20 mm nor more than 50 mm |
| Plumb in Single Storey   | 5 mm or H/600                           |
| Position on Plan         | ± 5 mm                                  |
| Level to Top of Steel    | ± 10 mm                                 |
| Level differential       | ± 5 mm or Span/1000                     |

## **5.5 QUALITY ASSURANCE**

- 5.5.1 Steels :** Provide test certificates to demonstrate that steels used in works conform with this specification.
- 5.5.2 Bolts :** Provide test certificates to demonstrate that bolts used in works conform with this specification.
- 5.5.2 Screws :** Provide test certificates to demonstrate that screws used in works conform with this specification.
- 5.5.3 Welds :** All welds may be subject to visual inspection to BS 5289 and individual welds may be selected for non-destructive examination at the discretion of the Engineer/Architect.
- 5.5.4 Verification :** Test certificates to be verified by the Engineer or an approved Inspecting Authority.

## 6.0 DRAINAGE AND SERVICE DUCTS

### 6.1 GENERAL REQUIREMENTS

All drainage work is to conform with the requirements of Document H of the Building Regulations 1991 and all relevant Irish and British standards and in particular B.S. 8301.

### 6.2 PIPES FOR FOUL AND SURFACE WATER SEWERS

#### Pipes for Foul and Surface Water Sewers (less than 150 mm diameter)

Pipe sizes specified on the drawings to be less than 150 mm diameter may be laid in uPVC flexible pipes all in accordance with I.S. 424. Bedding for flexible pipes is to be in accordance with Diagram 8, Document H of the Building Regulation 1991 provided the cover is a minimum of 0.9 m in roads and car parks or 0.6 m in fields and gardens and is not greater than 10.0 m. Where the cover falls outside these limits the pipes are to be concrete encased to a minimum of 150 mm cover all round with a flexible joint at all couplers.

#### Pipes for Foul and Surface Water Sewers (over 150 mm diameter)

Unless otherwise stated all pipes over 150 mm are to be in concrete. Concrete pipes for sewers shall be flexible spigot and socket type conforming with I.S.6/1974 incorporating rubber rings to the requirements of B.S. 2494. Concrete surface water pipes to I.S. 166.

#### Concrete O.G. Pipes

Concrete O.G. pipes shall be in accordance with I.S. 6/1974.

#### Pipe Gradients

Storm water Pipes

Minimum gradient for storm water drainage pipes to be 1:100 unless otherwise noted on the drawings.

#### Sewerage Pipes

Minimum gradient for sewerage drainage pipes to be 1:80 unless otherwise noted on the drawings.

### 6.3 BACKFILL AND PIPE SURROUNDS

#### Trench Backfill Material (Type A)

Shall be free draining 13 mm single size washed gravel chippings. (Min. size 10mm, Max. size 20 mm).

#### Type B Material

To be used for pipes laid in gardens, public open spaces and as approved by the Supervising Officer. Shall be fine material which may be selected from excavated material or imported, as required, from which all clay lumps in excess of 75 mm, stones in excess of 25 mm and vegetable matter have been removed. This material must be readily compactable. Wet or plastic clay may not be used. The material must meet with the approval of the Supervising Officer. Pipes laid under roads, driveways, paths, shall be backfilled with approved compacted hardcore.

#### Granular Bedding & Side Filling to Pipes

A granular bed of approved material, Type A, shall be provided under all pipes to the following thickness:

#### Pipe Diameter Minimum Thickness

110 and 150 water main 150 depth

100 and 150 sewers 100 depth

225, 300 and 375 sewers 150 depth

Side filling shall be placed to a level of the top of pipes in similar material to that used in beds and shall be thoroughly compacted in three layers to completely fill the space between the sides of the trench and the piping.

#### Concrete Bed Benching and Surround

Where a concrete bed is required under sewers, i.e. where cover to the crown of the pipe is less than 1200 mm in roads and 750 mm elsewhere, it shall be in Grade 20 concrete of following dimensions:

| Diameter | Depth | Width |
|----------|-------|-------|
| mm       | mm    | mm    |

---

|     |     |     |
|-----|-----|-----|
| 100 | 100 | 400 |
| 150 | 100 | 450 |
| 225 | 100 | 525 |
| 300 | 100 | 600 |
| 375 | 100 | 675 |

Bench half way up pipe and surround pipe in 150 mm concrete of similar mix as directed by the Engineer.

#### 6.4 PIPELAYING

##### Laying Sewer Pipes

All sewer pipework to comply with Code of Practice B.S. 5572. Sewer pipes shall be laid and jointed in accordance with manufacturer's instructions to correct line and gradient, each pipe being true to the general gradient of the section in which it is laid.

##### Branch Junctions and Specials

The Contractor shall provide all necessary branch junctions and specials in the correct locations.

#### 6.5 TESTS

##### Testing Pipes

Sewers shall be tested in convenient sections by one or other of the following methods, as directed by the Engineer.

##### Water Test

Pipes shall be tested for a minimum of 30 minutes under a head not less than 900 mm over crown at high point and not more than 2400 mm over crown at low point. Any defective work shall be made good or replaced and test repeated until pipe line is proved watertight to the satisfaction of the Supervising Officer.

##### Air Test

Air shall be pumped into the section of sewer under test until a pressure of 100 is indicated on a U-Tube connected to the system. The air pressure shall not fall to less than 75 head of water during a period of 5 minutes, without pumping, after a period of requisite stabilisation. Failure to pass the Air Test is not conclusive and, when failure does occur, a water test shall be carried out.

#### 6.6 MANHOLES, FRAMES AND GULLIES

##### Manholes and Inspection Chambers

##### Manholes

Manholes less than 1500mm deep of 800 x 800 on a 150mm concrete Class A thick base. The walls to be 225mm thick built of concrete blocks or alternatively pre-cast concrete. Block work to be a minimum of 10 N/ mm<sup>2</sup> in 1:3 mortars. The hoods of the manholes to be 100mm precast concrete.

Manholes in the public domain shall be constructed in Grade 20 concrete. Manholes shall be of the following internal dimensions:

- Less than 2700 mm in height: 1200 x 750 mm
- Over 2700 mm in height: 1200 x 840 mm
- Bases shall be 150 mm thick Grade 20 concrete
- Walls shall be 225 mm thick Grade 20 concrete
- Roofs shall be 225 mm thick Grade 30 concrete reinforced as indicated on drawings.

Alternatively, circular manholes of approved dimension and construction may be used, subject to approval by the Architect/Engineer. Inspection chambers to be a minimum of 600 mm square.

##### Channels and Benching for Manholes

Channels shall consist of preformed channels or pipes cut to form channels. At manholes where there is a change in pipe size between the main pipe entering and that leaving the manhole, the connecting channel may be formed in Grade 20 in situ concrete finished with 19 mm cement sand (1:2) mortar with steel trowel

finish. This may also apply where curved channel sections are not available. Benching shall be in Grade 35 concrete finished with 19 mm thick 1:2 cement sand mortar with steel trowel finish. Benching shall rise vertically from the top edge of the channel to a height not less than that of the soffit of the outlet and shall be sloped upwards to the walls at a gradient of 1 in 6. In the case of branch drains, the benching shall be so shaped as to guide the flow of sewage in the desired direction.

#### **Manhole Covers and Frames**

Shall be cast iron to comply with IS/EN 124 as follows:

Class D400 manhole covers and frames to be used in all areas to which vehicles have access. In all other areas Class C250 covers and frames to be used. Minimum clear opening 600 diameter.

All Class D400 manholes are to have an anti-rocking device and to be sealed. In areas which are not paved, surround manhole frames with a cement and sand (1:3) collar 150 mm wide x 100 mm thick.

#### **Manhole Step Irons**

Manhole step irons shall be provided in manholes deeper than 975 mm. Step irons shall be provided in two vertical runs, 300 mm apart centre to centre. Irons shall be 300 mm apart in each run and shall be staggered vertically by 150 mm.

The top rung shall be at a maximum depth of 450 mm from ground level and the bottom rung shall be a maximum of 300 mm above benching.

#### **Interceptor Traps**

Interceptor traps to be vitrified clay complying with the requirements of IS/EN 295-1/2/3:1992 or equivalent standard. Crushing strengths shall be in accordance with class number 160 and 200 of IS/EN 295-1:1992. Size to match outlet pipe diameter and set into chamber wall and surrounded in concrete on exit.

#### **Road Gullies**

Road gullies shall be cast iron in accordance with local authorities' specifications with grate, trap, cleaning eye, (overall weight approximately 114 kgs) and shall be lockable, and close with traffic.

#### **Armstrong Junctions**

Armstrong junctions shall be uP.V.C. With required number of inlets to suit pipe runs. They shall be set on Grade 20 concrete 150 mm thick and surrounded in similar concrete. Provide all necessary raising pieces. Provide galvanised cast iron cover set into concrete.

#### **House Gullies**

House gullies shall be uP.V.C. of approved type. Gullies shall be provided at sink outlets. Rainwater pipes shall be vertical back inlet pipe. Set gulley on 150 mm Grade 20 concrete base and surround in similar concrete. Provide dished concrete surround at yard level to all gullies. Provide all necessary raising pieces and 150 x 150 mm galvanised cast iron covers.

#### **P.V.C. Adapters**

Provide all necessary P.V.C. adapters for jointing P.V.C. pipes to Armstrong junction and gulley outlets.

#### **Infiltration Test for Manholes**

If so required by the Architect, manholes shall be tested for infiltration of ground water.

## **6.7**

### **CLEANING**

#### **Cleaning Sewer System**

On completion of the works, the Contractor shall ensure, to the satisfaction of the Architect/Engineer, that all sewers and manholes are clean and free from obstruction. P.V.C. house drains and fittings should always be laid and properly bedded i.e. Contractor to ensure that pipes and fittings are never freely suspended and unsupported while being placed and fitted on site. Manhole covers and frames must be adequately supported. When finalising the position and level of manhole cover in road, high density engineering bricks must be used to support the frame as necessary, particularly where manholes are likely to be subjected to heavy traffic loads.

## 7.0 MASONRY BLOCKWORK

### 7.1 Concrete Blocks

Manufactured concrete blocks shall be dense concrete blocks of the specified strength made with natural aggregates and complying with the harmonised standard I.S. EN 771-3 and the relevant guidance in S.R. 325. The aggregate used in the manufacture of these concrete blocks shall comply with the harmonised standard IS EN 12620 and the guidance for their use in Ireland provided in S.R. 16.

#### 7.1.1 Compressive Strength

The Contractor must satisfy the Engineer that all blocks have the required minimum crushing strength. The strengths of the blocks to be used in the various sections of the work shall be as stated on the drawings. But in any case should not be less than 13N/mm<sup>2</sup>.

#### 7.1.2 Drying Shrinkage

The drying shrinkage of the blocks shall be determined as described in I.S. EN 771-3, and shall not exceed the maximum value of 0.06%

### 7.3 Certificates

Prior to commencing any work the contractor shall supply the following documentation from the manufacturer of the blocks:

- (c) Certificate confirming a CE Marking in accordance with the provisions of the Construction Products Regulations for the blocks to be supplied for this project. The delivered blocks shall bear this CE Marking also.
- (d) Certification that the blocks comply with the appropriate harmonised standards or European Technical assessment in accordance with the Construction Products Regulations as noted in 7.1 and 7.1.1 above for blocks and **all** of the constituent aggregates used to make these blocks.

or

- (e) Comply with an appropriate Irish standard or Irish Agreement Certificate or with an alternative national technical specification of any state which is a contracting party to the agreement on the European Economic Area, which provides in use an equivalent level of safety and suitability.

### 7.4 Verification & Testing

The contractor shall supply a certificate with each delivery stating the date of manufacture and also that the blocks comply with all the requirements of I.S. EN 771-3. At intervals during the construction, samples of blocks delivered to site shall be taken when required by the Engineer and delivered to an approved testing laboratory. Testing shall be carried out by the methods described in I.S. EN 771-3. Where the sample from any delivery fails to meet the Specification requirements, the whole of this delivery shall be rejected and the blocks must not be used in the works and shall be removed from the site.

### 7.2 Materials

#### 7.2.1 Cement

The cement shall be Ordinary Portland Cement certified as complying with IS EN 197-1 (Cement type CEM I, CEM II or CEM III). Manufacturer's certificate of compliance with the standard shall be provided when requested by the Engineer. Cement is to be delivered to site in sealed drums or bags and is to be stored in an area where the cement is maintained dry and free from contamination.

#### 7.2.2 Aggregates

Aggregate used in the manufacture of blocks shall consist of naturally occurring sand, gravel or stone or a combination thereof. Aggregates shall be determined as hard, strong, durable, clean and free from deleterious content or adherent coatings. They shall comply with the harmonised standard IS EN 12620 and the guidance for their use in Ireland provided in S.R. 16.

All constituent aggregates shall be CE marked and conform with the requirements of S.R. 21 Annex E and shall not contain excessive quantities of deleterious materials such as free mica or pyrite. Coarse aggregate shall all pass a 20mm test sieve.

#### **7.2.3 Lime for Mortar**

Lime for mortar shall be in the form of lime putty, complying with the relevant provisions of IS EN 459-1. Hydrated Lime shall comply with I.S. 8.

#### **7.2.4 Water**

Clean fresh water shall be used and shall be free from deleterious material.

#### **7.2.5 Admixtures**

Admixtures may be used in the concrete at the contractors discretion in accordance with the manufacturer's instructions and best practice and shall comply with the requirements of or latest applicable BS EN 934-2. Air entraining agents may only be used with the approval of the Engineer. If used, the mortar shall be mixed in a powered mixer. No antifreezes' or accelerators shall be used without the prior approval of the Engineer.

### **7.3 Ancillary products for blockwork**

**7.3.1** During demolition works the contractor shall take all steps to keep DPC and wall ties intact and undamaged ready for reuse. Some of these materials will become damaged during these works and shall be replaced to meet good practice and Building Regulations requirements and as agreed with the Engineer.

#### **7.3.2 Damp Proof Course**

The damp proof course for all blockwork shall be of durable heavy grade plastic with a CE mark as approved by the Engineer. New DPC shall be lapped or taped to the existing to provide a continuous barrier to rising water or ingress.

#### **7.3.3 Metal Ties**

All cavity wall ties shall be checked by the contractor that they are undamaged and well anchored to the inside leaf after demolition of the outside leaf blockwork. Existing metal ties shall be confirmed as galvanised mild steel or stainless steel ties conforming to IS. EN 845-1. They shall be located in the correct position to provide the correct spacing of wall ties in accordance with spacing of ties in I.S. EN 1996-1-1 unless noted otherwise and the Building Regulations. Typical spacing for a standard cavity wall is 900mm horizontal and 450mm vertical and at each course around openings. The ties shall have a minimum embedment of 50mm either end. Plastic wall ties will not be permitted.

#### **7.3.4 Remedial Wall Ties**

Remedial wall ties shall be used to replace any of the existing wall ties which are damaged or loose after the completion of demolition. Arcon AC 31 remedial wall ties or equivalent may be used. Contractor shall submit product data and CE mark for approval by the Engineer one week prior to commencing this work.

#### **7.3.5 Lintels**

Concrete, lintels shall comply with the relevant provisions of I.S. 240 and I.S. 255. Steel or timber prefabricated lintels shall comply with the relevant provisions of BS 5977. The contractor shall provide CE mark for all lintels together with certified confirmation of load capacity for review and approval by the Engineer one week prior to commencing work.

#### **7.3.4 Metal Lathing**

Steel metal lathing for plastering walls and ceilings shall comply with the relevant provisions of BS 1369 and be plain expanded and ribbed expanded types respectively.

#### 7.4 Mortar

Mortar shall be mixed only as and when required in the relevant proportions indicated in the following table, until its colour and consistency are uniform. The constituent materials shall be accurately gauged, allowance being made for bulking of sand.

| MIX BY VOLUME |                          |                               |                     |
|---------------|--------------------------|-------------------------------|---------------------|
| Class         | Cement: Lime Putty: Sand | Cement: Sand with plasticizer | Masonry Cement Sand |
| M1            | 0 to ¼ : 3               | 1 : 1 : 2½ to 3               | M5 – 1 : 2 to 2½    |
| M2            | 1 : ½ : 4 to 4½          | 1 : 3 to 4                    | M6 – 1 : 2½ to 3½   |
| M3            | 1 : 1 : 5 to 6           | 1 : 5 to 6                    | M7 – 1 : 4 to 5     |
| M4            | 1 : 2 : 8 to 9           | 1 : 7 to 8                    | M8 – 1 : 5½ to 6½   |

Table 7.1. Nominal mix by volume

Ready mixed lime: sand mortar and ready to use retarded mortar shall comply with the relevant provisions of BS 4721.

All mortar shall be conveyed fresh to the Works as required for use. Mortar that has begun to set or which has been site-mixed for a period of more than one hour in the case of Classes M1, M2, M5 and M6 and two hours in the case of Classes M3, M4, M7 and M8 shall not be used. Mortar plasticizers shall comply with BS 4887 and shall be supplied with instructions for use.

#### 7.5 Underpinning Blockwork with new rising wall

The existing rising wall blockwork shall be demolished in sections no greater than 1m in width. Sections to be demolished shall be completed strictly in the sequence shown in the drawings. The demolished sections of rising wall shall be replaced with a new ready-mixed concrete wall formed flush with the outside face of the existing rising wall. The concrete shall be placed within 15mm of the underside of the inside leaf blockwork. After the concrete has hardened the gap shall be shimmed tightly with steel shims. The remaining gap shall be grouted or dray-packed with an approved non-shrink mortar.

##### 7.5.2 Non-shrink mortar

An approved non-shrink mortar shall be used for all underpinning of new concrete/masonry to the existing masonry structure. This is to ensure no loss of support due to drying shrinkage.

Approved non shrink mortars such as :

- (i) Parex Bedding Mortar SF
- (ii) Webercem Grout Eco,

or approved equivalent.

## 8.0 PLASTERWORK

### 8.1 GENERALLY

The Contractor shall provide all labour, materials, plant, tools, scaffolding and temporary rules necessary for the completion of the works. The plastering shall be carried out to the satisfaction of the Engineer and any work or materials rejected by them shall be removed and replaced at the Contractors expense.

### 8.2 CEMENT

The cement shall be Ordinary Portland Cement certified as complying with IS EN 197-1 (Cement type CEM I, CEM II or CEM III). Manufacturer's certificate of compliance with the standard shall be provided when requested by the Engineer. Cement is to be delivered to site in sealed drums or bags and is to be stored in an area where the cement is maintained dry and free from contamination.

### 8.3 LIME

Lime for mortar shall be in the form of lime putty, complying with the relevant provisions of IS EN 459-1. Hydrated Lime shall comply with I.S. 8.

### 8.4 SAND

The sand shall be clean sharp evenly graded river or pit sand and shall comply with shall comply with the harmonised standard IS EN 12620 and the guidance for their use in Ireland provided in S.R. 16.

### 8.5 WATER

Water to be fresh and clean.

### 8.9 PREPARATION

All walls and ceilings shall be thoroughly brushed down and well wetted before plastering or rendering. All plastering undercoats shall be well scored to provide a proper key for the following coat. Concrete surfaces shall be free from contamination including mould and soil.

### 8.12 MIXING

The materials shall be accurately measured and proportioned by volume by means of gauge boxes. Mixing shall continue until the mass is uniform in colour and consistency. Plasters shall be used up before they begin to set and shall not be re-tempered. All mixing shall be done on a clean platform on a clean mixing box or in a mechanical mixer. Only water shall be added and not other admixture is permissible.

### 8.10 TEMPORARY RULES

Timber laths spiked onto walls shall be used throughout as temporary rules to ensure proper thickness.

### 8.11 WORKMANSHIP

The plastering shall be executed in workmanlike manner to the satisfaction of the Engineer. It shall be finished absolutely smooth and free from cracks, holes, and blemishes. Adequate time shall be allowed for each undercoat to dry out before subsequent coats are applied.

### 8.13 SCUDDING

The wall surface shall be well wetted before applying the scud coat. Blockwork shall be scudded to a depth of 3-5mm using a thick slurry of 1 part sand to 2 parts cement to give a rough surface. After application the scudding coat shall be allowed to dry for 48 hours before applying any new layer.

### 8.14 THICKNESS OF PLASTERING

The total thickness of plastering stated in this Specification is exclusive of any scudding coat or keys (i.e. grooves or open joints in blockwork or spaces between lathing).

### 8.15 SAND-CEMENT PLASTER

A scratch coat is applied to a depth of 10-16mm using a 1:1:6 mix (cement:lime:sand) or a 1:6 mix cement:sand) with plasticiser added in accordance with the manufacturers instructions. The rendered surface shall be scratched throughly to form a key. Apply a finish in sand and cement (1:3) as described, with nap finish, 18mm total thickness on blockwork walls at plinth below dpc. Level.

#### 8.16 EXTERNAL PLASTER

Sand/cement plaster 18mm thick smooth float finish applied to exposed masonry walls. External angle reinforced with plastic nosed, stainless or epoxy coated Galvanized steel corner beads in accordance with BS 5262:1991.

#### 8.16 INTERNAL FINISHES TO BLOCKWORK

Internal rendering shall comply with the relevant section of the Building Regulations, with IS EN 13914 Design Preparation of external render and internal plastering, IS EN 998. Where a proprietry render is to be used it should be installed to the manufacturers specification and such renders should possess an appropriate CE Mark or Irish Agreement Bord certification.

#### METHODS OF INTERNAL PLASTER FINISHES

Internal plaster to blockwork may be finished by two methods. One is the use of wet plastering techniques and the other is drylining with plasterboard. The wet plastering method will require a certain amount of drying out time before decorating, whereas the drylining system will require less time for drying out.

## 9 Electrical and Fire detection & alarm system

All works must be designed, installed, and certified by competent professionals in strict accordance with the following current Irish and European standards: [1, 2, 3, 4]

- **Electrical Installations:** [National Rules for Electrical Installations \(I.S. 10101\)](#) (including requirements for communal facilities/assembly halls).
- **Fire Detection and Alarm Systems:** [Irish Standard I.S. 3218](#) (Planning, design, installation, and commissioning).
- **Building Regulations:** [Technical Guidance Document B \(Fire Safety\)](#).
- **Workplace Safety:** [Safety, Health and Welfare at Work Act 2005](#). [1, 2, 3, 4, 5]

### 1. General Electrical Wiring

- **Design & Compliance:** The electrical contractor must design and install all fixed wiring, switchgear, and protective devices in full compliance with I.S. 10101. The installation must be verified and an [Electrical Completion Certificate \(ETCI/Safe Electric\)](#) provided upon completion. [1, 2, 3, 4]
- **Cabling & Containment:** All cables must be low-smoke and zero-halogen (LSZH), rated to meet minimum Euroclass reaction to fire (Class Dca-s2, d2, a2) in accordance with I.S. EN 50575. Cable supports must be fire-resistant (e.g., copper/steel clips or steel conduits/trays with steel ties). [1, 2, 3, 4]
- **Protection Devices:** All lighting and socket circuits must be protected by Residual Current Devices (RCDs) Type A or B, and Arc Fault Detection Devices (AFDDs) should be incorporated for circuit protection in high-risk assembly areas. [1, 2]

### 2. Fire & Smoke Alarm System

- **System Category:** The community centre requires an automatic fire detection and alarm system designed to a Grade A category with an L-type (e.g., L2 or L3) level of protection, determined by a formal Fire Risk Assessment. [1, 2]
- **Control & Indicating Equipment (CIE):** The main fire alarm control panel must be installed at the primary entrance or designated supervised location at a height between 1.4m and 1.8m. It must have a battery backup capable of providing 24 hours of standby operation followed by 30 minutes of continuous alarm. [1, 2]
- **Detection & Sounders:** Smoke and heat detectors, optical beams, and manual call points must be installed throughout the facility in compliance with I.S. 3218 to ensure occupants are given sufficient warning to evacuate. Sound levels must comply with audible alarm requirements in all areas. [1, 2, 3, 4, 5]
- **Cabling Requirements:** Fire alarm circuits must be wired using "standard" fire-resistant cables (minimum EN 50200 PH 30 classification) to maintain system integrity during a fire. [1]

### 3. Commissioning and Handover

- **Certification:** All fire alarm systems must be commissioned by a competent, certified specialist. The installer must complete and issue the relevant [I.S. 3218 Annex Certificates](#) for Design, Installation, and Commissioning.
- **O&M Manuals:** The contractor must provide full "as-built" wiring diagrams, equipment specifications, and a detailed logbook for ongoing weekly/quarterly servicing.

## 10 Mechanical

### 1: Electric Wall-Mounted Heaters

#### 1.1 General System Design [\[1\]](#)

- All wall-mounted electric heaters shall be designed and installed to provide comfortable, responsive space heating to habitable rooms and specific zones.
- Heaters must incorporate electronic thermostats, 24/7 programmable timers, open-window detection, and adaptive start technologies to comply with the relevant EcoDesign directives.
- Bathroom-located heaters must carry a minimum **IPX4** rating and be installed outside strictly defined electrical water zones by a qualified professional.
- **1.2 Relevant Standards**
- **Safety:** All heaters must be CE and UKCA marked, and manufactured to [BS EN 60335-2-30:2009+A13:2022](#) (or the equivalent [IEC 60335-2-61:2024](#)) for room heaters.
- **Electrical Installation:** All fixed wiring and connections must comply with the current I.E.E. Wiring Regulations (BS 7671). In Ireland, the work must follow the [Safe Electric](#) rules and [SEAI Domestic Technical Standards](#).
- **Eco-Design:** Heaters must comply with Lot 20 of the European EcoDesign Directive for energy efficiency.

### 2: Mechanical Ventilation with Heat Recovery (MVHR) Unit

#### 2.1 General System Design

- The MVHR unit shall provide a continuously balanced supply and extract ventilation system, extracting stale, humid air from wet rooms and supplying filtered, pre-heated fresh air to habitable rooms.
- The system must have a thermal efficiency of at least 73%, a summer bypass facility for temperature control, and maintain a Specific Fan Power (SFP) of no more than 1.5 W/l/s.
- All ducting runs within unheated spaces (e.g., attics) must be properly insulated to prevent condensation and heat loss. Provide a clear maintenance space around the unit for tool-free filter replacement.

#### 2.2 Relevant Standards

- **Ventilation and Sizing:** Design and installation must strictly adhere to the [NSAI S.R. 50](#) standards in Ireland or Approved Document F in the UK.
- **Energy Performance:** System must comply with Part L of the Building Regulations.
- **Acoustics & Airflow:** Noise levels must not exceed 30dB in habitable rooms and 35dB in wet rooms.
- **Ductwork and Commissioning:** Installers must follow the [Passivhaus Trust MVHR Guidance](#) or equivalent CIBSE and BRE best-practice guides for rigid duct sealing and system balancing.