

# CAVAN COUNTY COUNCIL

## HOUSING DEPARTMENT

### GENERAL SPECIFICATION



September 2023

## GENERAL CONDITIONS

### 1.1 Contract Conditions

**Introduction:**

This is a General or Standard Specification provided by Cavan County Council's Housing Section for use on a variety of Projects. It should be read in conjunction with the Project Drawings and Project Specification (if one is provided).

### 1.2 Parties

**Employer:**

Cavan County Council

**Contractor:**

To be selected after tender process

### 1.3 Definitions & Explanations

**Headings:**

The Clause headings used in the Specification shall not be deemed to be part of the text.

**Approved:**

"Approved" shall mean approved in writing by Cavan County Council's Engineer (the Engineer).

**Instructed:**

"Instructed" shall mean instructed in writing by the Engineer.

**IS, BS + EN:**

'IS', 'BS' and 'EN' followed by a number means respectively the Irish, British or European Standard Specification relating to a particular product. Where one of these standards is specified, items complying with a similar International or National Standard of another member of the E.U. may be used only if approved by the Engineer.

**Standard Specification:**

The Standard Specification of Cavan County Council is also known as the "General Specification" and the "Specification". Any reference to any other specification shall be referred to by full name and by who prepared it or other information to distinguish it from the Standard Specification of Cavan County Council.

**Manufacturer and Type:**

Where “Manufacturer” is used in the Specification of materials, it shall mean the firm under whose name the particular product is marketed. Where ‘Type’ is used, it shall mean the proprietary brand name, reference to other quality by which the product is identified. The phrase “or equal approved” shall be deemed included whenever materials are specified by manufacturer’s name. Approval will be issued for any alternative material that is, in the opinion of the Engineer, equal to the Specified/Named Material. The contractor shall include in his tender for the item or product as specified/named in the Specification. After tender the contractor may put forward alternatives as options for consideration but no commitment is given to accept any alternative, it will always be assumed that the tender includes for the items as specified/named.

**Proprietary Names:**

The phrase “or equal approved” shall be deemed included whenever materials are specified by proprietary name. Approval will be issued for any alternative material that is, in the opinion of the Engineer, equal to the Specified/Named Material. The contractor shall include in his tender for the item or product as specified/named. After tender the contractor may put forward alternatives as options for consideration but no commitment is given to accept any alternative, it will always be assumed that the tender includes for the items as specified/named.

**1.4 Standards, Codes of Practice****Standards and Codes of Practice:**

References herein to Irish, British and EU or other National Standards or Codes of Practice do not give the year of issue or dates of amendments. The latest relevant published version including any relevant amendments at date of invitation to tender shall apply. Where a Standard or Code of Practice has been suspended, the latest edition of the superseding publications shall apply. Any discrepancies should be notified in writing to the Engineer.

**Standards, Codes of Practice and Text:**

The Specification shall take precedence over the Standards and Codes of Practice that are referred to where the Specification requires a higher standard. All aspects of the Works are to be carried out in accordance with the current Building Regulations and other subsequent amendments. The Home Bond House Building Manual shall be used as a supplementary guidance document for instances that are not specifically referred to in the Building Regulations. Any discrepancies should be notified in writing to the Engineer.

**Best Practice**

In the event of a dispute or where a standard or regulation it is unknown or unspecified, best practice will be adopted. Best practice in this case is defined as; the best method for the performance of a task whether or not it is commonly used, any such method that is to be adopted for

the construction contract must be approved by the Engineer. Any perceived ambiguity shall be drawn to the attention of the Engineer before the tender is submitted.

In any situation where the contractor is unsure of the construction method to be used best practice will be adopted and priced for in the tender. The Engineer in consultation with the Contractor and Clerk of Works will make the final decision as to what method will be used on site. The Home Bond House Building Manual shall be used as a supplementary guidance document for instances that are not specifically referred to in the Building Regulations.

## **1.5 Statutory Obligations**

### **Local Authority Approval:**

Obtain approval from the Local Authority for the location of temporary offices, entrances, hard standings and crossings required for the works. Comply with the requirements of the Local Authority regarding maintenance and reinstatement.

### **Building Regulations:**

All aspects of the Works are to be carried out in accordance with the current Building Regulations and additional amendments.

### **Safety, Health and Welfare:**

Comply with all statutory safety, health and welfare regulations and in particular the current Safety, Health and Welfare at Work (Construction) regulations.

FULL COMPLIANCE WITH ALL SAFETY AND HEALTH REGULATIONS ARE REQUIRED FOR THIS PROJECT WITH PARTICULAR EMPHASIS ON THE FOLLOWING: IN PURSUANCE OF THE ABOVE THE CONTRACTOR SHALL ENSURE THAT ALL PERSONNEL HAVE APPROPRIATE QUALIFICATIONS, EXPERIENCE AND/OR TRAINING FOR TASKS ALLOCATED TO THEM. THE CONTRACTOR SHALL ARRANGE FOR ALL NECESSARY SITE TRAINING OF HIS STAFF AND SUPPLY ALL NECESSARY PERSONAL PROTECTIVE EQUIPMENT INCLUDING 2 SPARE REFLECTIVE WAISTCOATS AND 2 SPARE CONSTRUCTION HELMETS FOR THE USE OF THE ENGINEER, CLERK OF WORKS OR ANY VISITOR TO THE SITE AUTHORISED BY THE ENGINEER.

The Contractor shall arrange regular “tool box” talks where he shall arrange for all operatives including subcontractors working on the site to attend and participate in a Safety, Health and Welfare briefing. The Contractor shall arrange and pay for site inductions for each visitor and operative including subcontractors and delivery drivers that access the site providing them with all Safety, Health and Welfare information they will require in the course of their work/visit on the site.

**Project Supervisor for Design Process:**

The client has appointed Cavan County Council as Project Supervisor for the Design Process of the Project to carry out the duties set out in Part 2 of the Regulations.

**Project Supervisor Construction Stage:**

The main contractor will be appointed as Project Supervisor for the Construction Stage of the Project unless otherwise notified by the Engineer.

**Duties of Project Supervisor Construction Stage:**

It shall be the duty of the project supervisor appointed for the construction stage:

- To prepare the construction stage safety and health plan prior to commencement of construction.
- To continually update the safety and health plan AND file as the project progresses.
- To co-ordinate the implementation of the general principals of prevention
- To co-ordinate the implementation of relevant requirements of regulations by contractors
- To follow the provisions of the Health & Safety Plan where required
- To organise co-operation between contractors and co-ordination of their activities in relation to a project with a view to protecting persons at work and preventing accidents and injury to health
- To organise the provision of information
- To co-ordinate the implementation by contractors of their duty to provide the project supervisor with the information in relation to any death, injury, condition or dangerous occurrence which the contractor is required to notify or report under the current Safety, Health and Welfare (General Application) Regulations.
- To provide appropriate information to the site safety representative
- To co-ordinate arrangements for checking implementation of safe working procedures
- To co-ordinate measures for permitting authorised persons only onto the construction site
- To co-ordinate arrangements which facilitate the provision and the maintenance, in an appropriate condition of site welfare provisions to all persons at work on the construction site
- To co-ordinate measures to ensure that relevant persons have Safe Pass training and have been issued with a registration card
- To co-ordinate measures to ensure that relevant persons have CSCS training and have been issued with a registration card
- To keep records relating to Safe Pass and CSCS
- To co-ordinate consultation
- To facilitate, where more than 20 persons are normally employed at any one time on the site at any stage of the project, the appointment of a site safety representative
- To inform the site safety representative when an inspector arrives on site for the purpose of making a tour of inspection.
- To take account of representations made by a site safety representative

- To give notice to the H.S.A. before commencement (Form AF2), where work is planned to last longer than 30 working days or on which the volume of work is planned to exceed 500 person days.
- To provide directions to designers, contractors or other in order for the PSCS to comply with their duties and if necessary, submit them in writing.
- To supply information to the PSDP for the Safety File.

The PSCS may appoint a competent person as health and safety co-ordinator to undertake on behalf of the Project Supervisor the above duties.

### **Competency of Project Supervisor Construction Stage:**

For this appointment the client must make reasonable enquiries to check the person or company to be appointed is able to fulfil the responsibilities of the position. The enquiries include the following:

- The Company's safety and health policy and the arrangements in place for the effective organisation and co-ordination of safety and health matters.
- Knowledge and experience of construction, particularly in relation to the nature of the project
- The availability of sufficient staff to carry out the role and also, their skills, knowledge, experience and training
- Experience of working with, and co-ordinating the activities, of different contractors involved in a project
- Experience in developing and monitoring compliance with safety and health plans
- Experience in preparing safety files
- Details of notifiable accidents in the last 3-5 years
- Evidence of ISO certification or other Quality Assurance Scheme, if any.

THE CONTRACTOR WILL PROVIDE DOCUMENTARY EVIDENCE OF THE ABOVE WITH THEIR TENDER.

The client may seek the advice of the project supervisor design process if other than Cavan County Council when appointing the project supervisor construction stage.

### **Preliminary Safety & Health Plan**

In accordance with Part 3.1.4 of the regulations, a preliminary Safety & Health Plan in a form as defined in the regulations has been prepared for the purpose of providing information to the Project Supervisor for Construction Stage. The copy of the said plan attached.

**Social Welfare Regulations:**

Comply with all statutory social welfare regulations regarding registering of work people, including those employed by sub-contractors, employed on the site.

**Insurance, All Risks:**

Effect and maintain All Risks Insurance for the works and Ancillary items.

## **Plumbing & Heating**

### **14.1 Work Generally**

**Work Generally:**

All work to be carried out by an approved firm of Plumbing Contractors tidily and in the best approved manner. All fittings to be tested and stamped. Contractor to provide for carrying out all cuttings, chasing, making good, trenching, etc. Pipe runs to be tidy and as straight as possible, pipes to be clipped or held in place by other appropriate fixings. Care must be taken not to leave any leaks to avoid damage to finishes. All plumbing work to be tested by plumber to ensure that no leaks are present. Sign-off system to be used where Main Contractor will get plumber to sign document stating that all plumbing work has been completed and tested and no water, carbon monoxide, gas or oil leaks have been detected. For gas and oil installing, fitting, commissioning and servicing only plumbing contractors with appropriate qualifications and experience and registered with appropriate organisations shall be permitted to carry out the work.

Gas installers shall be registered with the Register of Gas Installers of Ireland.

Oil installers shall be registered with the Oil Firing Technical Association.

### **14.2 Cold Water Supply**

**Supply and Service Pipes:**

Copper pipes to be I.S. 238. Jointing to be kept to a minimum and all couplings, tees, etc. to be approved type. All pipes to be securely fixed to wall with strong clips. Lugs, etc. to be spaced as to prevent all tendency of pipes to sag, bond or shake. All piping shall be jointed with compression fittings to I.S. 239 bearing the Standard Mark of Eolas. P.V.C. to be of best quality "Hydrodare" type heavy gauge or approved equivalent to I.S. 134, I.S. 135.

**Supply from Mains:**

Provide standard 15mm ferrule and pay all fees in connection with tapping of watermain by Council. Lay 15mm "Hydrodare" branch from stub and fit with a stopcock I.S. 239 set at 600mm below finish paving level. Fit standard cast iron cover in paving over and surround stopcock with dry chamber. Carry to each house 15mm diameter cold water supply in P.V.C. as specified at a depth of not less than 600mm under finished ground level.

**Internal Stopcocks:**

Provide 15mm brass “screw down” stopcock I.S. 239 on supply line inside each house at the point of entry of cold water supply.

**Cold Water Supply and Services:**

Take 15mm P.V.C. supply to 270 litres glass fibre storage tank in roof space together with condensation tray and cover. Tank to be provided with approved tested high pressure ball valve and 22mm P.V.C. overflow pipe to be taken down to discharge between rafters at eaves level. Tank to be carried on strong 175mm x 44mm timber primary, secondary and spreader bearers which in turn are to be covered with 19mm W.B.P. plywood fixed to framing as directed.

Take 15mm P.V.C. supply from rising main to cold water tap in kitchen sink. From storage tank take 22mm P.V.C. pipe to bath and 15mm P.V.C. branches to w.c. basin, complete with all necessary standard compression joint fittings, wall hooks and all ferrules, bibcocks, etc. which are to be tested and stamped by and approved testing department.

**14.3 Hot Water System**

**Dual coil cylinder to be installed in each house.**

**Hot Water Supply Indirect System:**

Flow and return pipes from boiler to cylinder to be 28mm 18 gauge. Boiler to be “Grant” multipass 95% efficient condensing boiler or other approved equivalent if applicable fitted with a draincock and flue to extend 1200mm above eaves level. Cold water storage tank to comply with Building Regulations. Cold supply from tank to cylinder to be 22mm x 18 gauge copper. Hot water branches to sink and w.h. basin to be 15mm x 18mm gauge copper and 22mm x 18 gauge copper main supply to bath. A further 45 litre tank shall be provided with the indirect system including similar pipework, connections and supports. Provide for 2 no. approved safety valves on the system.

**Hot Water Supply Direct System:**

Flow and return pipes from boiler to cylinder to be 22mm x 18 gauge. Boiler to be “Grant” or other approved and fitted with draincock and condensate drain both discharging to foul water sewer (not surface water drain). Provide and fit 300 litre indirect stainless steel triple coil water cylinder ready for solar hot water connection with factory fitted insulation and 22mm x 18 gauge expansion pipe carried up to discharge over tank in roof. Cold supply from tank to cylinder to be 22mm x 18 gauge copper. Cylinder to be insulated such that the heat loss does not exceed the value given by the formula  $1.6 \times (0.2 + 0.051V^{2/3})$  kWh per 24 hours, where V is the nominal cylinder capacity in litres

Hot water branches to sink and wash hand basin (whb) to be 15mm x 18 gauge copper and 22mm x 18 gauge main supply to bath.

Supply and fit a single element 3kW immersion water heater in upper half of cylinder with an adjustable thermostatic control and two on/off switches; one located beside the hot press, the other located in the kitchen, immersion water heater switches to have timer/boost function.

**ALL HOT AND COLD PIPEWORK TO BE LAGGED WITH INSULATION**

**Heating:**

Radiators shall be oversized to work efficiently with a high efficiency condensing boiler to reduce the average boiler operating temperature to ensure condensing occurs at average operating temperature for the entire system. Radiators to comply with B.S. 3528. Install adequately sized **low surface temperature** double panel “Runtal Zehnder” or other approved equivalent low surface temperature heating radiators with plinths to cover pipes and valves in suitable positions. Radiator covers to be hinged and lockable. Install a minimum of one radiator per room (including every separate habitable space such as living rooms, kitchen, bedrooms, utility room, hall, w.c. and bathroom). The design and installation of the heating system shall comply with B.S. 5499 Part 1. Materials and workmanship clauses that are specified separately shall have precedence over similar items included in the Code of Practice.

For oil or gas fired central heating thermostatic controls will be fitted in the living room, main bedroom and cylinder and Thermostatic Radiator Valves on the radiators in the other rooms (except on heat sink radiators) with connection to a central processor to control the heating system in compliance with Technical Guidance Document L of the Building Regulations and BS5449. Where solid fuel, oil or gas fired central heating and/or solar water heating are provided the Contractor shall ensure that the system is as simple as possible and shall provide clear operating instructions. In the case of any defect valves shall fail in a safe position and in the case of an interruption to power supply valves shall open automatically. One radiator in the hall and one radiator in the bathroom may act as heat sink radiators and should be fitted with valves that cannot be closed by hand. The heat sink radiators shall be connected to both the solid fuel and oil or gas fired central heating. The solid fuel boiler shall have a separate connection to the hot water cylinder separate from the oil or gas boiler or solar panel.

Flow and return pipes and an electrical duct will be fitted, installed and terminated outside the rear wall of the house to allow for the connection of an external central heating boiler.

ALL SUPPLY AND RETURN PIPEWORK TO BE LAGGED WITH INSULATION.

**Automatic boiler bypass valve**

This controls water flow according to the differential pressure of the water across it. It is used to maintain a minimum flow rate through the boiler and to limit the circulation pressure when alternative water paths are closed. A bypass circuit must be installed if the boiler manufacturer requires one, or specifies that a minimum flow rate has to be maintained while the boiler is firing. The installed bypass circuit must then include an automatic bypass valve, not a manual (fixed position) valve.

The use of an automatic bypass is essential as the system includes a large number of TRVs. When most of these are open, the automatic bypass remains closed, allowing the full water flow to circulate around the heating system. As the TRVs start to close, the automatic bypass starts to open, maintaining the appropriate water flow through the boiler. It also helps to reduce noise in the system caused by excess water velocity.

**Plume**

In condensing boilers a plume is present most of the time that the boiler operates. Flue terminal position must be above eaves level and located in a position where it will not cause nuisance to occupiers, neighbours or affect the dwelling or any other property in any way. Flue and insect proof terminal guard must resist the corrosive effect of the flue gases.

**Boiler interlock**

This is the required wiring arrangement to prevent the boiler firing when there is no demand for heat. The boiler is interlocked when it is switched on and off by the thermostats containing electrical switches. All thermostats in the heating system must be wired in this way. This includes room thermostats, programmable room thermostats, cylinder thermostats. The interlock is also applied to the operation of the pump, although any requirements for pump overrun stipulated by the boiler manufacturer must be observed.

**Frost thermostat**

A simple override control used to prevent frost damage to the dwelling and boiler system. The frost air thermostat should be fitted in a suitable place within the dwelling to ensure a minimum temperature is always maintained. If the boiler is located outside the dwelling then an additional pipe thermostat is also required to protect the boiler.

**Condensate**

Condensate from condensing boilers must be drained via a condensate trap to a waste water sewer (not surface water drain) and must be connected to a sewer internally to avoid freezing in cold weather. Drain must 32mm diameter and be resistant to corrosive condensate (not copper or steel).

**Cylinder thermostat**

To be strapped onto the cylinder about one third of the way up from the base. The strap needs to be tight to ensure good thermal contact and be adjusted to 60°C. If set too high, it may result in scalding, but if too low it can increase the risk of legionella bacteria which could result in serious health problems. The type of cylinder thermostat provided must be childproof.

**Instruction**

Installers must provide clear instructions on how to set and use the controls properly and effectively. In particular, the operation of programmers can be difficult to understand.

The manufacturer's instructions must also be provided and it will be necessary to demonstrate:

How to set the programmer clock and adjust for time (change for summer to winter time etc).

The use of the time control override function.

How to set summer hot water only.

How to separate space heating and domestic hot water time settings.

How to set room and cylinder thermostats.

How to set TRVs.

**14.4 Insulation****Pipe Lagging:**

All pipework shall be lagged with "Armflex" insulation or approved equivalent.

**Tank Insulation:**

All water tanks in attic shall be insulated with 100mm thick polyurethane insulation sandwiched between fitted 19mm W.B.P. plywood covers to protect insulation all to Engineer's approval. Insulation to be extended to cover entire platform on which tank sits and to be extended further down to ceiling level.

**14.5 Sanitary Fittings****Low Level W.C. Suite:**

Low level suite shall be white vitreous china conforming to B.S. 1213 with "P" trap, 14 litre cistern to B.S. 1125 with supporting brackets, 12mm ball valve to B.S. 1212 with a silencing pipe, 115mm float, inlet screwed for female iron and 22mm overflow connection with union for P.V.C 50mm white plastic flush bend with special rubber ring and coupling nut for jointing to pan, black plastic hinged seat to B.S. 1254 with chromium hinging device.

**Sink:**

Stainless steel sink and single drainer to I.S. 132 with built in overflow, size 1,067mm x 525mm complete with 38mm P.V.C. two piece swivel "P" trap with cleaning eye, 75mm water seal and neoprene core and washers, plug and strong C.P. chain and two 22mm taps marked hot and cold to B.S. 1010.

**Bath:**

To B.S. 1/89 as manufactured by Irish Foundries Ltd., Bailieboro, Co. Cavan or approved equivalent and to be cast iron 1,676mm long white porcelain enamelled inside and painted outside with 75mm roll, adjustable feet, earthing lug with brass screw, 30mm C.P. overflow, 50mm C.P. outlet, grating, 38mm P.V.C. trap with neoprene core, washers and P.V.C. overflow, plug and C.P. chain and Westco Avanti bath/shower mixing tap c/w chrome hose and shower head or similar approved.

**Wash Hand Basin:**

550mm x 404mm vitreous china with pedestal having; C.P. grating outlet and union, 32mm P.V.C. trap with cleaning eye and 75mm water seal, plug and C.P. chain, two C.P. tapes to B.S. 1010. Basin to be set with front rim at a level of 813mm over floor. Provide a 550 x 750mm mirror with anti-corrosion backing and bevelled edge, fixed with 4 no. chrome mirror dome headed fixing screws with rubber washers and cups set 225mm above wash hand basin.

**Towel Rail:**

600 mm long chrome towel rail with chrome ball-end brackets to be provided in each bath or toilet room.

## 14.6 Pipework

### Overflows:

From W.C. cistern and storage tanks take 22mm diameter P.V.C. overflow pipes through nearest external wall and finish with neat splay cut to discharge 50mm clear of wall face. From overflow of bath provide 28mm P.V.C. pipe and joint to trap.

### Waste Pipes:

Provide white P.V.C. pipes to sink and baths 38mm and w.h. basin 32mm. Carry through walls as necessary executing neat bends and neat finish where pipes discharge. Secure wastes with clips as directed and lay to constant falls.

ALL WASTE PIPES TO HAVE SEPARATE BOSS CONNECTIONS TO SOIL VENT PIPE.

### Soil and Vent Pipes and Stacks:

Soil and vent pipes to be provided to every house as shown on site plan in each block in 100mm diameter P.V.C. pipes. Stacks to be secured to walls with heavy screwed holder brackets to stand 38mm clear of blockwork and to have an approved type swan neck bend at eaves and to finish with 300mm length of pipe and P.V.C. cowl.

### Hoppers:

Obtain Engineers approval of hopper type securely fixed to wall where required and make connections.

### Testing Etc:

Before handing over, test all fittings, joints, circulation's, etc. to Engineers satisfaction and leave all wastes, traps, etc. clear and all fittings clean inside and out.

## 14.7 Heating Appliances

### Heating Appliances

Install A STANLEY "OISIN" multi fuel range complete with splash bank enamelled flues, bonnet and all necessary accessories also include heat reduction fire bricks to reduce heat to water boiler. All associate pipework, pumps, thermostats etc. are to be installed in accordance with manufacturer's instructions. Stove to be room sealed and to take air supply from outside.

Install a GRANT VORTEX 50/90 oil fired condensing boiler, 95% efficient or equivalent approved, and all ancillary fittings to manufacture instructions. External boiler to be provided where shown on the drawings.

Install a 1350 litre PVC oil storage tank and 50 gallons of home heating oil per house will be supplied by the contractor for testing of the oil fired boiler, thermostats, valves and timer etc.

## **14.8 Mechanical Services Installation**

### **Ventilation**

Whole house heat recovery ventilation systems shall be installed in all houses. Where such a system is to be used the Vent Axia extract fans specified may be omitted and replaced by a similar feature incorporated into the whole house heat recovery ventilation system capable of providing a similar and quantifiably equal performance compliant with the Building Regulations and enhancing the Building Energy Rating of the dwelling.

### **Mechanical Ventilation Heat Recovery Fan Units**

The whole house heat recovery ventilation system (MVHR) shall provide continuous airflow of 100 – 350m<sup>3</sup>/h between normal automatic mode and high speed combined with 95% heat recovery efficiency through a counterflow sonic welded polystyrol heat exchanger. Maximum airflow of 350m<sup>3</sup>/h @ 225Pa. MVHR unit to be fitted with EU F7 filters on supply air and waste air. Unit fitted with brushless DC EC motors complete with integrated thermostats. System controlled by internal intelligent biorhythmic control and automatic 100% bypass and automatic efficient defrost cycle.

Unit to be fitted with water condensation drain piped to a sewage outlet. Unit to be capable of connection to internet for remote monitoring and diagnosis.

The MVHR Unit shall be SAP Appendix Q registered and shall have a specific fan power of no more than 0.67 W/l/s. The MVHR Unit shall be MTD-Solutions ERV-350, or equal and approved.

### **Controls**

Ventilation control shall be capable of providing variable speed control and operation on humidity sensitivity. The controls shall have a boost feature for kitchen extract and shall be integrated into bathroom PIRs for bathroom boost. Controller shall be mounted at 1500mm height.

### **Ductwork**

Ductwork system to be installed using the Eco-Air semi flexible 5 core aluminium polyester composite thermally insulated ducting on the waste air and Eco-Air acoustic and thermally insulated duct on the supply air. Eco Air ducting is certified and fire tested to EN 13502-1 B-s1,d0 and tested for air tightness to EN 13180 standard:

Ventilation in Buildings – Air Ducts – Measurements and mechanical requirements for flexible ducts. Primary ducts to be Eco-Air 150mm diameter inner core with thermally insulated outer core. All mechanical fixing of ductwork system to be stainless steel, aluminium or galvanised steel.

Where ductwork must be dropped in stud partitions, flat pack with a minimum height of 54mm may be used. Final connections may be flexible to a maximum length of 300mm. Ductwork connections shall be 100mm diameter, with 150mm diameter to main runs. Cross talk between rooms shall be minimised by allowing individual duct runs for all rooms. Installation shall be carried out in accordance with the MVHR unit manufacturer's installation guide.

### **Supply & Extract Air Devices**

All supply and extract air devices shall be ceiling mountable capable of flowrates of 12-70m<sup>3</sup>/hr @100Pa.

Supply and Extract air devices shall be installed at a minimum separation distance of 1m from any smoke detectors.

### **External Wall Louver, Ridge Terminal & Roof Cowl Devices**

All external wall louver, ridge terminal, and roof cowl devices shall be supplied complete with bird and insect mesh and be capable of a flowrate of 210m<sup>3</sup>/hr @10Pa.

## **14.9 Solar Water Heating Equipment**

A solar water heating system shall be provided for all house types including hot water cylinders with 300 litres storage capacity and pre-insulated with 50mm thick factory applied polyurethane or equivalent insulation.

The cylinders shall be suitable for 3 Bar operation and have dual heating coils (i.e., supplied by both solar panels and boiler).

The hot water cylinders shall be 'slimline' models capable of fitting in the hotpress cupboards or as detailed on the architect's drawings. Solar water heating panels shall be supplied and installed to each housing unit on a South or West facing roof at a pitch of between 30 and 45 degrees. Allow for increased size of solar panels due to poor orientation of roofs.

The solar panels shall have the following specification:

- Compound Parabolic Collector (CPC) type
- 4mm thick low iron solar safety glass
- the absorber shall be constructed from copper with nickel oxide coating.
- 1.5mm leak proof welded aluminium collector tank without vent holes.
- cylindrical, high-gloss rolled galvanically anodised pure aluminium reflector.
- anodized aluminium frame.
- c/w negative pressure relief valve for pressure compensation.
- Diffusion factor (Kdif) of 0.87
- Heat capacity of 8513 J/m<sup>2</sup> K
- Flowrate of 20 - 70 l/m<sup>2</sup> h.

The solar panel circuits feeding hot water cylinders shall be 22mm diameter and be complete with circulating pumps, pressurisation units, automatic air vents (installed at highest point of circuit) and non-return valves. The system shall include 3-way valve linking to heating system in order to enable the system to dissipate heat through radiators when demand is not required to the hot water cylinder.

The solar panels shall be SolarFocus or equal and approved.