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| **EAST KENT HOUSING** |  |

Employers Requirements for replacement heating and hot water plant at

Win Pine House

Lyell Close

Hythe

Kent

CT21 5JD

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| Rev No | Comments | Author | Approved | Date |
| 1 | Boiler room refurbishment | Stuart Campbell |  | 04/05/20 |
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Mechanical Services Specification

1. **Scope and Description of Works**

Win Pine House is a housing scheme of 44 self-contained dwellings, 1 office and communal areas managed by East Kent Housing.

It is the intention to completely re-new the Heating and Hot Water plant along with all associated equipment and controls within the external plant room energy centre.

* The heating plant room energy centre is located within a single story small building attached to the main scheme, on the ground floor at the rear of the main building. The gas meter is installed in a small cabinet adjacent to the plant room.
* The buildings heating energy is supplied via 3 No. Regency Slimline, gas-fired boilers. The appliances are in a poor visible condition and at fast approaching the end of their serviceable lifespan.
* The Hot water for the scheme is supplied via 2 No, 450 litre capacity Calorifiers installed within the plant room.
* The heating system is an open vented system feed from an F&E tank.
* Plant room control panel is in poor condition and will need replacing. This will include BMS and safety parameters.

The existing plant room is to be stripped out and all mechanical and electrical plant to be renewed, this will include new heating boilers, direct fired water heaters, pumps, pressurisation unit, pressure vessels, pipework, control panel and controls. The current flue is not to current standards and needs to be re-lined. This list is not exhaustive and only to act as a guide to the scope of the project.

The full system shall be fully commissioned on completion and handed over to the client’s representative on practical completion.

The contractor shall visit site to determine the whole extent of the project and no variations shall be entertained through lack of knowledge of the site or intent of the specification.

1. **Workmanship and Materials**

All work is to be undertaken to industry best practice, all materials are to be of the highest quality to align with Gas Safety (Installation and Use) Regulations 1998, British Standards, IGEM technical Standards, IET Requirements for Electrical Installations and all Health and Safety legislation. Whether specifically noted or not, this shall be taken to denote the minimum acceptable standard of material or workmanship.

Manufactured items referred to in the Specifications shall unless specified to the contrary mean manufacturer's standard products and installed to the manufacturer’s instructions.

1. **British Standards**

All products, equipment, materials must comply with and installed in accordance with the relevant British Standard or CE certificated product.

1. **Equivalent and Or Approved**

The specified products may be substituted if prior approval of the Contract Administrator has been agreed to use an alternative manufacturer’s product.

The Contract Administrator's decision on the use and continued approval of alternative materials goods and equipment is final. All such alternative goods, materials and equipment that are approved for use in the works shall be provided at no extra cost to the contract.

1. **Continuity of Service**

The contractor will leave the properties with all services in safe and proper working order at the end of each working day. Under no circumstances shall residents be without the use of these services and facilities overnight unless agreed with the contract administrator.

*Ensure that an alternative form of heating is available for the residents during the period of works. The alternative form of heating will be a minimum of one portable electric convector heaters of 3kw max. Output with at least 3 heat settings and thermostat control.*

1. **Design Criteria**

In the absence of the original design criteria it is assumed that the system has been designed with the following criteria:

This housing scheme is for elderly or in firm residence so the system shall be designed for and outside winter temperature of -1°C and an internal temperature of 23°C.

1. **Drawings & Installation Specification**

This project is to be let by the client on a design and installation basis.

1. **Heating boiler Plant**

The existing boiler plant shall be removed complete with all associated pumps, pipework and boiler flues.

The existing ventilation will need to be checked against the new boiler requirements and provision made to increase ventilation as required.

Supply and install to the manufacturer’s requirements 3 in number, Viessmann Vitodens 200-W B2HA 125kW Commercial System Boiler boilers, complete with a frame assembly, low loss header and cascade controls.

Supply and Install to the 2 in number Direct fired water heaters. Kw rating, size and recovery times are to be agreed with the CA prior to start of work and installed to the manufactures requirements.

In addition, each boiler may require a shunt pump to be installed in the return pipework from the low loss header.

The boiler plant will be linked via the low loss header; in addition each boiler shall have the following connections:

* Heating flow full flow lever Isolation Valve
* Heating return full flow lever Isolation Valve
* Gas isolation lever valve (AECV)
* Drain valve, positioned to allow the boiler to be drained, this shall be fitted with a removable key.
* A Condensate Drain
* 100mm diameter temperature gauges fitted on boiler flow & return pipework’s and can be easily read and replaced without draining the boiler or system
* Pressure Gauge fitted on the flow and can be easily read and replaced without draining the boiler or system

Boiler Condensate Discharge will be run to low level and terminate within an appropriate drain.

Each boiler module shall be suitable for 240 volts, 1 phase, and 50 Hz electrical supply.

The boilers shall be installed entirely in accordance with the manufacturer’s instructions and commissioned by the manufacturer / approved agent.

**Flue System:**

The new flues will need to comply with the clean air act.

1. **Heating Circulation Pumps**

The new circulating pumps need to be Grundfos Magna 3 or equivalent. The size of the pumps is to be calculated by the contractor.

1. **Automatic Pressurisation Unit**

A new pressurisation unit with a built in conventional pump, complete with expansion vessel shall be installed. The expansion vessel shall be sized for suitability. The vessel will have a lock-shield and drain point on the connecting pipework. The vessel will need to be secured to the floor.

The Pressurisation Unit shall have a 15 mm BSP mains water connection and a 25 mm System connection. A 25 mm overflow from the unit shall be run into a drain and complete with quick fill connections and with isolation valves and line size RPZ backflow prevention device to comply with the current water regulations.

1. **System Protection Equipment**

A BOSS X-POT Compact Side Stream Filtration & Dosing Unit will be installed on the heating system. This will be accompanied by a PICV Valve, Sight Flow Indicator and insulation jacket. This will be fully installed in-line with the manufacturer’s recommendations. Ensure the drain point is left capped off.

\*Note: This system is a combined magnetic filter, side stream particle filter, A&D separator and dosing pot.

Upon installation the heating system shall be dosed to the correct concentration with inhibitor as manufactured by Eclipse Magnetics, and or similar inhibitor.

1. **Plant Room Gas / CO Leak Protection Devices**

A 230v mains powered Gas Leak / CO Leak Detection system will be installed within the plant room and directly linked to the plant room safety circuit.

1. **System Flushing**

Prior to the installation a chemical power flush in line with BS 7593 should be undertaken by a specialist sub-contractor who will be engaged by the main contractor. Final filling and dosing of the system the contractor shall engage a specialist contractor to power flush the entire system, and on completion treat the contents of the system for pseudomonas and then effect the chemical dosing as noted above. A sample of the system water will be sent to the inhibitor company for analysis, the inhibitor company will provide a water test certificate and a copy of the water test certificate will be included within the O&M manuals.

1. **Hot Water Generation**

Remove the existing Calorifiers and remove from site.

Supply and Install in accordance with the manufactures requirements 2 in number Direct fired water heaters. Kw rating, size and recovery times are to be agreed with the CA prior to start of work.

1. **Secondary Hot Water Circulation Pump**

A new Secondary hot water pump will need to be fitted to the Direct Fired Water Heater on the secondary return adjacent to the DFWH as per manufactures requirements. The pump sized for this application will be agreed with the CA prior to installation

1. **Water Conditioner**

The total hardness of the incoming cold-water mains is to be determined by the contractor and, upon this the contractor shall supply and install on the cold-water mains into the building a water conditioning unit, which shall be installed in accordance with the manufacturer’s recommendations. The unit to be used is a Sentinel Kal-Guard fill kit pack using a MK2 controller or equal and approved.

The contractor shall be responsible for providing any new electrical fused spur arrangements to this unit, which shall be rated according to the load. The power feed for this should be taken from the new control panel.

1. **Cold Water Storage Tanks**

No works are envisaged to be carried out to the existing Cold-water storage tanks. There may be the need to add a cooling discharge tank from the open vent on the direct fired water heaters to satisfy the requirements of L8 ACOP

1. **Heating Pipework**

All new heating pipework shall be installed in medium weight black mild steel using screwed malleable iron fittings. The contractor may also use Gebrit pressfit copper if they so choose but must be stated in their tender price.

1. **Domestic Pipework**

All new mains, hot and cold-water service pipework shall be installed in light gauge copper tube half hard. Joints shall be made with copper capillary fittings or Gerbrit pressfit, Compression fittings may be used in certain positions.

All solder and flux materials used for soldering shall be WRAS approved for use on wholesome water systems.

1. **Gas Pipework**

The existing gas meter size should be inspected and confirmed its availability to meet the demand of the new plant, if this meter is undersized for the requirements of the new gas fired heating and hot water requirements then the contractor should make allowances to have the meter changed prior to the start of the installation of the new plant.

The gas pipe will require replacement from the gas meter to all the appliances within the boiler room.

The new gas pipe shall be calculated and installed to IGE /UP/1 or IGE /UP/1A and also IGEM/UP/2

All calculations for pipe sizing, purge volumes, strength tests and tightness test shall be produced and submitted to the CA prior to installation and all documentation relating to this will be added to the OM manual.

1. **Sleeves**

All pipes passing through walls or floors shall pass through a sleeve cut from a length of mild steel pipe and butt into wall or floor.

The sleeves shall finish not less than 2 mm proud of the finished surface of the plaster.

The annular space between the pipes and sleeves shall be adequately filled with Rockwool or similar, to reduce noise penetration, maintain fire integrity, whilst allowing free movement of the pipe. Sleeves for steel pipe shall be from galvanised material. Sleeves for copper pipes shall be in copper.

Sleeves shall be fixed in such a manner that will prevent them becoming detached from the building fabric and it shall be the Contractor’s responsibility to ensure that they are so fixed ant the they do not project beyond the finished surface.

Pipe sleeves where exposed to view in occupied areas shall be fitted with wall or floor plates.

1. **Draining and Venting of Pipework**

Pipework shall be installed to be self-venting and self-draining where possible. Drain cocks are to be fitted at all low points and on the dead side of valves.

Pipework shall be run in such a manner that all pipes can be completed drained of water and no accumulation of air can occur.

Mains and risers shall be provided with drain cocks so that any section may be emptied with the isolating valves closed.

At all high points in water mains, where it is not possible to vent through apparatus, open vents or automatic air vents shall be provided.

**Low Pressure Heating Valves**

Isolating valves shall comply with current British Standards and installed in accordance with manufacturer’s instructions.

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1. **Domestic Services Mains and Hot & Cold-Water Valves**

Isolating valves shall comply with current British Standards and installed in accordance with manufacturer’s instructions.

Mains water, Cold Water and Hot Water Service Valves shall be WRAS approved.

1. **Gas Valves**

An AECV for boiler room isolation will be installed on the gas supply. The manual gas valve for isolating the boiler house shall be clearly identifiable and fall to the closed position. This should be located as near to the gas mains point of entry into the plant room as possible.

An elctro- hydraulic gas safety shut –off valve will be required the valve should be sized one size larger than incoming and outgoing pipe sizes to ensure that the maxium 1mb pressure drop across the gas carcass can be maintained. A stop button linked and installed and clearly labelled adjacent to the main plant room entrance. A means of interlocking the fire alarm within the control panel made available.

1. **Safety Valves**

Safety Valves shall have a bronze body with flat seating surfaces, precision lapped to give positive closure and screwed B.S.P.T. ends and shall comply with current British Standards and installed in accordance with manufacturer’s instructions. Discharge from the safety valves should terminate within 100mm of the plant room floor

1. **Automatic Air Vents**

Automatic Air Vents on low temperature systems shall have a bronze body.

1. **Draincocks**

Draincocks 25 mm and under, type a bronze draw-off cocks, screw down pattern, lock-shield with loose key shall comply with current British Standards and installed in accordance with manufacturer’s instructions.

1. **Strainers**

A new Y strainer filter is to be installed in the pipe work on the

Isolating valves shall be provided on each side of the strainer or the strainers shall be fixed relative to equipment isolating valves so that the filter can be opened and cleaned without draining down the circuit.

1. **Pipework Pressure Tests**

On completion of each pipework installation the system shall be pressure tested during which time they shall remain airtight.

Water tests shall be carried out by filling the system with water and raising to the figure specified below.

The section shall then be left with the test pump disconnected and all joints shall remain tight for a period of at least 2 hours.

Any fault discovered during such tests shall be at once remedied by the Sub-Contractor at his own cost and expense and the test reapplied until the consulting engineer is satisfied that the section under test is sound.

On completion of the test, the water is to be released and drained completely away as rapidly as possible, the system being then thoroughly sluiced through to ensure the removal of as much dirt and dross as possible before being refilled and put into service.

The test pressures to be supplied to the numerous services are as follows:

* L.P.H.W. Heating 7.0 bar
* Tank Cold Water Services 5.0 bar
* Cold Water Main 12.5 bar

1. **Protection of Pipework**

All mild steel pipework whether insulated or not shall be thoroughly wire brushed and painted with red lead paint after pressure testing and again before the finishing treatment is applied.

1. **Plugs for Open Pipes**

Any open-ended pipe or duct left overnight or for any considerable period shall be protected from the entry of dust, or builders rubbish by the fixing of approved type plugs.

1. **Valve and Equipment Labels**

All valves shall be clearly numbered with discs of laminated plastic. Each valve disc shall be attached to the respective valve by a length of chain with proprietary connectors.

All equipment shall be clearly labelled. The labels shall be of multi-layer, white and black plastic, front engraved, securely fixed to the equipment by means of stainless steel screws or blind rivets.

A valve chart indicating the duty and position of all valves shall be fixed into a glazed picture frame and fixed in the plantroom in an agreed position, also a Schematic drawing of all the plant affixed as close as possible to the valve chart.

1. **L.P.H.W. Pipework Insulation**

All pipework shall be insulated, including mains and sub-circuits, which run within rooms etc.

Pipework shall be insulated with foil faced rigid mineral fibre or CFC free phenolic foam preformed sectional insulation, securely fixed and finished with foil faced finish Class ‘O’ sheeting with overlaps neatly pasted down finally this shall be covered with Isogenapak covering

Bends and fittings shall be formed from mitred and trimmed sections cut to ensure that a good contact with the surface to be insulated is made and that the true shape of the fitting is maintained. Straight sections of insulation shall be applied in lengths up to 1.2m in half segment sections, adjoining sections being firmly butted together and joined with minimum 100mm wide, and self-adhesive foil faced finish dead soft aluminium tape, applied over a clean surface and firmly pressed down.

The insulation shall be continuous except where brackets or rollers, valves, unions, flanges, etc. are encountered.

End caps of sufficient size to extend from the outside of the insulation to the outside of the pipework.

Valves, strainers and flanges etc. shall be uninsulated, unless specifically called for in the specification where the insulation shall be carried through with oversized sections.

1. **Hot Water Service Pipework Insulation**

Shall be insulated as 1.34

1. **Mains and Cold-Water Services Pipework Insulation**

Shall be insulated as 1.34

1. **Painting**

Items of equipment shall be provided with the manufacturer's standard finish which, on completion of installation, shall be in good condition or brought up to original standard.

Ferrous pipework, brackets etc., shall be painted red primer, undercoat and finish coat in approved colour gloss paint. Alternatively, where steelwork is completely enclosed a proprietary anti-rust coating may be used.

Pipework, brackets etc., in public spaces shall be painted red lead primer only, undercoat and finish coat shall be provided by the Contractor.

Gas pipework shall finally be painted yellow ochre.

The boiler house shall be cleared of all arising and any rubbish from these associated works then shall be completely painted throughout with two coats of White Matt emulsion paint on the walls and two coats of Grey floor paint applied to the floor areas.

1. **Chlorination**

After testing of pipework and prior to making the connection between the site main and the incoming main, all hot and cold-water pipework will be satisfactorily cleaned and chlorinated, and a certificate provided.

Before chlorination all service pipes, tanks, and down services will be thoroughly flushed out to remove dirty water, debris etc. The flushed water shall be discharged to the foul water drainage system.

1. **Description of equipment**

The automatic operation and temperature controls of the plant and equipment are to be designed and installed in accordance with the specific requirement of this document. The control panel is to be designed to incorporate remote monitoring via the bms panel**.** controls package, adjustment and early warning signals included in the software, via e-mail or text. Sufficient log in details are to be provided for the client and the maintenance contractor. All works to facilitate the remote monitoring and adjustment are to be included when submitting a cost.

In the tender the contractor shall allow for the preparation of all control wiring details for approval by the Consultant prior to the installation of the works.

The contractor shall allow for all necessary automatic control systems components, relays, devices, and switched accessories to achieve the complete sequential and functional operation and control of the plant and systems. In addition, the control panel should have the capability to isolate the Electronic ECV in the event of a fire alarm being raised.

The control panel will incorporate a key, or a push button operated fire test isolation that keeps the valve open for a limited time using a time delay relay to allow testing to be carried out and automatically resets after the fire test.

The control panel will have the capacity to monitor the hot water temperatures via sensors, placed on hot water outlet and hot water return pipework, positions to be agreed.

Where applicable these control elements shall be housed in a lockable purpose made cabinet with all required safety interlocks including a volt free pair for interconnection of the premises fire alarm.

The control panel shall comply with the latest regulations, statutory requirements and standards as: -

* BS 7671 18th edition Requirements for Electrical Installations.
* Health & Safety at Work Act.
* British Standards & Approved Codes of Practice.

The panel shall be constructed to be wall mounted with external fixing brackets and constructed from not less than 2mm sheet metal stove enamelled to an approved colour by the CA.

The cabinet door shall be hinged and interlocked with the main electricity supply to prevent unauthorised access to the live panel.

The plant and operation selection switches shall be mounted on the front face to facilitate operation of the systems without internal access to the panel.

The wiring in the panel shall be fully colour coded, of low smoke and fume manufacturer.

All cables shall be fully identified at both ends and terminals by numbered coded ferrules and these shall be directly cross referenced to the wiring diagrams.

Copies of the wiring diagrams shall be stored within a metal pocket in the panel.

All cables entering or leaving the panel will be by terminal sited adjacent to the entry / leaving location. No external wiring will be permitted to bridge these terminals.

All outgoing power supplies, together with the supply the controls function transformer shall be protected by individual H.R.C. fuses.

Spare fuses shall be stored in the panel within a purpose made holder.

1. **Electrical Wiring**

All new electrical power & control wiring shall be included in the tender. This shall be in full compliance with the latest BS 7671 18th edition. All cables shall be LSF and run in galvanised conduit and trunking.

1. **Electrical Earthing**

The Contractor shall co-ordinate with the Electrical Contractor to ensure that facilities are allowed for all pipework to be electrically earthed.

1. **Boiler House Ventilation**

The existing boiler house ventilation is provided via louvered panel doors providing both ventilation and combustion air. These shall be checked for adequacy of ventilation and upgraded to current requirements if necessary and the costs of these works will be included within the submitted costs.

1. **Commissioning**

The boilers are to be commissioned in accordance with the current British Standard. The following commissioning certificate are to be completed in their entirety. CP15, CP16 and CP17 or their electronic equivalent.

The boilers shall be commissioned by the manufacture or agent. The controls shall be commissioned by the controls installation specialist.

Set up the commissioning stations to the figures to be provided during the construction phase of the project.

Run the heating system and check throughout the building to ensure that all circuits and radiators are vented and working properly.

1. **Operating and Maintenance Manual**

Two sets of comprehensive operating and maintenance manual shall be provided for the client.

The manuals shall be sub-divided into several easily identifiable sections consecutively numbered with tabbed dividing sheets.

The sections shall be arranged in the following order with a front sheet numbered 1 to 10 with description against each number to indicate the contents of that section. Spare numbers to be left blank. Where there is more than one folder to a set, a front sheet shall be included in each ring binder with a reference to the number of ring binders and all the sections included in the full manual.

1. Introduction Health & Safety / Building Log Book.
2. Project Description.
3. Control Detail.
4. Operating Procedures.
5. Maintenance Instructions.
6. Test Certificates.
7. Manufacturers Literature.
8. Record Documentation.
9. Spare
10. Spare

The manual contents shall be housed in four-hole ring binders for easy removal and insertion of documents.

The binders must not be over full and must can add 25% more bulk in the future. More than one binder set must be provided if necessary

The front of the manual shall have a fixed label with the job title.

All sections shall be indexed with contents list.

The literature section shall be filed alphabetically A-Z according to the manufacturer’s name.

All manufacturers’ documents shall include name, address, and telephone number. They shall be original and not photocopies.

Drawings shall be folded to A4 size and stored in transparent polythene punched pockets, one drawing to one pocket.

A draft copy of one completed manual shall be provided to the Contract Administrator for comments or approval before the Client’s copies are issued.

The draft copy shall be provided at the handover and the final copy within three weeks of receiving comments on the draft.

An electronic copy of the OM manual shall be provide on a usb memory stick.

Upon completion the works shall certificated for Building Regulation Compliance and this Certificate will be placed at the front of the Manual.

In addition to all the drawings and manuals, the contractor is to supply a lockable box fitted to the boiler house wall to house all of the documents when complete, this is to have at least two keys

1. **Record Drawing**

Record drawings of the installation shall be provided.

The Contractor shall provide an accurate set of installation drawings on completion. Drawings shall be produced by electronic means and shall be provided at handover together with hard copy prints in the O&M manual.

Complete and fully detailed record wiring diagrams shall be required for the electrical work. A copy of the record wiring diagram shall be included in the controls panel together with a numbered fuse chart.

The contractor is to provide an A3 size framed Schematic drawing and a valve chart for all the boiler plant and pipework, these to be mounted on the wall within the plantroom.

The contractor is to provide a line diagram of the gas pipe run; this is to be mounted near the primary gas meter.

