# Heat Networks

## GTC Technical Guidelines

GTC Technical Guidelines and Safety Information for
House Builders and Developers

info@gtc-uk.co.uk www.gtc-uk.co.uk

# Contents

# Section One

# Introduction

These guidelines provide you with information on the installation of heat mains, services, Heat Interface Unit (HIU), and other parts of our heat networks to the home from heat generating plant within a centralised Community Heat Hub (Energy Centre). The guidelines also cover the safety aspects of GTC completing works onsite and specify your responsibilities in the delivery of the heat network. Each home will have a pair of service pipes with isolation valves connected to the district heating pipework, and connected to an internal wall mounted Heat Interface Unit.

These guidelines provide the Developer with their requirements for the installation of the district heating infrastructure of a low-density development..

**Should you wish to contact us, the telephone number is 01359 758757**.

## Disclaimer

Although the greatest of care has been taken in the compilation and preparation of this document, GTC on behalf of GTC respectfully accepts no responsibility for any errors, omissions or alterations or for any consequences arising from the use, or reliance upon the information in this document.

# Section Two

# Communications

Our opening hours are from 08.00 to 17:00 every weekday. The below is a list of contact details for various parts of the customer journey.

## Heat Emergency

To report failure to supply heat or damage to or leakage from a heat pipe, please call **02920 100346**.

## Gas Emergency

If you can smell gas or believe a gas pipe has been damaged, please call **0800 111 999** (24 hours).

## Electricity Emergency

To report No Supply or Electrical Damage, please call **0800 0326990** (24 hours).

## Fibre Emergency

To report damage to a fibre plant or OSCP, please call **02920 028726**.

## Water Emergency

To report a loss of supply or a burst or leaking water main, please call **02920 442716**.

## Sales

To discuss your utility infrastructure solution needs and obtain a quotation, please contact **01359 240154** or **sales@gtc-uk.co.uk**.

## Design

To discuss a utility design or request a variation, please contact **01359 300798** or **network_variations@gtc-uk.co.uk.**

## Site Installation

To book in work on your site, please contact **0345 6022498** or **gtcworks@gtc-uk.co.uk**.

## Heat Interface Unit Details

Request or query HIU details, please contact TBC**.**

## Supplier Agreements

To check supplier contract agreements, please contact TBC

## Finance Queries

For any queries regarding invoices or billing, please contact **01359 308144** or **credit.control@gtc-uk.co.uk**.

## Customer Services

At GTC, we are committed to providing you with excellent customer service and we encourage feedback so that we can ensure we are making our customers happy. If you have any comments or complaints about our service, please contact **01359 302640** or **customerservices@gtc-uk.co.uk**.

# Section Three

# Safety

## Safe Place of Work

GTC requires a safe place of work to be provided for all its staff and contractors. We will seek confirmation that the construction site is a safe place to work.

Upon arrival on site, staff and contractors will report to the Site Manager/Representative to discuss intended works. Prior to undertaking this work, a site-specific risk assessment will be undertaken. If, following this assessment, the works cannot be undertaken in a safe manner, the Site Manager/Representative will be informed. Until a safe working environment is achieved, no activities shall be undertaken.

## Site Traffic Rules

All site traffic information should be made available to the team/operative when arriving on site, via a site induction or during the booking in on-site stage.

## Equipment and Materials

All materials will be handled, transported, stored and fixed in accordance with the manufacturer's requirements. Any conflict between such requirements, this documentation and the British Standards Institution, shall be referred to GTC in writing for a decision.

The Site Manager/Representative shall ensure their equipment and materials are operated and stored in such a manner that they do not become a hazard within the working area of the GTC team/operative.

## Scaffold

Ensure all scaffolding where the team/operatives are to work is removed prior to their arrival on site.

## Waste

In most cases, GTC will make use of the waste collection and disposal facilities on site from the Principal Contractor. If this is not possible it should be discussed with your local Project Manager.

# GTC Technical Guidelines

## Welfare Facilities

In most cases, welfare facilities are to be made available on site from the Principal Contractor.

## Utility Protection

Ensure all excavation works onsite are progressed using safe digging techniques. Refer to HSG47 *Avoiding Danger from Underground Services*. GTC utility plans are available via **www.gtc-uk.co.uk/network-locations**..

## Competence

Any staff and/or appointed contractor working on behalf of GTC who attend site will have the appropriate training, technical knowledge and experience to discharge the intended works in a safe manner.

## Construction Design Management (CDM) Regulations

GTC will act as the 'Designer' and 'Contractor' for the construction and commissioning of heat networks on new property developments.

The heat mains, services and HIU that will be installed on the development will remain the property of GTC as named in your quotation. GTC will be responsible for the operation and maintenance of the network on behalf of the GTC.

The construction team should leave a marked-up copy of what is live in the site agent's office during the construction phase so that other construction workers have access to live plant information.

## Damage to Heat Mains

It is imperative that the heat mains and services are not damaged following installation, and it is the responsibility of the Developer to ensure that ALL contractors working on site are informed of the location of the heat mains and services. The mains and services drawing should always be on site and updated to clearly show the installation progress.

Please note that other utility apparatus may be in close proximity to heat pipes particularly when services cross over other utility mains. The Developer should at the earliest stage establish the location of any non-GTC utility mains and services that may be affected.

Damage to live heat mains and services must be reported immediately to the **emergency contact number 0292 0100 346** who will arrange for the Emergency Service provider to attend site and undertake any repairs.

Any damage to non-commissioned heat pipes, no matter how slight, must be reported immediately to GTC.

For further information refer to HSE publication HSG47 *Avoiding Danger from Underground Services* which gives detailed guidance on avoiding damage to gas mains and services, including information on detecting underground services and safe digging practices. Free information is available from the **HSE Infoline on 0845 345 0055** or the **HSE website http://www.hse.gov.uk**

## Ground Workers Safety

**All heat apparatus MUST be treated as live.**

- Any injury, damage to plant, however slight, must be notified to the Asset Owner and Site Manager immediately.
- Underground services, particularly electricity and gas can be extremely dangerous.
- Damage to heat pipes can cause scalding from the release of hot water under pressure. Damage to electrical cables can lead to severe burns or even death. Gas leaks can cause fire and explosion.
- Damage can result from excavation or penetration of the ground (e.g. by a road pin).
- Underground services may be commonly found in roads, footpaths and on sites or across open land.
- Make sure you have plans of the underground services in the area and make use of them. This may not always be possible for emergency or unforeseen works.
- Use approved equipment to confirm the position of electricity cables, metal pipes and any other detectable plant within and around the area of proposed excavation.
- Look for signs of service connection cables or pipes, e.g. heat, gas, electricity or water meter boxes, valve covers or a service connection entry into a house or street lamp.
- Hand dig trial holes (as many as necessary), to confirm the exact position of services in close proximity to the area of your work. This is particularly important if there are plastic pipes which cannot always be found by electromagnetic location techniques.

All mains cables will have a marker tape laid above – this is a useful indication of the presence of a live utility apparatus in the vicinity and therefore you should avoid disturbing the tape.

**It is possible that cables or pipes may be embedded in concrete**. Electricity cables embedded in concrete **MUST** be isolated before the concrete is broken out – please contact GTC at the earliest opportunity to arrange.

**Services are sometimes protected by concrete, polyethylene or earthenware tiles or a marker tape laid above the service** - this is a useful indication of the presence of the service; you should avoid disturbing any tile or tape to expose the service if possible.

Do not use existing buried plant as a step to enter or exit any excavation.

# Section Four

## Definitions

| | |
|---|---|
| **Community Heat Hub** | The Community Heat Hub is the Energy Centre where the heat is generated and connected to the heat mains. |
| **DNO / IDNO** | District Network Operator / Independent District Network Operator. |
| **ENC** | Electricity Network Connections. |
| **Heat Interface Unit (HIU)** | A heat transfer unit located within the dwelling which transfers heat from the primary district heating to the property heating and hot water system.<br>The HIU is normally located within a room or cupboard specifically designed to accommodate the installation |
| **Heat Main** | Underground/buried pipe network for distributing heat throughout the property development. |
| **Heat Service** | Underground pipe for conveying heat to premises from the district heating mains system. |
| **Heat Transporter** | Independent Community Heating Limited (ICHL). |
| **Installation Pipe** | The pipe work within a consumer's premises between the outlet of the HIU and the appliances. |
| **Internal Service Riser** | A riser heat pipe installed within the structure of a building. |

# Section Five

## Roles and Responsibilities

The matrix below identifies the roles and responsibilities for the Developer and GTC:

| Ref | Planning and Pre-Construction Documentation | GTC | Developer |
|---|---|---|---|
| 0.01 | Construction Programme | | Yes |
| 0.02 | Planning Permission Submissions | | Yes |
| 0.03 | Environmental Surveys | | Yes |
| 0.04 | Energy Strategy | | Yes |
| 0.05 | Planning Conditions pertaining to Community Heat Hub | | Yes |
| 0.06 | Site Noise Assessment / Requirements | | Yes |
| 0.07 | Fire Strategy | | Yes |
| 0.09 | Ground Condition Report (entire site) | | Yes |
| 0.10 | Accommodation Schedule | | Yes |
| 0.11 | Development Masterplan | | Yes |
| 0.12 | Dwelling Layout Drawings | | Yes |
| 0.13 | Site topography drawing | | Yes |
| 0.14 | Construction phasing plan (identifying required heat-on date) | | Yes |
| 0.15 | CDM Principal Contractor | As detailed in each section | As detailed in each section |
| 0.16 | Location of Community Heat Hub on site masterplan | | Yes |
| 0.17 | Assessment for day one temporary Community Heat Hub | To advise | Yes |
| 0.18 | Easements | | Yes |

| Ref | Community Heat Hub | GTC | Developer |
|---|---|---|---|
| | **Community Heat Hub** | | |
| 1.01 | Principal Contractor (CDM) | | Yes |
| 1.02 | Community Heat Hub Acoustic Attenuation | Excluded[1] | |
| 1.03 | Maintenance free ground surface | | Yes |
| 1.04 | Perimeter fencing (including any acoustic mitigations identified by the Developer's acoustic specialist) | | Yes |
| 1.05 | Access door/gates to the compound | | Yes |
| 1.06 | Design, supply and installation of external pipework including pipework, insulation, weatherproof finish and floor mounted supports | Yes | |
| 1.07 | Design, supply and installation of bases for external pipework floor mounted supports | | Yes |
| 1.08 | Lightning Protection | Yes | |
| 1.09 | Fire Detection | Yes | |
| 1.10 | Security Alarm | Yes | |
| 1.11 | Vehicle Access & Van Parking Space | | Yes |
| 1.12 | Area for standby boiler plant outside of perimeter fence | | Yes |
| 1.13 | External Lighting | Yes | |
| 1.14 | All below ground duct requirements | | Yes |
| 1.15 | Specification, supply, design and install of inspection chamber and valve chamber | | Yes |
| 1.16 | Below ground drainage (foul and surface water) | | Yes |
| | **Community Heat Hub – Utility Connections** | | |
| 2.01 | Mains water connection to street mains & DNO meter | Subject to contract[1] | Subject to contract[1] |
| 2.02 | Broadband/Fibre connection to street mains | Subject to contract[1] | Subject to contract[1] |
| 2.03 | HV Power connection to street mains & DNO meter | Subject to contract[1] | Subject to contract[1] |
| 2.04 | HV Power infrastructure e.g. Ring Main Units | Subject to contract[1] | Subject to contract[1] |
| 2.05 | Foul drainage connection to street mains | | Yes |
| 2.06 | Rain/Surface Water Connection to street mains | | Yes |

| | | | |
|---|---|---|---|
| | **Community Heat Hub – Pre-fabricated Plantroom** | | |
| 3.01 | Principal Contractor (CDM) | | Yes |
| 3.02 | Specification | Yes | |
| 3.03 | Supply | Yes | |
| 3.04 | Delivery to site | Yes | |
| 3.05 | Off load at site & lift into position | Yes | |
| 3.06 | Supply of Reinforced concrete base/foundation | | Yes |
| 3.07 | Design of reinforced concrete base/foundation | | Yes |
| 3.08 | Commissioning (excluding load bank) | Yes | |
| 3.09 | Low Voltage connection from transformer/s | Yes | |
| | **Community Heat Hub - Air Source Heat Pumps** | | |
| 4.01 | Principle Contractor (CDM) | | Yes |
| 4.02 | Specification | Yes | |
| 4.03 | Attenuation | Excluded[2] | |
| 4.04 | Supply | Yes | |
| 4.05 | Delivery to site | Yes | |
| 4.06 | Off load at site & lift into position | Yes | |
| 4.07 | Concrete base/foundation | | Yes |
| 4.08 | Commissioning | Yes | |
| 4.09 | All mechanical/electrical connections (excluding below ground drainage) | Yes | |
| 4.10 | Drainage connection to mains foul drain infrastructure (including floor gullies) | | Yes |
| 4.11 | Above ground drainage pipework | Yes | |
| | **Community Heat Hub – Thermal Stores** | | |
| 5.01 | Principle Contractor (CDM) | | Yes |
| 5.02 | Specification | Yes | |
| 5.03 | Supply | Yes | |
| 5.04 | Delivery to site | Yes | |
| 5.05 | Thermal Store off load at site & lift into position | Yes | |
| 5.06 | All mechanical/electrical connections (excluding drainage) to thermal stores | Yes | |

| | Community Heat Hub – Commissioning / Testing | | |
|---|---|---|---|
| 6.01 | Air Source Heat Pumps | Yes | |
| 6.02 | Community Heat Hub pre-fabricated plantroom (and all plant / equipment within) | Yes | |
| 6.03 | Transformers | Yes | |
| 6.04 | Ring Main Unit | Subject to contract[1] | Subject to contract[1] |
| 6.05 | Above ground district heating pipework | Yes | |
| 6.06 | Below ground district heating pipework | Yes | |
| 6.07 | Sump pump | | Yes |
| 6.08 | Compound access gates (specification issued by GTC) | | Yes |
| 6.09 | External lighting | Yes | |
| **Ref** | **Buried District Heating Main and Service to Dwelling** | **GTC** | **Developer** |
| 7.01 | Principal Contractor (CDM) | | Yes |
| 7.02 | Principal Designer (CDM) | | Yes |
| 7.03 | Route of district heating pipework | Yes[3] | Yes[3] |
| 7.04 | District heating pipe specification | Yes | |
| 7.05 | District heating pipe supply | Yes | |
| 7.06 | Delivery of district heating pipe to site | Yes | |
| 7.07 | Off-loading and moving pipes to on-site storage | | Yes |
| 7.08 | On site storage of district heating pipes | | Yes |
| 7.09 | Movement of pipes from on-site storage to trench | Yes | |
| 7.10 | Excavation of trenches | | Yes |
| 7.11 | Provision and maintenance of trench supports | | Yes |
| 7.12 | Trench perimeter rails / fence | | Yes |
| 7.13 | Preparation of trench bottoms for district heating pipes | | Yes |
| 7.14 | Access to trench | | Yes |
| 7.15 | Dewatering of trench | | Yes |
| 7.16 | Coordination of district heating pipework with existing services / building foundations | | Yes |

| | | | |
|---|---|---|---|
| 7.17 | Diversion of existing utilities | | Yes |
| 7.18 | All pipework ducts / sleeves | | Yes |
| 7.19 | Pipework to be loaded out into trench and levelled on sandbags | | Yes |
| 7.20 | Jointing of pipework connections | Yes | |
| 7.21 | Flushing and pressure testing of district heating pipework | Yes | |
| 7.22 | Communications duct & cable supply | Yes | |
| 7.23 | Communications duct & cable installation | Yes | |
| 7.24 | Backfill of trenches with suitable backfill material | | Yes |
| 7.25 | Supply district heating marker tape | Yes | |
| 7.26 | Install district heating marker tape / sand | | Yes |
| 7.27 | Installation of top cover/surface | | Yes |
| 7.28 | Setting out and excavation of valve chambers | | Yes |
| 7.29 | Provision and installation of valve & communication chambers including covers and access irons. | | Yes |
| 7.30 | Excavation at dwelling for service pipework entry to dwelling | | Yes |
| 7.31 | 2x Isolation valves at service pipework entry in dwelling | Yes | |
| 7.32 | Fire stopping | | Yes |
| **Ref** | **Dwelling Services** | **GTC** | **Developer** |
| 8.01 | Principle Contractor (CDM) | | Yes |
| 8.02 | Heat Interface Unit specification | Yes | |
| 8.03 | Heat Interface Unit supply | Yes | |
| 8.04 | Heat Interface Unit delivery to site | Yes | |
| 8.05 | Off-loading and moving Heat Interface Units to storage | | Yes |
| 8.06 | Heat Interface Units storage | | Yes |
| 8.07 | Heat Interface Unit coordination | | Yes |
| 8.08 | Heat Interface Unit installation | | Yes |
| 8.09 | Heat Interface Unit commissioning | Witness/Verification | Yes |
| 8.10 | Heat Interface Unit service (primary) pipework and insulation specification | Yes | |
| 8.11 | Heat Interface Unit service (primary) pipework and insulation supply, installation, flushing, chemical cleaning and testing | | Yes |
| 8.12 | All boxing, covering or hiding of pipework | | Yes |

| | | | |
|---|---|---|---|
| 8.13 | Heat Interface Unit electrical power supply connection | | Yes |
| 8.14 | Heat Interface Unit mains cold water connection and associated pipework | | Yes |
| 8.15 | Heat Interface Unit connection and pipework for foul drainage | | Yes |
| 8.16 | Heat Interface Unit connection and pipework for space heating | | Yes |
| 8.17 | Heat Interface Unit connection and pipework for domestic hot water | | Yes |
| 8.18 | Heat Interface Unit connection and cabling for communications | | Yes |
| 8.19 | Metering and Billing Platform Specification | Yes | |
| 8.20 | Metering and Billing Platform Hardware and Infrastructure Installation | Yes | |
| 8.21 | Room thermostat/programmer | | Yes |

## Notes

[1] Works subcontracted to GTC or affiliate will be the responsibility of GTC. Works subcontracted to alternative contractor will be the responsibility of the Developer.

[2] All attenuation is excluded from initial contract offer and is subject to site specific parameters and requirements. Attenuation mitigations identified by the Developer's acoustic consultant can be added to GTC's scope of works post-contract award as a variation instruction from the Developer.

[3] The Developer shall work with GTC in optimising the district heating route. GTC will be responsible for the production of drawings, the Developer shall verify and agree the intended routes. Any deviation from the agreed routing shall be the cost of the Developer.

# Section Six

# Community Heat Hub

The Developer will carry out all civil and ground works associated with the Community Heat Hub. Community Heat Hubs will be built to GTC's specifications and drawings.

The Developer is to ensure all necessary site documents and drawings are made available to GTC at the earliest opportunity after contract award. All changes to site documents and drawings are to be issued to GTC as soon as possible to review and approve against impacts to design.

All of the procurement, design, installation and setting to work will be carried out in accordance with CIBSE Heat Networks CP1 2020 which places responsibility and specific requirements on the Developer/Contractor/Energy Services Company (ESCo). A copy of this and further documents can be downloaded from GTC's website: https://www.gtc-uk.co.uk/house-builders/downloads/.

## Legals & Easements

All Community Heat Hub sites will be subject to a lease as detailed within the quotation. The Developer is required to obtain all relevant planning permission and building regulations compliance.

GTC requires legal rights over all of its equipment to secure future ownership and maintenance abilities which are imperative to the continued supply of heat. Where this equipment is within private land, GTC will need to obtain such rights from the Developer (or landowner if different). To ensure these consents are completed efficiently and at the earliest opportunity, the Developer (or landowner if different) should assist with the following:

- Ensure their legal representative is instructed to act upon acceptance of the project.
- Ensure their legal representative responds to all correspondence received from GTC's legal representative without delay.
- Immediately advise GTC of any changes that may affect the legal title on which GTCs equipment resides

The timescale of consent acquisitions for a project are of great importance as they may affect the required commissioning dates if not completed in good time.

## Development Drawings / Documents

The Developer is to provide GTC with all architectural drawings for the full development. Any changes to the architectural drawings must be notified to GTC at the earliest opportunity to review against impacts to design.

The development accommodation schedule for the full development should be used to generate GTC's quote and subsequently accepted by the Developer. If the development accommodation schedule has not been provided, the Developer shall issue the schedule to GTC as early as possible after quote acceptance. The accommodation schedule should include the following details for each individual plot:

- Number of bathrooms (including en suites)
- GIAs and NIAs of each dwelling
- Space Heating Emitter type (e.g. radiators, under floor heating, electric towel rail, etc.)
- Details of commercial spaces including GIA/NIA, type (e.g. A1, B1, D1, etc.); or if a design has already been undertaken, the space heating and domestic hot water loads in kW

We shall also require, but not limited to:

- Site layout detailing plot numbers for each dwelling and Community Heat Hub location(s)
- Dwelling layout drawings for all house types (with proposed HIU locations)
- Dwelling SAP calculations, including confirmation of dwelling heat loss parameter
- Dwelling space heating and domestic hot water annual demands (kWh)
- Phasing plan
- Ordnance Survey drawing (including contour lines showing ground heights across the development)
- Development phasing programme
- Dwelling foundation details
- Commercial area locations and intended district heating connection point

## Construction Programme

The Developer is to provide GTC with a construction programme which shall include the following milestones:

- If there is a requirement for early installation of district heating pipework
- Date for when the area designated to the Community Heat Hub compound is ready for plant installation
- Date of when first heat on is required
- Date of when subsequent construction phases require heat
- Any requirement for temporary Community Heat Hub/plant (before build of the permanent Community Heat Hub)

# GTC Technical Guidelines

## Noise & Air Flow

GTC will provide the Developer with equipment noise data and operational run-times for all noise emitting plant.

The Developer is to provide GTC with their site Noise Assessment. The noise assessment shall include details of the background noise levels and the requirements / mitigations needed for all Community Heat Hub plant to be compliant with local and national conditions.

Mitigation requirements for plant noise (and vibration) will be subject to each site location and site specific background noise levels. As such, all noise and anti-vibration mitigations are excluded from GTC's initial contract offer and are to be developed with the Developer during the detailed design stage to achieve the required noise limits. The mitigation requirements will arise form the following:

- Site specific background noise levels
- Planning conditions
- British Standard 'BS4142 Methods for Rating Industrial and Commercial Sound'

Any mitigations required by GTC shall be costed as a variation to the contract offer. The hierarchy of mitigations measured applied will be:

1. Acoustic treatment of pre-fabricated plantroom
2. Acoustic louvres to pre-fabricated plantroom
3. Perimeter fence and access doors general fence construction of minimum 20kg/m2, impervious and continuous
4. Perimeter fence of 5 metres high from ground level, louvres of minimum 3 metres high from ground level to three elevations of the fence (final louvre area subject to size of CHH)
5. Acoustic treatment to Air Source Heat Pumps
6. Single bank/double bank attenuation louvres in the perimeter fence (acoustic louvres to have minimum 50% free area for air flow to air source heat pumps)

The perimeter fence louvres must not be obstructed by any means for a minimum distance of 3 metres to facilitate sufficient air flow to the air source heat pumps.

The elevation with the perimeter fence louvres will ideally be oriented away from the nearest noise sensitive dwellings.

## Fire Strategy

The Developer is to provide GTC with their site Fire Strategy.

The pre-fabricated plantroom shall be fire rated to 60 minutes and shall be in accordance with Building Regulations Approved Document Part B.

The Developer shall advise GTC of any site specific requirements for the CHH which may require a greater fire rating than 60 minutes.

# GTC Technical Guidelines

## Energy Strategy

The Developer shall issue the Energy Strategy where available to GTC.

If an Energy Strategy has not been completed at the time of contract award, GTC can provide details to assist with the production of the Energy Strategy for the Developer to complete.

## Ground Contamination Survey

The Developer is to provide GTC with the ground contamination survey of the development. The survey will need to cover the areas including:

- The Community Heat Hub compound
- The full buried district heating route

Any required remediations as a result of the ground contamination survey will be the responsibility of the Developer and must be undertaken prior to any GTC works.

## Environmental Impact Assessment

The Developer is to provide GTC with their Environmental Impact Assessment.

The analysis should include the following components as a minimum, the likelihood for occurrence and identify mitigations to ensure the continuous supply of heat is not interrupted in all scenarios:

- Flooding
- Heavy snowfall
- High winds
- Lightning strike
- Drought or prolonged hot and dry periods
- Subsidence

Any mitigations deemed required, as a result of these or any other adverse weather or environmental conditions, for the continuous plant operation shall be the commercial responsibility of the Developer.

## Existing Utility Services Drawings

The Developer is to provide GTC with utility drawings validated by onsite CAT Scans depicting below and above ground utilities including, but not limited to:

- Electrical Power Network
- Below Ground Drainage
- Natural Gas Network
- Mains Cold Water
- Communications / Fibre
- Underground tunnels
- Underground structures
- Unexploded bombs
- Mine workings

## Incoming Utilities – Electrical Power

### Where GTC are the Asset Owner

For sites where GTC are the asset owner and are contracted for the provision of HV and LV power from the mains infrastructure, GTC shall include all LV power requirements to the Community Heat Hub as part of GTC's scope of works.

Please see Fig.1 below for a single line diagram showing scope of supply for electrical infrastructure.

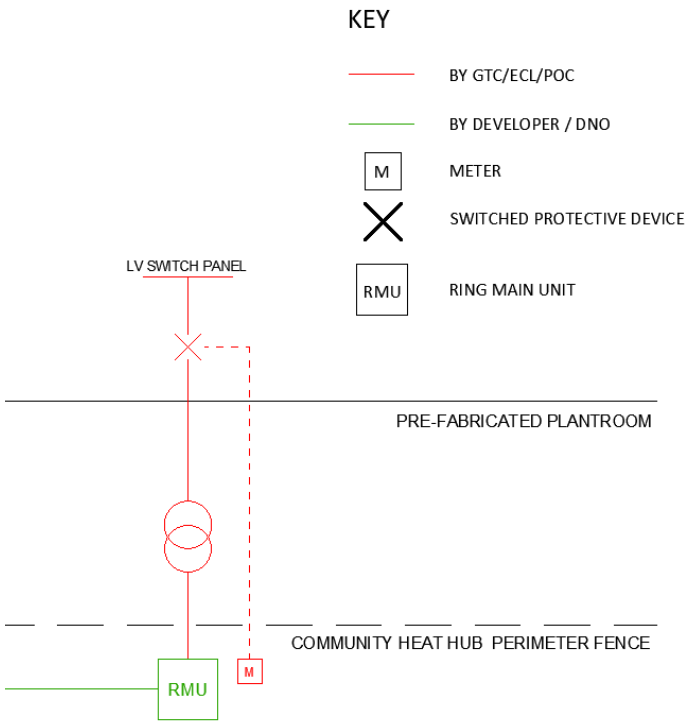


**Figure 1 – SLD of electrical supply to the Community Heat Hub where GTC are the asset owner**

## GTC Technical Guidelines

**Please refer to the following GTC documents for requirements:**

- *GE-TG-IG-0015 – Electricity Networks – GTC Technical Guidelines*
- *GE-CIC-ES-0063 – GTC Appendix A for ENA Engineering Recommendation – G81-Part 1: Design and Planning*

### Where GTC are not the Asset Owner

On development's where GTC are not the asset owner, the Developer is to provide a HV electrical power to a HV/LV transformer dedicated to serving the Community Heat Hub.

The Developer shall need to provide:

- HV/LV transformer and all associated infrastructure
    - Transformer to include Air Circuit Breaker (ACB) to allow for isolation of downstream electrical equipment in Community Heat Hub
    - Where possible, to include GRP enclosure
- Ring Main Unit (to the requirements of the DNO), located adjacent to the Community Heat Hub perimeter fence
- LV meter
- Busbar/cable connections to LV Panel in pre-fabricated plantroom

Please see Fig.2 below for a single line diagram showing scope of supply for electrical infrastructure.

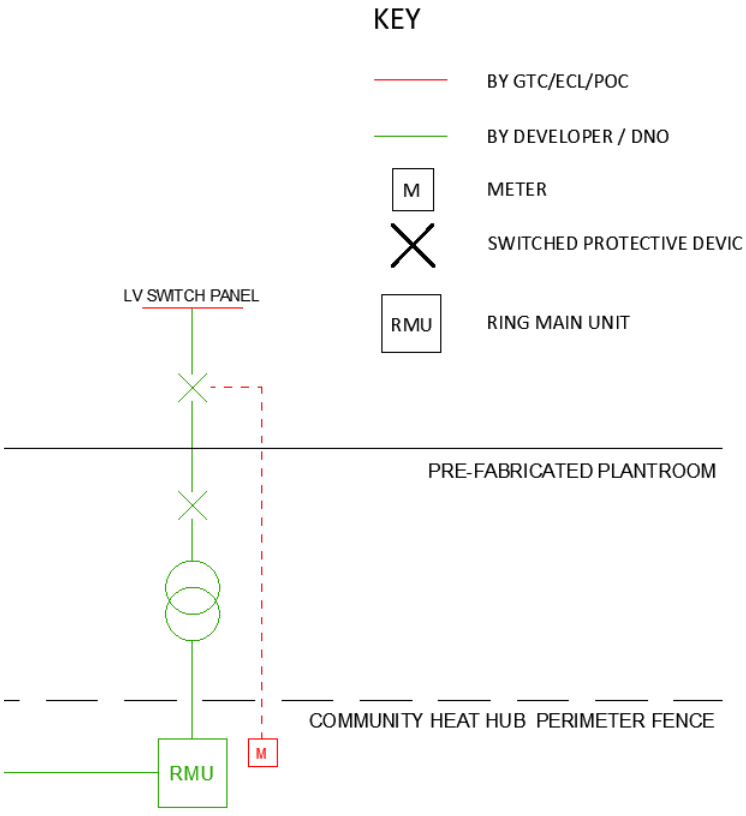


**Figure 2 – SLD of electrical supply to the Community Heat Hub where GTC re not the asset owner**

The transformer is a single point of failure for the Community Heat Hub. The asset owner must have a plan for replacing the transformer in the event of failure (e.g. a readily available stock of replacement transformers with immediately deliver to site). The transformer must be delivered to site within a minimum of 12 hours of a transformer failing.

Details of the transformer replacement plan shall be submitted to GTC's project manager. Any penalties resulting from GTC/GTC unable to supply heat to the development as a result of transformer non-operation shall be the responsibility of the asset owner (IDNO).

The Developer is to ensure that all incoming power requirements are verified by GTC and DNO/IDNO.

## Incoming Utilities – Mains Water to Community Heat Hub

### Where GTC are the Asset Owner

For sites where GTC are the asset owner and are contracted for the provision of mains water infrastructure, GTC shall undertake the required connection to the energy centre. GTC will require a Ø54mm Mains Cold Water connection from the mains infrastructure.

Please refer to the following GTC documents for requirements:

- *GW-TGI-IG-0017 – Water Network – GTC Technical Guidelines*

### Where GTC are not the Asset Owner

The Developer is to provide a nominal Ø54mm Mains Cold Water pipework to the Community Heat Hub pre-fabricated plantroom. The Developer shall provide and install the utility supplier's water meter as part of their works in an accessible location external of the Community Heat Hub. Please refer to GTC's drawings for location of the Community Heat Hub connection and specific details.

## Incoming Utilities – Communications / Fibre

**Where GTC are the Asset Owner**

For sites where GTC are the asset owner and are contracted for the provision of fibre/broadband communications, GTC shall undertake the required fibre connection to the energy centre. GTC will require 2 dedicated fibre/broadband lines with IP addresses and a connection speed of minimum 50mbps.

**Please refer to the following GTC documents for requirements:**

- *GF-TGI-IG-0545 – Fibre Network – GTC Technical Guidelines*

**Where GTC are not the Asset Owner**

The Developer is to provide 2 dedicated broadband lines with fixed IP addresses and a connection speed of minimum 50MBPS to the Community Heat Hub compound pre-fabricated plantroom. Please refer to GTC's drawings for location of the Community Heat Hub connection and specific details.

## Incoming Utilities – Foul and Surface Water

The Developer is responsible for all below ground drainage infrastructure for foul and surface water requirements. This includes pipework; connection to existing mains sewers; diversions; surface gullies; soakaways; and any requirements for gully trace heating.

The Developer shall provide the required gullies and drainage points as shown on GTC/GTC's drawings. All connections to the mains sewers, including diversions is the responsibility of the Developer.

The Developer is responsible for the supply, installation and operation of any sump pumps and associated pipework required in association with the surface water and foul drainage infrastructure of the CHH.

## Builders Works

The Developer shall be responsible for providing the following:

- All civils and structural requirements (excavations, foundations, plant bases, ducts, below ground drainage)
- Surface and foul/sewer water connections to the mains infrastructure
- All drainage pumping requirements (e.g. sump pumps)
- Perimeter fence around the Community Heat Hub
- Access doors to the Community Heat Hub
- All ducts inside and external to the Community Heat Hub (for below ground services) as detailed on GTC's drawings

Outside of the perimeter, the Developer will need to provide:

- Electrical Ring Main Units (RMUs) (if not supplied by GTC as the IDNO), subject to DNO confirmation
- Vehicle parking space for a GTC maintenance personnel van
- Below ground valve chambers for connection to temporary boiler plant/isolation of Community Heat Hub plant
- Space for emergency temporary boiler plant

The Developer will carry out all civil work and builders work associated with the Community Heat Hub compound and buried district heating infrastructure, including:

- Concrete bases and plinths
- Trench excavations and backfilling
- Chambers and chamber covers
- Paving and sub-base
- Granular fill on compacted base
- Foundations
- Sub-station buildings (if required)

## GTC Technical Guidelines

The Developer shall refer to GTC's Builders Works drawings, specifications and schedules and, where applicable, manufacturer's drawings and technical information supplied by GTC, for all builders works requirements.

The ground within the perimeter fence must be flat and level, i.e. concrete with a non-slip finish on a consolidated load bearing base, so that plant and equipment can be moved throughout the CHH. The ground shall have local falls to surface water drainage points.

The ground specification shall be suitable for the loads of each applicable equipment item.

## Community Heat Hub Location

The Developer shall inform GTC of the Community Heat Hub locations. The locations of the Community Heat Hub should be sited with the following considerations:

- Located as centrally within the development as possible, the resultant benefits being:
    - Pipework will be of smaller diameter resulting in smaller trenches and lower network losses
    - Energy required for pumping plant will be reduced
- On land which has not been identified as a flood plain or presents a risk of flooding
- If the build out of plots is phased, the Community Heat Hub buried pipework and valving arrangement will require to be installed to suit the phasing, to ensure heat is provided to all early phase plots
- Located as with as much distance as possible to the closest dwelling:
    - Distance provides a natural noise reduction
    - ASHPs produce cold air discharge, typically 10°C lower than ambient temperature
- Identified space for a mobile crane, for plant replacement (this can be the same space for the temporary boiler plant)

The footprint and spatial requirements for the Community Heat Hub Compound is detailed on the Community Heat Hub Layout Drawing.

Please refer to the '**Noise and Air Flow**' section.

## Perimeter Fence & Access Doors

The Developer shall provide a perimeter fence (including access doors) around the CHH. Please refer to the 'Noise and Air Flow' section above for the perimeter fence height requirements.

The fence is to include the following with the final specification to be agreed with GTC:

- Secure in that it is to prevent unauthorised personnel from entering any part of the compound
- Non-climbable
- Vandal proof
- Minimum 30-year lifespan
- Low Maintenance
- Impervious and continuous (excluding louvre sections)
- Non-combustible

## GTC Technical Guidelines

The Developer shall ensure that any specific requirements not identified in the 'Noise and Air Flow section' for the perimeter fence identified by their specialist acoustic consultant are provided.

The specification for the Community Heat Hub access doors are to be determined and issued under separate notification or further update to the Developer Guidelines by GTC/GTC. The Developer is responsible for access to the Community Heat Hub doors.

The area directly outside the perimeter fence shall be flat, kept clear and will be required for access at all times for maintenance purposes (please refer to the 'Noise and Air Flow' section above).

The Developer shall undertake all landscaping requirements internally and externally of the CHH.

## Pre-fabricated Plantroom

The Developer will need to provide a reinforced concrete slab designed for the footprint and load of the pre-fabricated plantroom.

The Developer shall provide the foul and surface water below ground including connection to the mains for the requirements detailed on GTC's drawings.

GTC will endeavour to ensure architectural aspirations for the Community Heat Hub are accommodated. However, GTC reserves the right to specify the type of Community Heat Hub building, doors and ventilation systems to be used. Any architectural aspirations requested post-contract agreement and may incur additional cost or delay to the build of the pre-fabricated plantroom will be discussed with the Developer. If the Developer chooses to proceed, any cost and delay implications shall be submitted by GTC to the Developer and shall be costed as a variation to the contract offer.

The pre-fabricated plantroom will be fully constructed and built off site and transported to site. The pre-fabricated plantroom will be lifted into position by GTC. GTC will undertake a lifting plan in conjunction with the Developer and a specialist plant movement contractor. The Developer will need to ensure there is sufficient space and access for the completion of the lifting the pre-fabricated plantroom into final position.

## Community Heat Hub Ground Works

The Developer shall ensure the ground in the Community Heat Hub is solid, level and capable of withstanding loads identified on GTC/GTC's drawings.

It is imperative that surface water will drain and that surface pooling is prevented. Any damage to equipment which results in corrective remediation or replacement as a result of inadequate surface water drainage will be at the cost of the Developer.

Where GTC are the transformer asset owner, transformer ground works shall be detailed by GTC under a separate transformer (substation) specification. Please refer to GTC document *GE-TGI-IG-0032 Substation Specification*. Where GTC are not the asset owner, the Developer is to liaise with the appropriate asset owner

The Developer shall supply appropriate floor supports for external pipework to be fixed to. Pipework routing and required supports shall be designed at the Detailed Design stage of the project.

The Developer shall specify and install required covers for drainage such as grilles and covers.

# GTC Technical Guidelines

## Delivery of Plant and Equipment

The following plant will be delivered to site and lifted into position by GTC:

- Pre-Fabricated Plantroom
- Thermal Stores
- Air Source Heat Pumps
- Transformer

GTC will undertake a lifting plan in conjunction with the Developer and a specialist plant movement contractor. The Developer will need to ensure there is sufficient space and access for the delivery of each equipment and the lifting operation of each equipment into final position.

## CHH Architectural Aspirations

Architectural aspirations for the any of the Community Heat Hub equipment shall be acknowledged to GTC prior to contract award, which include specification of any colour or material to visible cladding. Any architectural aspirations requested post-contract agreement and may incur additional cost or delay to the build of the thermal stores will be discussed with the Developer. Any impacts to cost and programme of subsequent changes to the thermal store specification shall be notified by GTC to the Developer and shall be costed as a variation to the contract offer.

## Transformer

The Developer is to provide the HV infrastructure from the HV Mains Network to the Community Heat Hub transformer. All DNO approvals will be the responsibility of the Developer.

### Transformers: Where GTC are the Asset Owner

Where GTC are the transformer asset owner, GTC/GTC will be responsible for the supply, delivery, positioning of the transformer.

GTC/GTC shall off-load the transformer from the kerbside delivery vehicle via a forklift truck to the final position. The Developer is responsible for ensuring the route to the transformers final position is level, flat and suitable for an appropriate forklift vehicle.

The Developer will be responsible for all builders works associated with the Transformer Community Heat Hub, as detailed in Builders Works section.

### Transformers: Where GTC are not the Asset Owner

Where GTC are not the transformer asset owner, the Developer is responsible for the supply, delivery positioning and commissioning of the transformer.

The Developer shall off-load the transformer from the kerbside delivery vehicle to the final position. The Developer is responsible for ensuring the route to the transformers final position is level, flat and suitable for the required offload delivery vehicle.

The Transformer specification and design must be coordinated with the Community Heat Hub and pre-fabricated plantroom, including cable/busbar connections, isolation, communications to the Community Heat Hub BMS, access, ventilation.

The Developer shall be responsible for the LV connections from the transformer to the LV Panel in the pre-fabricated plantroom. Any works required to facilitate ???

## Development Phasing

The Developer is to provide GTC of the development phasing programme, detailing the intent to construct the number of units for each year until completion.

GTC shall design the Community Heat Hub and district heating infrastructure for the requirements of the entire development. However, the installation of the Community Heat Hub equipment and district heating pipework shall be installed in a manner to suit the phasing of the development.

The Developer shall make reference to the current issue of the Technical Guidelines (which will supersede all previous revisions) for all future plant installations.

During pre-construction, GTC shall advise the Developer the build programme of the Community Heat Hubs. The Developer shall follow the requirements of these Developer guidelines for the installation of all future-phased plant.

## Temporary Plant

The Developer shall confirm the date when heat on is required from the CHH before contract award and should be noted on the Developer's construction programme.

Should GTC's quote exclude temporary plant and is subsequently required, the costs of temporary plant will be advised by GTC and to be instructed by the Developer as a variation.

# Section Seven

# Buried District Heating Pipework

The district heating pipework, comprising of flow and return pipework, will route underground throughout the development as shown on GTC's development district heating layout drawing.

Any deviations to the district heating distribution layout must be agreed in advance with GTC before construction.

It is the responsibility of the Developer to ensure all contractors working on site are informed of the location of the buried district heating pipework and services.

## General

A pre-start site meeting will be arranged at the start of your development.  At any stage of construction, you can contact GTC for advice and guidance.

It is desirable that the Developer agrees a programme of construction which will enable GTC to co-ordinate main laying activities, within our set timescales.

The Developer is responsible for all excavations, duct laying and backfill work on site, unless otherwise specified within the quotation.

On request, GTC will normally arrange for the on-site buried pipework to be laid in trenches and/or ducts provided by the Developer.

If there are any alterations to the agreed site layout, which may affect the route of the heat main, then GTC must be advised immediately.

## District Heating Trench

The Developer is to provide all trench requirements for GTC to install the district heating pipework including:

- Ensure kerb braces have been installed prior to scheduling work with GTC. IN EXCEPTIONAL CIRCUMSTANCES ONLY where this is not practical or reasonable and with the express written permission at Director level, GTC may accept a site-specific indemnity letter signed by the Developer accepting a “line and level” approach. In such circumstances the Developer will indemnify GTC against all costs relating to future relocation of all utility pipes, ducts, and cables and/or repairs to damaged pipes and ducts.
- Carry out all necessary excavation and backfilling work for the installation of district heating pipework mains, services, and associated equipment.
- Maintain an obstacle free route to allow installation work to be carried out in one visit wherever possible.
- Structural reinforcement of the trench as necessary to allow for safe operation of pipe laying.
- Removal of all sharp objects which will potentially damage the pipework
- Removal of any water pooling/flooding
- Valve chambers and covers
- Storage facility for pipework
- All safety barriers
- Ensure no work is carried out beneath scaffolding.
- Ducting, supplied by the Developer, can only be used for perpendicular road crossings; and to route the service pipe to a dwelling building entry location.
- Ensure that you have read, understood, and signed ‘CDM Construction Plan Parts C and D GU-DPR-FM-1014’.
- Ensure groundworkers are trained, competent and registered to lay ducting and/or services in accordance with the design drawing.
- Maintain a register of trained and competent groundworkers in Appendix 1 (to follow).
- Lay ducting for mains in accordance with the design drawing.
- Lay ‘district heating pipe’ marker tape, supplied by GTC, 250mm above district heating mains or ducting for mains before backfilling the trench.
- Lay ‘district heating pipe’ marker tape, supplied by GTC, 75mm above district heating service or ducting for services before backfilling the trench.
- All district heating mains and services should be minimum 150mm away from other utility services.
- Provide a suitable safe access platform for installation of all district heating riser works.

The Developer is to ensure all trenches for district heating are undertaken in line with the current pipework manufacturer’s requirements. The following section set out an overview of these requirements and shall be verified at the time of construction.

GTC have specified pre-insulated, bonded: PEX-A; or PP-R; pipework for all buried district heating pipework.

Where PEX-A or PPR pipework is laid below **soft ground or footways**, pipework shall have a minimum depth of cover (to the top of the pipe outer casing) of **600mm**.

Where PEX-A or PPR pipework is laid below **roads/carriageways**, pipework shall have a minimum depth of cover (to the top of the pipe outer casing) of **800mm**. Trenches must allow for a gradual incline on the approach to a road crossing.

Fig.3 below depicts the pipework specified by GTC.

**Figure 3 – PEX-A UNO pipework tee connection**

## Adjacent Utilities

District heating pipework will be laid alongside other buried utilities required for the development. It is GTC's preference for all district heating pipework to be laid below public soft dig areas such as grass verges. If none is available or the land is private, pipework shall be laid below public footways wherever possible. Only in unavoidable circumstances shall district heating pipework be laid below vehicle carriageways and must be prior agreed by GTC.

The Developer shall follow the guidance depicted in GTC's multi-utility trench drawings for minimum distances between adjacent services. Where GTC are not the asset owner, the Developer shall request similar documents from the asset owner for verification by GTC or GTC.

## Traffic Loads

Laying underneath roads must comply with loading classifications SWL 30 (=300kN total load) or SWL 60 in accordance with DIN 1072. With appropriate surface structure according to the guidelines for the standardisation of the surface structure of traffic areas (RStO) the pipes can be driven over with SWL 60. The Developer shall inform GTC if there is potential for vehicles with a SWL greater than 60 to drive over where pipework is located.

The trench shall have no less than 5 metres of transition to the point at which the additional depth of cover is required. If there are a significant number of road crossings in a short space (e.g. front facing properties on the opposite side of the road to the district heating pipe) then the pipework in the footway shall have a depth of cover appropriate for a road crossing (800mm from the top surface to the top of the pipework outer casing). In this instance, half of the trench for the pipework shall be a full pipe size lower to allow for tee connections.

Fig.4 shows the depth of cover to the top of pipework for vehicular loads. All road crossings shall be ducted as detailed in the section below.

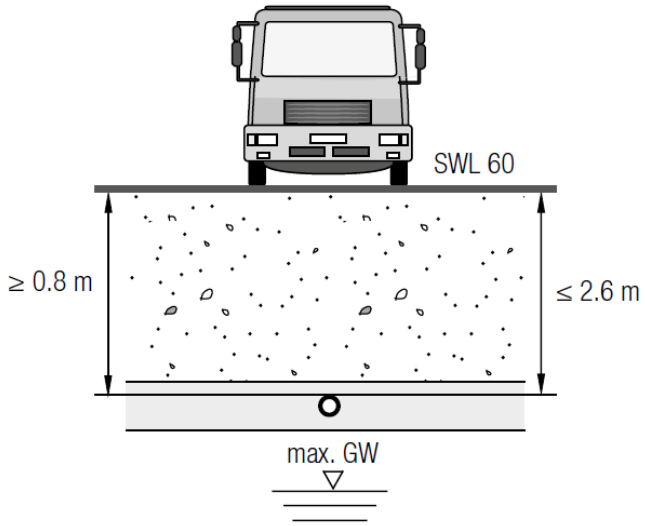


**Figure 4 – Trench depth for vehicular loads**

**MAINS DUCTING**

The laying of district heating pipework will be in an open trench excavated by the Developer. Rigid ducting shall be used for perpendicular road crossings. The Developer is responsible for the supply and installations of ducting. A suitable standard for plastic ducting is BS 4962.

Internal corrugated ducting must not be used for road crossings. See Table 1 below for duct diameters and corresponding pipework sizes.

**Table 1 – Road Crossing Duct Sizes**

| Pipework Outer casing diameter | Internal diameter of duct |
|---|---|
| **63mm** | 100mm |
| **90mm** | 150mm |
| **125mm** | 200mm |
| **180mm** | 300mm |
| **250mm** | 300mm |
| **315mm** | 400mm |

## Bottom of Trench Requirements

The width at the bottom of the trench is subject to: the external diameter of the pipe(s); if additional working space is required e.g. to make joint connections; or if it is part of a multi-utility trench. For district heating pipes PEX-A and PPR, accessible working space is required for sleeve connections and in accordance with 'DIN 4124 Excavations and trenches – Slopes, planking and strutting breadths of working spaces'.

The trench base is to be created with a sand bed (grain size 0/4) in the width and depth in such a way, that the pipe lies across the whole length. The base of the trench must not be loose. Before the pipes are laid, any loose, cohesive soil is to be removed down to where the loose soil begins and this is to be replaced with non-cohesive soil or a special pipe support. Loose, non-cohesive soil must be compacted again.

The thickness of the trench base (i.e. from the underside of the outer district heating pipe to the bottom of the trench) is subject to the specification of pipework:

- For all PEX-A pipework a minimum sand bed thickness of **100mm**
- For all PPR pipework a minimum sand bed thickness of **150mm**

## High Water tables and Wet Ground Conditions

In areas where pipes are laid with fluctuating water levels/high water table, the Developer must remove solid obstacles under the pipes that could influence the bedding of the pipes. When doing this the Developer must ensure that there is a sufficient distance from such solid objects.

In the case of a non-load bearing and heavily water-saturated trench base, the Developer is to secure the pipe using suitable construction measures, e.g. non-woven material. This also applies if the trench base has varying load-bearing capacity due to varying soil layers.

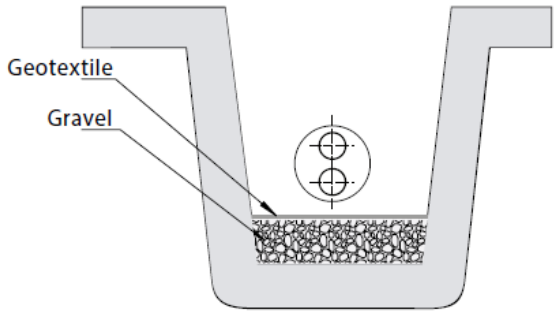


**Figure 5 – Securing pipe in boggy or fluctuating water level locations**

## Sloped Trenches

The Developer is to provide all cross brackets necessary to prevent the trench bedding from being washed away. The Developer shall provide drains where necessary.

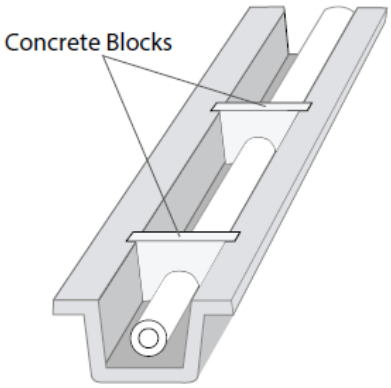


**Figure 6 – Cross-brackets on slopes**

## Handling the Pipes for Installation

All pipework deliveries are to be accepted and moved to an appropriate storage facility by the Developer. GTC will be responsible for moving all pipework from the Developer' storage facility to a position close to the trench for installation. All pipework uncoiling is to be undertaken under by GTC. Pipework shall be laid into the trench by GTC.

## Backfilling of Pipe Trenches

The Developer shall backfill the trench over the top of the pipes using sand of grade 0.4 and compact it by hand. Backfilling is not to commence until GTC have completed all pipework testing and commissioning.

The minimum fill of sand compacted above the top of the pipe is 100mm for both PEX-A and PPR pipe.

### District Heating Pipework Heat Spread (for where GTC are not the multi-utility asset owner)

Tables 3 and 4 shows the estimated heat spread for PEX-A UNO and DUO pipework to adjacent soil at a water temperature of 60°C for Rehau Rauthermex pipe (alternative pipework specifications shall need confirming with the manufacturer).

Where the asset owner is not GTC, the Developer shall advise the utility asset owner of the temperatures to review for locating their pipework. The temperatures are provided at:

- The outer surface of the pipe
- +100mm from the outer surface of the pipe
- +200mm from the outer surface of the pipe
- +1000mm from the outer surface of the pipe.

**Table 2 – Pipe surface and adjacent ground temperatures at noted distances for UNO 125/182mm pipe**

| UNO Standard - 125/182 | Adjacent ground temperature at 60°C water temperature |
|---|---|
| At pipe surface | 15.8 |
| +100mm | 14 |
| +200mm | 13 |
| +1000mm | 10 |

**Table 3 – Pipe surface and adjacent ground temperatures at noted distances of DUO 63/182mm pipe**

| DUO Standard - 63/182 | Adjacent ground temperature at 60°C water temperature |
|---|---|
| At pipe surface | 14.5 |
| +100mm | 13.1 |
| +200mm | 12.3 |
| +1000mm | 10 |

## Materials Delivery & Storage

In preparation of GTC commencing work on-site, there is a requirement for the Developer to responsibly store pipe and fittings on site.

- Pipe and associated equipment will be delivered directly to site and must be visually inspected on delivery and any damage to be marked, set aside and immediately reported to GTC.
- Any loss or damage occurring after delivery will be chargeable to the Developer.
- Under no circumstance are pipe coils to be untied without the supervision of a suitably trained GTC operative.

## Unloading

Before unloading, thoroughly inspect all material for shipping damage. Pay close attention to the inside radius of the coil – where damage may occur in the form of a rip or tear in the outer jacket.

Pipe coils are to be transported horizontally, lying completely flat on a load area, and must be secured to prevent slipping. The area must be cleared prior to loading.

Note: DH pre-insulated pipe coils are packaged with protective end covers and coiled, then fastened with nylon straps.

When lifting coils, lifting straps must be placed around the entire coil. When using a forklift, contact points must be protected (for example, fork tines may be padded, or inserted in a section of polyethylene pipe longer than tines, and so on); the lifting must be performed on the entire coil. Forks must not be inserted between coils in a stack, or between pipes in the coil.

Forklifts should be used in accordance with '*BK-HAS-MS-0142 Use of Forklift Truck*'.

Always lift coils from the transport vehicle using wide straps around the coil. To avoid damage, do not drop from truck bed or from similar elevation, or drag the coils over coarse or sharp surfaces. For short distances, manually roll the coil.

## Handling

Prior to installation, some coils will require handling and loading on to a horizontal, or vertical, de-coiler. Depending on the weight of the coil, this operation can be completed by a team onsite utilising lifting straps and in accordance with GTC document '*PO-HSE-MS-0171 Manual Handling*'.

## Storage – General Guidance

The onsite storage facility shall be a secure compound, with careful consideration given to the following:

- Security of all materials and equipment from theft, vandalism, accidental damage, or contamination. Precautions should be taken to prevent debris and water from entering pipe and fittings. (Pipe end caps on coils, intended to prevent ingress of contamination, should be kept in place during storage).
- Safety of the site workers, public, especially children and blind persons.
- The movement of traffic and construction equipment.
- All pipe store locations should be on a suitably firm hard standing, level ground, free from ground water, mud, and other damaging material with adequate access for construction vehicles and/or lifting equipment.
- All pipework must be securely stored. Badly stacked pallets, coils or bundles may slip or collapse, causing injury to personnel and/or damage to the pipe.
- Pipe and fittings are not to be stored on the ground, suitable pallets or wooden battens should be the interface between the ground and material.
- Pipes and fittings should be stored away from exhaust outlets and other high temperature heat sources and where contact is possible with aggressive chemicals such as lubricating or hydraulic oils, chemical solvents, diesel or gas oils, etc.

- No other materials should be stored or placed on top of the PE pipe or fittings as this may damage or affect the dimensional stability of the pipe and fittings.
- Pipes must be kept sealed at cut ends to prevent foreign material entering the pipes and damage to the pipe from UV radiation.
- Care should be taken to prevent damage to, and distortion of, pipe ends and fittings.
- Stock should be stored in such a manner as to ensure adequate stock rotation on a “first-in, first-out” basis.
- All pipes are to be inspected for any storage and transportation damage before being placed in a trench. Any damaged pipework found in storage will not be used and is the Developer’s responsibility to return damaged items to the supplier or remove from site.

## Storage – Individual Pipe Lengths

Pipe lengths stored individually should be stacked on clear level ground in a pyramid not more than one metre high, with the bottom layer fully restrained by wedges.

Sticks in bundled packs should be stored with the restraining battens in place.

The bottom layer of pipes should be laid on timber battens at one-metre centres. Where possible PEX-A pipework will be supplied in a coil but in some circumstances it may be supplied in straight lengths. PPR pipework will be supplied in straight pipe lengths.

Straight pipe lengths shall not be stacked in excess of 1m from ground.

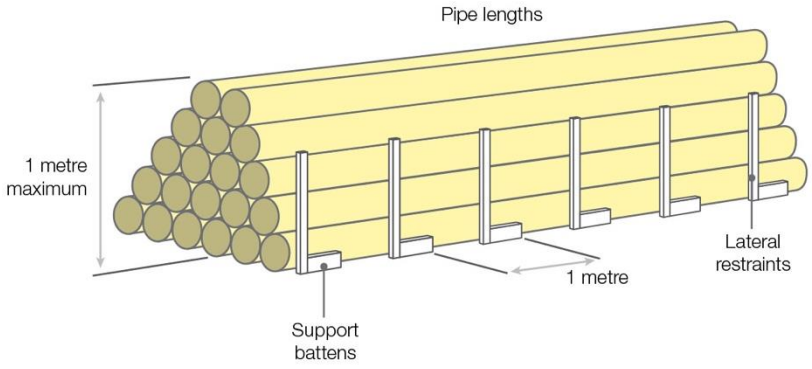


**Figure 7 – Storage of straight pipe lengths (loose)**

## Storage – Coiled Pipe

Coiled pipe should be stored flat and on firm level ground which has suitable protection for the bottom coil. Where space is limited, and coils are to be stacked, the height of stacked coils should be such that the stack is stable, and the uppermost coil can be safely handled. The maximum height of coils stored horizontally shall be 2 metres.

Wooden battens placed below the bottom coil and used as spacers between each layer will facilitate easy access for slinging. When the need for transportation is required, it should only be carried out by trained operatives. Batches of coils delivered on pallets must remain secured to the pallet and only be broken at the time of use. All pipe coils are to be stored horizontally as shown in Fig.8 below.

**Figure 8 – Coil storage**

Prior to installation, some coils will require handling and loading on to a horizontal, or vertical, de-coiler. This work shall be undertaken by a competent GTC team onsite utilising appropriate lifting equipment and in accordance GTC procedures.

**WARNING: Under no circumstances shall a person not competently trained cut the bands on coiled pipe.**

## Fittings

Where electrofusion and mechanical fittings are to be stored on site, they should be under cover in dry conditions, preferably on racking in a lockable container. They should be kept in their boxes/packaging until ready for use. Fabricated fittings may be stored outdoors if they are protected against damage and prolonged direct sunlight.

## Valve Chambers

Where identified by GTC, the Developer shall undertake the trench (note the dimensions will differ from the pipework requirements and as indicated on GTC drawings), base and wall levelling, and chamber cover. The chamber must not be backfilled as future access to valves will need to be made. Backfill material should not be able to enter the chamber after works have been completed. Any backfill material which has entered the chamber must be cleared by the Developer. The chamber shall be free from any standing water during and after installation.

The Developer shall allow for all necessary drainage to allow all water ingress to route to the below ground water source.

## Bundles

Where pipe lengths are to be removed from a bundle, it should be from a single bundle with no unbroken bundles underneath; stakes should be securely fixed to retain the bundle shape whist stock is drawn from the bundle.

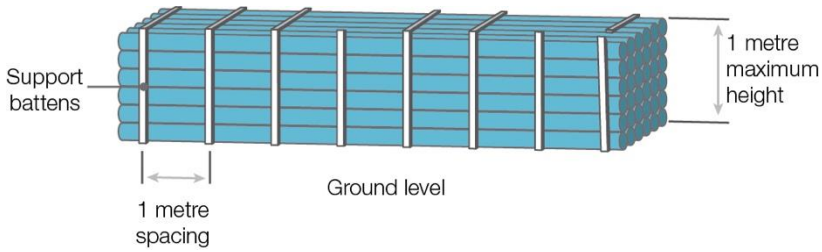


**Figure 9 – Broken bundles of pipes**

## Ground Workers

Ensure ground workers have enough knowledge about safe working practices on site and that work is carried out safely.

- Ground workers must be aware of the large amount of stored energy in coils of pipe. Coils of pipe should be carefully restrained and unwound following the guidance in section **Materials Delivery & Storage**.
- Where connections are to be made to an existing heat main, the GTC Project Manager shall advise the Developer/groundworker of the type of connection to be undertaken and the dimensions of the excavation necessary to facilitate the connection.

### Table 4 – Minimum excavation requirements to support connections

| Minimum excavation requirements to support connections.<br>Excavation base to be 150mm below pipe | | | | |
|---|---|---|---|---|
| **Connection type** | Applicable mains diameters (to outer casing) | Excavation size required for the live main to be exposed (mm) | Additional bell hole in middle in direction of offtake (mm) | Excavation shape |
| **End on connection** | 1x ≤200mm DUO | TBC | TBC |  |
| | 2x 160-180 UNO | TBC | TBC |  |
| | 2x 200-315 UNO | TBC | TBC |  |
| **Insert tee** | 1x ≤200mm DUO | TBC | TBC |  |
| | 2x 160-180 UNO | TBC | TBC |  |
| | 2x 200-315 UNO | TBC | TBC |  |
| **Branched offtake** | ≤180mm mains diameter | TBC | TBC |  |
| | 200-315mm diameter | TBC | TBC |  |

# Section Eight

# Heat Service Connection

## General

The Developer is required to undertake all excavation works on-site to enable the service pipe or service ducting to be laid, allowing the connection to the heat main and the service termination at the building to be completed.

The heat service must be laid in a straight line along a route as shown on the agreed design, any deviations must be agreed with GTC, prior to laying the service pipe or service duct. The route should be perpendicular to the property and take the shortest route practicable to the gas main.

Services shall be laid, in trenches or inserted into ducts provided by the Developer.

The Developer shall install a pre-formed bend pipe supplied by GTC at the time of foundation/slab construction in accordance with GTC requirements. Connection of the pre-formed bend to the below ground service pipe shall be by GTC.

The Developer shall supply and install all above ground pipework and insulation. This pipework connects to the isolation valves (adjacent to the dwelling entry PEX-A pipework) to the Heat Interface Unit.

## Sleeving/Ducting & Excavation

A service pipe shall connect the district heating mains pipework to a dwelling. The Developer shall be responsible for the trenching to each dwelling for the installation of each service pipe. For trench and backfill requirements, please refer to section Buried District Heating Pipework and GTC's standard drawings.

GTC shall supply and install the below ground service pipe as described in this section. The service pipe shall be kept as short as possible.

The service pipe shall be located such that replacement can be made if required or at the end of the pipe lifespan. The service pipe shall not be located under any buildings or structures which will prevent this access.

**If the installed service pipe or ducting has insufficient cover, or no marker tape has been laid above the pipe or ducting, or the duct ends have not been sealed, then the heat mains service will not be connected/commissioned, and the Developer will be notified.**

Service branches pipework tees to dwellings shall be laid from the mains at the time of mains construction to allow for the service connection to take place in the footpath or soft ground.

The service pipe shall route underground to the dwelling boundary where it will rise vertically to above ground. The location of the service pipe shall be in conjunction with locating the Heat Interface Unit. Please refer to the Heat Interface Section below.

**The Developer is responsible for all building Structural and Civils design associated with pipework entry to the dwellings.**

## Service Pipe

GTC shall free issue a pre-formed (prefabricated) pipework bend which the Developer shall install. The Developer shall take delivery and store all pre-formed bends in line with the Storage and Transportation requirements detailed in section Buried District Heating Pipework. The Developer is to ensure the pipework is not damaged prior to and during installation. Any damages must be notified to GTC immediately who will advise on the course of action.

The Developer shall supply and install all sleeve/ducting to route pipework through the building wall line, including all fire stopping. The seal between the sleeve and pre-formed bend shall be by the Developer, the specification of which shall be submitted to GTC for approval. Please refer to GTC's standard drawings.

The Developer shall locate the buried pipework entry point into the dwelling at an external wall as close to the connecting sub-main pipe as possible. The void where the pipework enters the dwelling shall be sized so that the pre-formed bend can be replaced in the event of a leak or at the end of its expected life. The void shall be filled with insulative material and covered so that access can be easily made in the future for pipework replacement.

Please see fig.10 for service pipework scope of supply by the Developer and GTC.

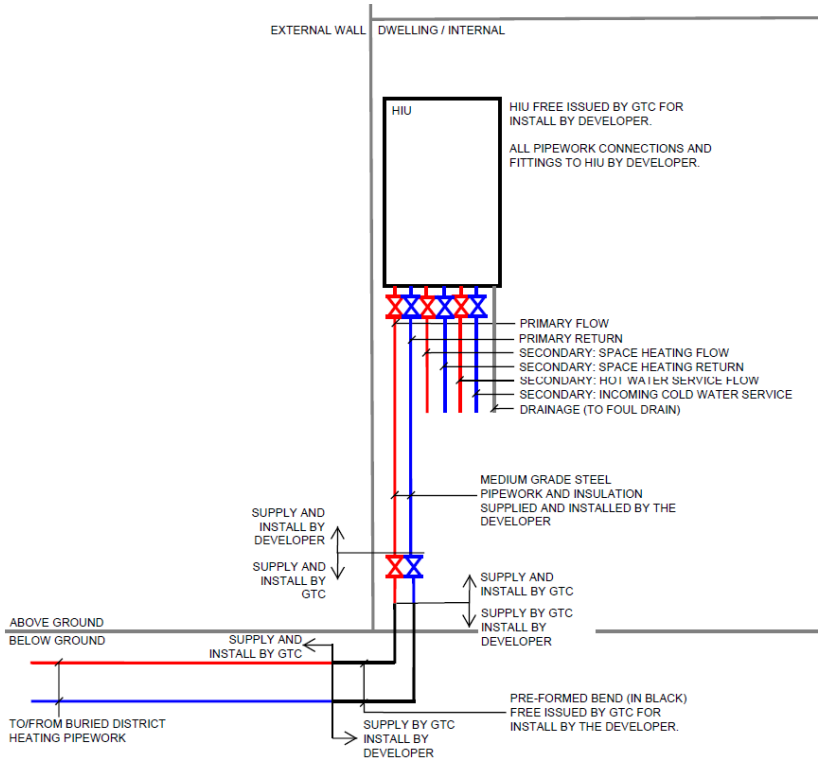


**Figure 10 – Scope of supply schematic of service pipe to / from the HIU**

## Pipework Specification

The Developer is to supply, install, test and commission all above ground pipework and insulation from the dwelling entry isolation valves (isolation valves supplied by GTC), up to and including the HIU connections.

The above ground service pipework and fittings from the isolation valves to the HIU shall be **medium weight steel tube to BS2871 with screwed joints, PN10 rated**.

The Developer shall pressure test pipework to '*BESA TR/6 Site Pressure Testing of Pipework*'; and flush the pipework between the valve entry position and the HIU to BSRIA document '*BG29/2021 Pre-Commission Cleaning of Pipework Systems*) and submit the following documents to GTC, identifying the applicable plot number on the document:

- Certification of pressure test
- Certification of flushing

Above ground pipework should not be filled with water until the connecting below ground service pipework is commissioned and ready to supply district heating water to the above ground service pipe.

If the above ground service pipe is flushed and commissioned more than 48 hours in advance of the connecting below ground service pipe the Developer shall be responsible for maintaining the integrity of the pipework and all corrosion prevention means e.g. filling with nitrogen gas or pre-commission cleaning agent such as Hydrosphere (or equivalent). Any pipework filled with a temporary anti-corrosive agent shall be clearly labelled on the pipework. The Developer is responsible for the removal and disposal of any anti-corrosion agent in the service pipework.

Before opening to the district heating system, any service pipe which has had an anti-corrosion agent shall undergo water quality sampling by a UKAS accredited laboratory. The water quality shall follow the guidelines depicted in the current '*BSRIA BG29 Pre-Commission Cleaning of Pipework Systems*'. If the sample does not meet the guidelines stated, the Developer shall treat and dose the pipework accordingly, and undergo further testing until the water quality meets the guidelines.

All valves and components must be accessible post construction (i.e. not buried in solid floors, or behind drylining). If valves are to be concealed, they must be accessible in the event of an emergency e.g. triangle key or similar.

GTC shall supply and install isolation valves above ground, which is where GTC's pipework supply and installation scope of supply ends. The Developer is responsible for all above ground steel pipework and insulation to the Heat Interface Unit, including testing and chemical cleaning. For the isolation valves, the Developer shall also supply and install a removable insulation jacket to the thermal conductivity noted in section Pipework Insulation below.

The Developer shall supply and install all Earth bonding required for the steel pipework.

The Developer shall be responsible for all concealment of the void, pipework and isolation valves. Isolation valves must be accessible in an emergency e.g. located in an easily openable cupboard/box.

Pipework in the dwelling to the HIU shall be as short as possible, accessible and not permanently concealed (i.e. not routed in a building cavity, cast into screed, etc.).

## Pipework Insulation

The Developer is to ensure all pipework is fully insulated. Insulation shall be applied to all above ground service pipework and isolation valves. The specification of the insulation shall be as a minimum **CFC free phenolic foam insulation (to BS EN 14314:2015) with a thermal conductivity minimum of 0.025W/mK 30mm thickness**.

All phenolic foam insulation should include a factory applied vapour barrier and finished in alu-wrap foil or similar finish and shall be continuous such that there are no exposed sections of pipe and continuous when passing through pipe support brackets and pipe sleeves. It is recommended that phenolic foam bracket inserts are procured with the bracket

Insulation is to be inspected by a GTC employee before any concealment is applied. If insulation has not been verified by a GTC employee, the method of concealment is to be removed and reinstated at no cost to GTC.

## Fire Stopping

The Developer shall be responsible for complying with Building Regulations and undertake all fire stopping requirements associated with the service pipe to dwellings.

Where a service pipe is enclosed within a duct or an enclosure, the duct or enclosure must comply with the building regulations and shall be at least half hour fire resistant and comply with BS 8313; suitable removable access/inspection panels shall be made available.

The pipework insulation specification shall not be compromised through fire compartments. The Developer shall procure an appropriate fire stopping insulation which includes the minimum thermal conductivity requirements stated in section Pipework Insulation.

# Section Nine

# Heat Interface Unit (HIU)

## General

The Heat Interface Unit shall be supplied (free issued) by GTC for installation by the Developer. The Developer shall store the HIU on site (in accordance with the storage requirements below) until required for their installation. GTC shall undertake HIU commissioning.

It is the Developer's responsibility to identify and consult with GTC to ensure that adequate provision is made for siting and installing the HIU. The Developer should provide property layout plans showing the proposed HIU positions prior to the final design of the heat services. Once the design is approved, any variations required shall be submitted to GTC for approval. GTC shall be the sole arbiter of HIU entry positions.

When booking services and HIU fits the Developer is required to confirm the GTC network number and plot number.

The HIU installations shall be sited so that:

- It is in the same room as the below ground pipework entry void
- Fixed to a wall internally, the wall shall be an external wall, as close as possible to the below ground service pipework and connecting sub-main.
- Ideally at the front of the property
- Above ground service pipework shall kept to a minimum
- In a room where connected services (mains water, power, drainage and fibre) are readily available – e.g. a utility room is ideal but a kitchen is also acceptable
- The optimum location in the dwelling is in a utility room where connected services are available (mains water, power and drainage)
- Alternatively, if a utility room is not available or is located at the rear of the property, the Kitchen is an alternative location where connected services are available
- The HIU can be installed, adjusted, serviced, and exchanged
- The HIU is easily accessible for inspection and meter reading
- All functions of the installation can be easily operated
- Does not create an obstruction hazard along access and egress routes

A HIU installation shall not be sited:

- At the rear of a property
- Where it might be outside the operating range of the HIU as specified by the manufacturer
- Where it might be exposed to accidental damage
- Where it might cause an obstruction
- Where it might be affected by a damp or a corrosive atmosphere
- Where it will constitute a danger to any person
- At such a low level that there is a significant risk of it being submerged in the event of flooding

## HIU Site Storage

The Developer is to provide a suitable facility and space for the storage of HIUs on site. The onsite storage facility shall be a secure compound, with careful consideration given to the following:

- Security of all materials and equipment from theft, vandalism, accidental damage, or contamination.
- Safety of the site workers, public, especially children and blind persons.
- The movement of traffic and construction equipment.
- All HIU store locations should be on a suitably firm hard standing, level ground, free from ground water, mud, weatherproofed and other damaging material with adequate access for construction vehicles and/or lifting equipment.
- Badly stacked pallets may slip or collapse, causing injury to personnel and/or damage to the pipe.
- HIUs are not to be stored directly on the ground, suitable pallets or wooden battens should be the interface between the ground and the equipment.
- HIUs must be fully covered to prevent foreign material entering or damaging the HIUs
- Stock should be stored in such a manner as to ensure adequate stock rotation on a “first-in, first-out” basis.
- All HIUs are to be inspected for any storage and transportation damage before being installed in a dwelling. Any damage identified to a HIU must not be used and reported immediately to GTC who will advise of subsequent action. The Developer will be responsible for all damages identified by GTC and the Developers HIU commissioning engineer at HIU commissioning.

It is the Developer’s responsibility to identify and consult with GTC to ensure that adequate provision is made for siting and installing the HIU. The Developer should provide plans of all dwelling types showing the intended HIU position. Once the design is approved, any variations required shall be submitted to GTC for approval.

## HIU Dimensions

Fig.11 below shows a typical dimensional drawing of the proposed HIU (physical dimensions only, does not show additional space required for maintenance access). An additional 100mm shall be made around each side of the HIU to allow for front cover removal access therefore the overall width space required for the HIU is 730mm.

GTC shall advise of the full HIU specification at the detailed design stage, following the Developer’s acceptance of GTC’s quote.

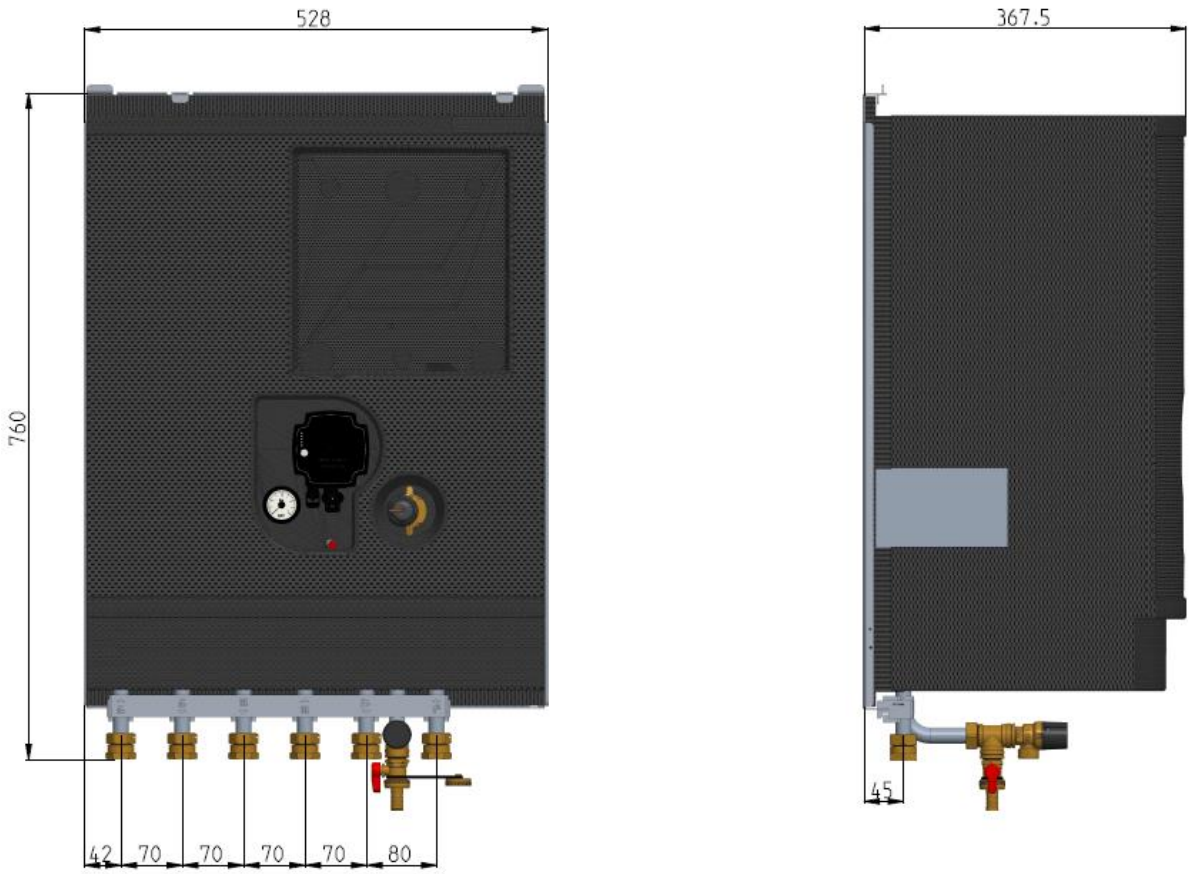


**Figure 11 – Typical HIU dimensions excluding access for cover removal (actual HIU may differ from image shown above. Connections may be top mounted or a mix of bottom and top entry/exit and shall be confirmed at detailed design)**

## HIU Mains Cold Water

The Developer shall provide and install all pipework and fittings, connecting the heat interface unit (DN20 internal thread connection on HIU) to the mains cold water service, in each dwelling. An isolation valve should be included on the cold water service as close as possible to the HIU in the event of unit failure.

Cold water shall have a minimum pressure at the HIU of 1 bar(g) and maximum of 10 bar(g).

## HIU Electrical Power

The Developer is to provide and install a single 230V 6A fused fixed spur from a dedicated MCB on the dwelling consumer unit to the electrical wiring box within the heat interface unit in each dwelling.

## HIU Drainage

The HIU includes a safety valve which, in the event of system over-pressure, opens and releases system water. The Developer shall be responsible for a pipework connection from the HIU safety valve (DN15 connection) to a foul drain.

## HIU Commissioning

The Developer is to undertake all commissioning requirements for the HIUs. The Developer shall ensure commissioning is carried out in accordance with the manufacturer's recommendations and to a method statement to be agreed with GTC.

Prior to HIU commissioning, space heating and domestic hot water systems should be installed, tested, chemically cleaned and dosed and ready to receive heat from the HIU. Space heating and domestic hot water valve set points should be factory set and verified on site by measurement. Documentation of all PI-TRV setpoints shall be issued to GTC for their records.

The Developer is required to confirm to GTC the HIU serial number installed at each plot number / dwelling postal address on each HIU commissioning certificate.

Any issues that arise during HIU commissioning shall be immediately reported to GTC, even if is resolvable by the commissioning engineer. GTC shall advise of the course of action to be followed. The issue(s) shall be recorded as part of the commissioning certification and the course of action taken.

The Developer shall inform GTC of the commissioning programme for each dwelling, allowing GTC access for witnessing the commissioning of each HIU.

## Dwelling Space Heating and Domestic Hot Water

It is imperative that the Developer's appointed designer and contractor undertaking dwelling space heating and domestic hot water design, installation and commissioning follow the requirements of this document. Any deviations must be reported to GTC at the earliest opportunity to review the operational implications. If the deviation(s) have a commercial impact, this will subsequently be the responsibility of the Developer.

The designer of the dwelling space heating and domestic hot water systems shall refer to the minimum guidance depicted in the current CIBSE Heat Networks CP1.

**The design of all space heating and domestic hot water systems shall be submitted to GTC for comment.**

## System Temperatures

System flow and return temperatures for dwelling space heating and domestic hot water are to follow the requirements shown in Table 4 below**. Any deviations from these temperatures could have significant impacts on the operation of the Community Heat Hub plant and it is therefore imperative these temperatures are designed, implemented and verified**:

**Table 5 – HIU Space Heating and Domestic Hot Water temperatures**

| Type | HIU Flow / Outlet Temperature (°C) | HIU Return / Inlet Temperature (°C) |
|---|---|---|
| **Space Heating (Radiators)** | 50 | 30 |
| **Space Heating (Underfloor Heating)** | 40 | 30 |
| **Domestic Hot Water** | 50 | 10 |

## Space Heating Emitter

The Developer is responsible for all space heating requirements in the dwelling. Underfloor heating is the preference for dwelling space heating emitter as they are the optimum emitter for district heating systems, owing to inherently low return temperatures.

If space heating is provided by radiators, each radiator is to include a pre-settable pressure independent TRV (PI-TRV). Pre-settable lockshield valves (e.g. Danfoss RA-DV or SAV PT40) on all radiators for accurate flow setting during commissioning. The specification of the PI-TRV shall be issued to GTC for verification.

Radiator inlet and outlet entry positions to the radiator are to be a ‘top entry, bottom exit same end connection’ arrangement as shown in Fig.12 below.

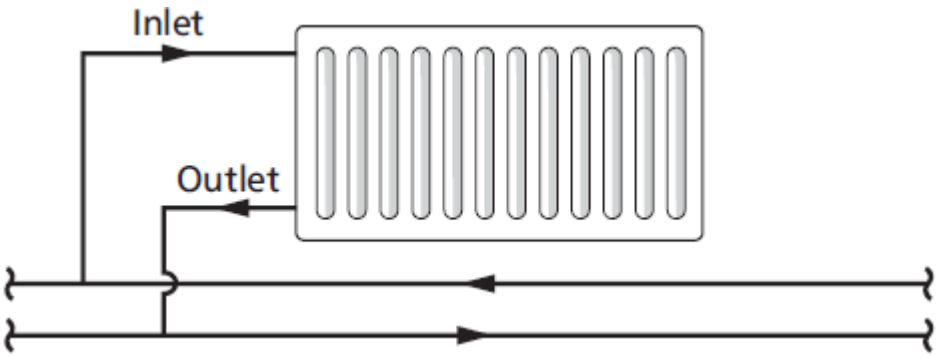


**Figure 12 – Schematic arrangement of ‘top entry, bottom exit same end connection’ radiator**

Radiator towel rails should be of the electric type and not connected to the low temperature hot water system. If this is completely unavoidable, the towel rail must be connected with a lockable temperature limiting TRV to ensure it does not act as a bypass for flow and return.

Commissioning certificates detailing space heating valve settings, recorded flow rates and temperatures shall be provided to GTC for all dwellings. GTC are to witness a sample of dwelling space heating commissioning, no less than 10% of the overall site. Any dwellings which have problems with commissioning or cannot meet the design parameters are to be reported to GTC.

## Space Heating Room Thermostat

The Developer shall be responsible for the supply, installation and commissioning of all room thermostats. The Developer shall submit the technical specification to GTC that the thermostat is compatible with the proposed HIU before procuring.

## Domestic Hot Water

All dwelling domestic water flow rates shall be in accordance with Building Regulations and should follow the latest guidance depicted by the NHBC. Any deviation from NHBC's guidance should be reported to GTC at the earliest opportunity to assess the impact on plant sizing.

It will be the Developers responsibility to flush and chemically treat/chlorinate and clean the tertiary (in dwelling) space heating system and submit to GTC water sampling certificates from a UKAS accredited laboratory prior to the tertiary systems being opened to the HIU.

## Domestic Hot Water Storage

Under no circumstance is the Developer to specify hot water storage associated with the domestic hot water, or space heating. The HIU system temperatures detailed in Table 4 are based on an instantaneous HIU system with no storage facility in any dwelling.

## Metering and Billing

GTC shall specify the metering and billing system across the development for ordering, installation and commissioning by The Developer.

The Developer shall provide all necessary infrastructure to facilitate the metering and billing equipment including:

- Power supply (230V AC, 50Hz)
- Communications (i.e. fixed broadband, ethernet connection)
- Location in dwelling

Further details for the metering and billing system are TBC.

# Section Ten

# Multi Occupancy Buildings

Multi-occupancy Buildings should follow the principals of dwellings where possible. The main difference will be the building entry requirements and distribution pipework to flats in the form of riser and lateral pipework.

Early consultation (at the design stage at the latest) with GTC should take place for GTC/GTC to evaluate designs associated with the district heating infrastructure. GTC's District Heating guidance documentation should be requested and issued to M&E design consultants in advance of design production. The District Heating, space heating and domestic hot water design should follow the minimum requirements depicted in CIBSE Heat Networks Code of Practice CP1 throughout the design and project lifecycle.

## Risk Assessment

A bespoke risk assessment is required for all flatted property installations. The Developer must provide the following information to the GTC Designer relating to the building/block.

- Special occupancy type (e.g. elderly, disabled etc) expected in the building.
- How is 24/7 access guaranteed.
- The type of building construction.
- Detailed floor plans and building layouts.
- Proposed HIU locations.
- Isolation of service pipe to each dwelling.
- Other utility and service routes.

The Developer or the principal contractor acting on behalf of the client will be required to sign the GTC Risk Assessments as deemed appropriate.

## Pipework Building Entry

A dedicated excavation inside of the building shall accommodate the service pipe transition from below ground to above ground. The location must be adjacent to an external wall so that no service pipe routes under the building where it cannot be later accessed.

Pipework must include 2 No. isolation valves on both flow and return. Between the isolation valves shall be a tee connection with an isolation valve and end cap to allow for flushing. A heat meter of Ultrasonic MID II type shall be provided before any tee connections to usage (e.g. before landlord areas or dwellings) to record losses between the buried pipework network and the building. The heat meter shall be mains powered and to provide at least 4 years of data storage. This is required under the Heat Metering and Billing Regulations.

## Above Ground Pipework

Please refer to section Heat Service Connection and Pipework Specification for minimum requirements.

## Water Quality

Please refer to section Heat Service Connection and Pipework Specification for requirements.

## Pipework Insulation

Please refer to section Heat Service Connection and Pipework Insulation for minimum requirements.

## Fire Stopping

The Developer shall be responsible for complying with Building Regulations and undertake all fire stopping requirements associated with the district heating pipework and routes.

Fire stopping and protection from fire must be constructed and in place prior to the commissioning of any riser/lateral pipework within multi-occupancy buildings, written confirmation is required from the Developer confirming fire stopping and ventilation is not compromised.

Risers and laterals shall be fire stopped between fire compartments in accordance with Building Regulations.

Where a riser or lateral is enclosed within a duct or an enclosure, the duct or enclosure must comply with the building regulations and shall be at least half hour fire resistant and comply with BS 8313; suitable removable access/inspection panels shall be made available.

## Risers and Laterals

District heating pipework shall be in an accessible riser, dedicated only for district heating pipework. Under no circumstances shall district heating flow and return pipework be located in the same riser as mains cold water or LV/HV cabling.

The architect and M&E designer shall assess the use for multiple district heating risers for reducing system energy losses.

To allow for movement a sleeve is required through any boxing/plasterboard for each lateral pipe passing through from the riser to the meter positions. The sleeve shall be filled with either fire retardant non-setting mastic or alternatively a fire-retardant silicone sealant to allow for movement of the lateral pipe installed. It is not acceptable for any plasterboard to be in direct contact with the lateral pipe resulting in restraining the lateral and preventing movement.

Risers and laterals shall be sleeved where they pass through any floor or wall.

Lateral pipework can route at high level, fixed to the soffit and should be as far as practicable from all other services.

Service connections to each dwelling or landlord use shall be complete with a lockable isolation valve on both flow and return outside of the premise boundary, so that a flat can be easily isolated in an emergency without entering the flat.

GTC shall require access to heat risers and laterals 24/7 post commissioning.

## Plate Heat Exchanger Plantrooms

The use of plate heat exchanger plantrooms shall not be considered unless there is a technical reason to hydraulically split the district heating infrastructure. The Developer shall request GTC's documentation of requirements and key design parameters of any plate heat exchanger plantrooms early during the design stage of the project.

Should a plate heat exchanger plantroom be deemed necessary, GTC shall be given the opportunity to comment on the design.

# Section Eleven

# Commercial Areas

All commercial use areas on a development which are connected to the district heating must follow the guidance depicted within this document, particularly with regards to the design of secondary systems.

## Early Design

Details of the commercial area should be provided to GTC at the earliest opportunity during the design stage, ideally the heat load required to supply from the district heating if it has been designed. If this is unavailable, the Net Internal Area and the space use type should be provided, with any details of untypical requirements, for GTC to approximate the required load from the district heating.

## Building Entry

Please refer to section Multi Occupancy Buildings for requirements.

## Above Ground Pipework

Please refer to section Heat Service Connection and Pipework Specification for minimum requirements.

## Water Quality

Please refer to section Heat Service Connection and Pipework Specification for requirements.

All commercial area systems must be fully pressure tested, flushed and filled with treated water of the same specification of treatment used for the district heating. GTC shall provide the technical submittal for the water treatment in advance and shall be requested by the Developer in a timely manner to the construction programme.

## Pipework Insulation

Please refer to section Heat Service Connection and Pipework Insulation for minimum requirements.

## Fire Stopping

Please refer to section Multi Occupancy Buildings and for requirements.

## Space Heating and Domestic Hot Water Parameters

Please refer to section Heat Interface Unit for requirements.

## Plate Heat Exchanger Plantrooms

Please refer to section Multi Occupancy Buildings for requirements.

## Notes


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