Heat Network Technical Assurance Scheme

New Build Heat Networks

Technical Specification

District Distribution Network

Phase 2: Design

HNTAS-NB-TS-DD-P2

Version History

Revision	Notes	Date
V0.4	Draft issue	05/12/25

Disclaimer

The following HNTAS Code document is published in draft format. This document is intended to give the sector early sight of HNTAS requirements in their current stage of development for the purpose of facilitating sector understanding of the scheme.

Draft Code documents, including Technical Specifications and Assessment Procedures, have been reviewed and consulted on through a series of technical workshops with participation from a range of experts from across the heat network industry. The content of this document is still in development and subject to change. Requirements should not be considered as fixed at this stage.

Changes which may be made to this document in future include those to:

- reflect learnings from the New Build and Existing network pilot programmes;
- align with aspects of HNTAS which are subject to public policy consultation;
- align with new requirements in TS1 and MMS;
- align the terminology of this document with that used in other HNTAS documentation;
- rectify errors in this draft version; and
- improve clarity of contents.

The Key Failures set out in the draft Code documents have been identified as a specific area for review, to ensure that:

- all Key Failures enable a binary assessment;
- Key Failures are only included for genuine issues presenting major risks to KPIs, and that moderate or lower risks are considered via non-conformity processes; and
- Key Failures do not duplicate Technical Requirements unless there is a clear justification to do so.

DESNZ will be welcoming feedback on the information in this document via a change management process. This process will run in parallel to the HNTAS policy consultation and DESNZ invites stakeholders to engage with both, once they are open. You can sign up to receive updates on future detailed draft technical documents as they are published by contacting: heatnetworks@energysecurity.gov.uk.

Please be advised that this document references other HNTAS draft Code documents which have not yet been published. References to other documents will also be subject to change following the publication of updated standards. The final version of this document will be released before the launch of HNTAS.

Note on Phase 4: Operation (initial) and Phase 5: Operation (ongoing)

The New Build Technical Specification and Assessment Procedures Overview (Phase 0) documents indicate that there are separate New Build Code Documents for Phase 4: Operation (initial) and Phase 5: Operation (ongoing).

These documents have since been consolidated to reduce the number of Code Documents, so the Phase 4: Operation documents cover requirements for New Build networks during both initial and ongoing operation.

This change does not impact the assessment of New Build networks in operation, which still occurs:

- after 1 year of operation; and
- after 2 years of operation.

Contents

Foreword

This Technical Specification forms part of the UK Government's Heat Network Technical Assurance Scheme (HNTAS, The Scheme) delivered by the Department for Energy Security and Net Zero, in partnership with the Scottish Government and Ofgem. The Department for Energy Security and Net Zero appointed FairHeat as technical author for this document.

The Scheme has been designed and developed in consultation with a range of experts across the heat network industry in the form of Technical Sub-Working Groups, culminating in a series of Technical Specifications and Assessment Procedures to facilitate the validation and verification of performance outcomes of Elements within a Heat Network.

This document specifies HNTAS Requirements for a District Distribution Network Element within a New Build Heat Network in Phase 2: Design.

This document sits within a series of Technical Specifications for a District Distribution Network, which features within a wider Code documentation structure, as outlined in Table 1.

This Technical Specification has been issued in draft format and will be updated prior to scheme launch.

For further information on the use of this document within the Heat Network Technical Assurance Scheme, please refer to the Heat Network Technical Assurance Scheme – New Build Heat Networks – Scheme Rules – Assessment Regime (HNTAS-NB-SR-XX-AS) document.

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Code Document Structure

Technical Specifications

Document Type	Element		Part/Phase				
			Overview	Phase 1: Feasibility	Phase 2: Design	Phase 3: Construction	Phase 4: Operation
			P0	P1	P2	P3	P4
Technical Specification	Energy Centre	EC	HNTAS-NB-TS-EC-P0	HNTAS-NB-TS-EC-P1	HNTAS-NB-TS-EC-P2	HNTAS-NB-TS-EC-P3	HNTAS-NB-TS-EC-P4
	District Distribution Network	DD	HNTAS-NB-TS-DD-P0	HNTAS-NB-TS-DD-P1	HNTAS-NB-TS-DD-P2	HNTAS-NB-TS-DD-P3	HNTAS-NB-TS-DD-P4
	Substation	SS	HNTAS-NB-TS-SS-P0	HNTAS-NB-TS-SS-P1	HNTAS-NB-TS-SS-P2	HNTAS-NB-TS-SS-P3	HNTAS-NB-TS-SS-P4
	Communal Distribution Network	CD	HNTAS-NB-TS-CD-P0	HNTAS-NB-TS-CD-P1	HNTAS-NB-TS-CD-P2	HNTAS-NB-TS-CD-P3	HNTAS-NB-TS-CD-P4
	Consumer Connection	CC	HNTAS-NB-TS-CC-P0	HNTAS-NB-TS-CC-P1	HNTAS-NB-TS-CC-P2	HNTAS-NB-TS-CC-P3	HNTAS-NB-TS-CC-P4
	Consumer Heat System	CH	HNTAS-NB-TS-CH-P0	HNTAS-NB-TS-CH-P1	HNTAS-NB-TS-CH-P2	HNTAS-NB-TS-CH-P3	N/A

Table 1: New Build Network Technical Specification structure

Scope

This document specifies the HNTAS Requirements for a District Distribution Network within a New Build Heat Network in Phase 2: Design.

A District Distribution Network is defined as any pipework system that is not within a building and distributes thermal energy from one location within a Heat Network to another. For example, distributing thermal energy from an Energy Centre to a Building Connection underground.

A detailed definition of the District Distribution Network is contained within the Heat Network Technical Assurance Scheme – New Build Heat Networks – Technical Specification – District Distribution Network – Overview (HNTAS-NB-TS-DD-P0) document.

New Build Heat Networks

There are two stages within Phase 2: Design, which are Stage 2: Developed Design and Stage 3: Technical Design. This is outlined in Figure 1.

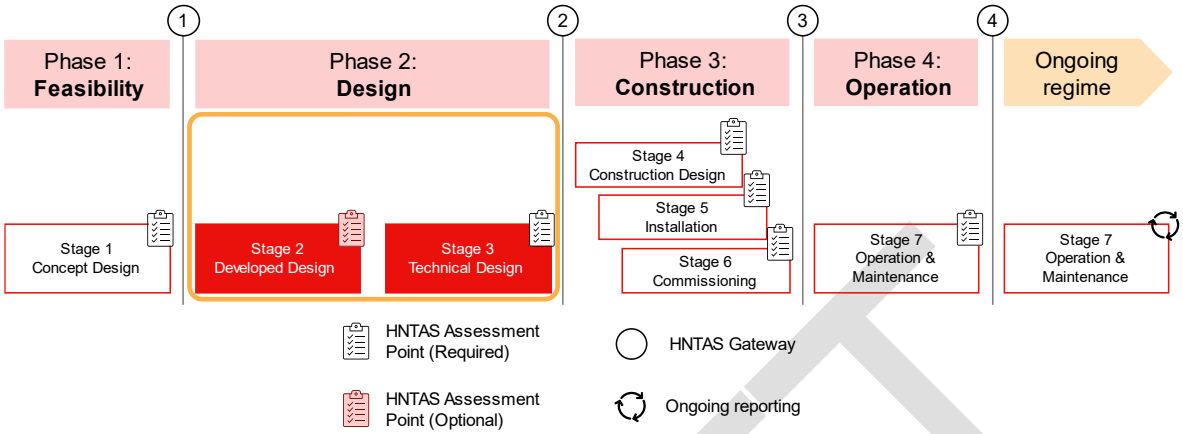

Figure 1: HNTAS New Build regime phases and stages

References

Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

- Heat Network Technical Standard (TS1) (HNTAS, 2025)
- Heat Network Metering and Monitoring Standard (MMS) (HNTAS, 2025)
- Heat Network Technical Assurance Scheme – New Build Heat Networks – Scheme Rules – Assessment Regime (HNTAS-NB-SR-XX-AS)
- Heat Network Technical Assurance Scheme – New Build Heat Networks – Technical Specification – District Distribution Network – Overview (HNTAS-NB-TS-DD-P0)

Informative references

The following informative references apply to this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

- RIBA Plan of Work (RIBA, 2020)

Terms and Definitions

For the purposes of this document, the terms and definitions given in the Heat Network Technical Assurance Scheme – Terms and Definitions (HNTAS-XX-TD) document apply.

2. Requirements for Stage 2: Developed Design and Stage 3: Technical Design

2.1. Technical Requirements

The applicable HNTAS Technical Requirements in Table 2 shall be fulfilled.

Technical Requirement		Applicable technical standard(s)		Evidence Requirement(s)
		Stage 2	Stage 3	
2.1.1.	Peak heat demands and annual heat consumption shall be calculated in accordance with the applicable technical standard(s).	TS1 2.1.1 TS1 2.1.2 TS1 2.1.3 TS1 2.1.4 TS1 2.1.5 TS1 2.1.6 TS1 2.1.7 TS1 2.1.8 TS1 2.1.9 TS1 2.1.10 TS1 2.1.11 TS1 2.1.12 TS1 2.1.13 TS1 2.1.15 TS1 2.1.16 TS1 2.1.17 TS1 2.7.3 TS1 2.7.7	TS1 3.1.1 TS1 3.1.2 TS1 3.1.3 TS1 3.1.4 TS1 3.1.5 TS1 3.1.6 TS1 3.1.7 TS1 3.1.8 TS1 3.1.9 TS1 3.1.10 TS1 3.1.11 TS1 3.1.12 TS1 3.1.13 TS1 3.1.15 TS1 3.1.16 TS1 3.1.17 TS1 3.7.3 TS1 3.7.7	DD-S2-E01
2.1.2.	Operating temperatures shall be determined in accordance with the applicable technical standard(s).	TS1 2.4.1 TS1 2.4.3 TS1 2.4.4 TS1 2.4.7 TS1 2.4.8 TS1 2.4.9 TS1 2.4.10	TS1 3.4.1 TS1 3.4.3 TS1 3.4.4 TS1 3.4.7 TS1 3.4.8 TS1 3.4.9 TS1 3.4.10	DD-S2-E02
2.1.3.	The routing of District Distribution Network pipework shall be determined in accordance with the applicable technical standard(s).	TS1 2.3.2 TS1 2.3.3 TS1 2.3.4 TS1 2.3.5 TS1 2.3.6 TS1 2.3.7 TS1 2.3.8 TS1 2.9.11	TS1 3.3.2 TS1 3.3.3 TS1 3.3.4 TS1 3.3.5 TS1 3.3.6 TS1 3.3.7 TS1 3.3.8 TS1 3.9.11	DD-S2-E04 DD-S2-E05
2.1.4.	The District Distribution Network pipework shall be sufficiently separated from other buried conduits in accordance with the applicable technical standard(s).	TS1 2.3.9	TS1 3.3.9	DD-S2-E05 DD-S2-E06 DD-S2-E11

Technical Requirement		Applicable technical standard(s)		Evidence Requirement(s)
		Stage 2	Stage 3	
2.1.5.	Pipe sizes shall be calculated in accordance with the applicable technical standard(s).	TS1 2.5.1 TS1 2.5.6 TS1 2.9.11	TS1 3.5.1 TS1 3.5.6 TS1 3.9.11	DD-S2-E05 DD-S2-E07 DD-S2-E17 DD-S2-E18
2.1.6.	Working pressures shall be assessed in accordance with the applicable technical standard(s). Note: it is expected that this assessment is undertaken with consideration for the other Elements present in the Heat Network.	TS1 2.6.1 TS1 2.6.2 TS1 2.6.3 TS1 2.6.4	TS1 3.6.1 TS1 3.6.2 TS1 3.6.3 TS1 3.6.4	DD-S2-E03
2.1.7.	The risk of transient pressure shall be considered, mitigated against, and assessed, in accordance with the applicable technical standard(s). Note: it is expected that this assessment is undertaken with consideration for the other Elements present in the Heat Network.	TS1 2.6.6	TS1 3.6.5 TS1 3.6.6	N/A

Technical Requirement		Applicable technical standard(s)		Evidence Requirement(s)
		Stage 2	Stage 3	
2.1.8.	The pipework system shall be specified in accordance with the applicable technical standard(s). The pipework system shall be selected and specified with a service lifetime of 50 years. A pipework system with a service lifetime of less than 50 years can be selected, provided there is a lifecycle cost justification, including RepEx, for selecting the lower service lifetime pipework system versus a pipework system with a 50 year service lifetime. A minimum safety factor of 1.25 shall be used when determining the lifetime of the pipework system.	TS1 2.16.1 TS1 2.16.2	TS1 3.16.1 TS1 3.16.2	DD-S2-E15 DD-S2-E19
2.1.9.	Where steel pipework systems are used, they shall be specified in accordance with the applicable technical standard(s).	TS1 2.16.3 TS1 2.16.4 TS1 2.16.8 TS1 2.16.15 TS1 2.16.16 TS1 2.16.17 TS1 2.16.18	TS1 3.16.3 TS1 3.16.4 TS1 3.16.8 TS1 3.16.15 TS1 3.16.16 TS1 3.16.17 TS1 3.16.18	DD-S2-E19 DD-S2-E20
2.1.10.	Where polymer pipework systems are used, they shall be specified in accordance with the applicable technical standard(s).	TS1 2.16.5 TS1 2.16.10	TS1 3.16.5 TS1 3.16.10	DD-S2-E19
2.1.11.	The joint system and method shall be specified in accordance with the applicable technical standard(s).	TS1 2.16.6 TS1 2.16.7 TS1 2.16.9	TS1 3.16.6 TS1 3.16.7 TS1 3.16.9	DD-S2-E19 DD-S2-E21

Technical Requirement		Applicable technical standard(s)		Evidence Requirement(s)
		Stage 2	Stage 3	
2.1.12.	Expansion analysis of the pipework system shall be undertaken in accordance with the applicable technical standard(s).	TS1 2.16.11	TS1 3.16.11	DD-S2-E23
2.1.13.	The pipework expansion system shall be designed and specified in accordance with the applicable technical standard(s).	TS1 2.16.12	TS1 3.16.12	DD-S2-E08 DD-S2-E22
2.1.14.	Marker tape shall be specified above each line of buried pipework in accordance with the applicable technical standard(s).	TS1 2.15.16	TS1 3.15.16	DD-S2-E26
2.1.15.	The design of the District Distribution Network shall provide the necessary trench depth in accordance with the applicable technical standard(s).	TS1 2.16.13	TS1 3.16.13	DD-S2-E10
2.1.16.	The termination of District Distribution Network pipework above ground or within buildings shall be designed and specified in accordance with the applicable technical standard(s).	TS1 2.16.14	TS1 3.16.14	DD-S2-E14 DD-S2-E26

Technical Requirement		Applicable technical standard(s)		Evidence Requirement(s)
		Stage 2	Stage 3	
2.1.17.	The location of isolation valves shall be in accordance with: 1. the applicable technical standard(s); 2. commissioning and Water Quality Strategy requirements; 3. Phasing Plan requirements; 4. Resilience Strategy requirements.	TS1 2.9.3 TS1 2.9.11 TS1 2.15.8 TS1 2.15.10	TS1 3.9.3 TS1 3.9.11 TS1 3.15.8 TS1 3.15.10	DD-S2-E05 DD-S2-E07 DD-S2-E27 DD-S2-E29 DD-S2-E30
2.1.18.	Valve chambers shall be specified in accordance with the applicable technical standard(s). An access and maintenance strategy shall be developed as part of the specification for valve chambers and other facilities across the Heat Network requiring access (including surveillance system monitoring terminals).	TS1 2.15.14 TS1 2.15.15	TS1 3.15.14 TS1 3.15.15	DD-S2-E05 DD-S2-E12 DD-S2-E16 DD-S2-E32
2.1.19.	Venting and draining provision shall be designed and specified in accordance with the applicable technical standard(s). This requirement is only applicable at Stage 3.	N/A	TS1 3.15.3 TS1 3.15.12	DD-S2-E26
2.1.20.	Bypasses, if required, shall be sized, selected, and located in accordance with the applicable technical standard(s).	TS1 2.10.1 TS1 2.10.4	TS1 3.10.1 TS1 3.10.4	DD-S2-E07 DD-S2-E25

Technical Requirement		Applicable technical standard(s)		Evidence Requirement(s)
		Stage 2	Stage 3	
2.1.21.	The surveillance strategy shall be determined and specified in accordance with the applicable technical standard(s).	TS1 2.12.8	TS1 3.12.8	DD-S2-E24
2.1.22.	A Resilience Strategy shall be developed in accordance with the applicable technical standard(s). This shall include the production of a Disaster Recovery plan using the relevant information available. Note: it is expected that this is undertaken with consideration for the other Elements present in the Heat Network.	TS1 2.9.1 TS1 2.9.2 TS1 2.9.3 TS1 2.9.5 TS1 2.9.6 TS1 2.9.7	TS1 3.9.1 TS1 3.9.2 TS1 3.9.3 TS1 3.9.5 TS1 3.9.6 TS1 3.9.7	DD-S2-E27 DD-S2-E28
2.1.23.	A repair and replacement strategy shall be developed in accordance with the applicable technical standard(s).	TS1 2.9.7	TS1 3.9.7	DD-S2-E32
2.1.24.	Access rights for construction and maintenance of network shall be negotiated in accordance with the applicable technical standard(s).	TS1 2.15.13	TS1 3.15.13	DD-S2-E34
2.1.25.	A Water Quality Strategy shall be developed in accordance with the applicable technical standard(s). Note: it is expected that this is undertaken with consideration for the other Elements present in the Heat Network.	TS1 2.11.1 TS1 2.11.2 TS1 2.11.3 TS1 2.11.5	TS1 3.11.1 TS1 3.11.2 TS1 3.11.3 TS1 3.11.5	DD-S2-E30

Technical Requirement		Applicable technical standard(s)		Evidence Requirement(s)
		Stage 2	Stage 3	
2.1.26.	A Water Quality Recording Programme shall be developed in accordance with the applicable technical standard(s). Note: it is expected that this is undertaken with consideration for the other Elements present in the Heat Network.	TS1 2.11.6 TS1 2.11.7 TS1 2.11.8 TS1 2.11.9 TS1 2.11.10 TS1 2.11.11 TS1 2.11.12 TS1 2.11.13	TS1 3.11.6 TS1 3.11.7 TS1 3.11.8 TS1 3.11.9 TS1 3.11.10 TS1 3.11.11 TS1 3.11.12 TS1 3.11.13	DD-S2-E30 DD-S2-E31
2.1.27.	The District Distribution Network shall be designed to minimise the entry of oxygen into the system.	TS1 2.11.20 TS1 2.11.24 TS1 2.11.29	TS1 3.11.20 TS1 3.11.24 TS1 3.11.29	DD-S2-E19 DD-S2-E26
2.1.28.	The design of the District Distribution Network shall mitigate the risk posed by stagnation in the system.	TS1 2.11.25	TS1 3.11.25	DD-S2-E05 DD-S2-E07 DD-S2-E14 DD-S2-E30 DD-S2-E31
2.1.29.	Water quality equipment shall be specified in accordance with the applicable technical standard(s).	TS1 2.11.14 TS1 2.11.15 TS1 2.11.23	TS1 3.11.14 TS1 3.11.15 TS1 3.11.23	DD-S2-E07 DD-S2-E30
2.1.30.	The District Distribution Network insulation shall be specified in accordance with the applicable technical standard(s).	TS1 2.13.1 TS1 2.13.2 TS1 2.13.7 TS1 2.13.8 TS1 2.13.9 TS1 2.13.10 TS1 2.13.12 TS1 2.15.14 TS1 2.16.18	TS1 3.13.1 TS1 3.13.2 TS1 3.13.7 TS1 3.13.8 TS1 3.13.9 TS1 3.13.10 TS1 3.13.12 TS1 3.15.14 TS1 3.16.18	DD-S2-E15 DD-S2-E16
2.1.31.	The District Distribution Network design heat loss shall be calculated and be in accordance with the applicable technical standard(s).	TS1 2.13.11	TS1 3.13.11	DD-S2-E15 DD-S2-E16

Technical Requirement		Applicable technical standard(s)		Evidence Requirement(s)
		Stage 2	Stage 3	
2.1.32.	An outline commissioning plan for the District Distribution Network shall be developed in accordance with the applicable technical standard(s). This requirement is only applicable at Stage 3.	N/A	TS1 3.8.2 TS1 3.17.5	DD-S2-E35
2.1.33.	The required items to be demonstrated, the performance criteria and methodology for Acceptance Testing shall be identified in accordance with the [HNTAS Acceptance Testing Standard]. The District Distribution Network design shall be able to facilitate the Acceptance Testing methodology. This requirement is only applicable at Stage 3.	N/A		DD-S2-E36
2.1.34.	Specialist Heat Network design items to be completed at the Construction Design stage shall be identified. A design specification for the specialist design items to be undertaken during the Construction Design stage shall be produced, which shall indicate the design and performance requirements of the item. The specification shall also outline any applicable HNTAS Technical Design standard(s). This requirement is only applicable at Stage 3.	N/A		DD-S2-E37

Technical Requirement		Applicable technical standard(s)		Evidence Requirement(s)
		Stage 2	Stage 3	
2.1.35.	Drawings and schematics shall be produced in accordance with the applicable technical standard(s).	TS1 2.17.3 TS1 2.17.4	TS1 3.17.3 TS1 3.17.4	DD-S2-E05 DD-S2-E06 DD-S2-E07 DD-S2-E08 DD-S2-E09 DD-S2-E10 DD-S2-E11 DD-S2-E12 DD-S2-E13 DD-S2-E14
2.1.36.	The Technical Parameters Schedule shall be completed with accurate information and references to relevant documentation.			DD-S2-E38

Table 2: Technical Requirements for the District Distribution Network at Stage 2: Developed Design and Stage 3: Technical Design

2.2. Performance Monitoring Requirements

The applicable Performance Monitoring Requirements in Table 3 shall be fulfilled.

Performance Monitoring Requirement		Applicable technical standard(s)		Evidence Requirement(s)
		Stage 2	Stage 3	
2.2.1.	The Metering and Monitoring Strategy shall be updated in accordance with the applicable technical standard(s).	TS1 2.12.1	TS1 3.12.1	DD-S2-E39
2.2.2.	The KPI Schedule shall be updated. The KPI Schedule shall contain: 1. the identified applicable KPIs to be measured and reported by the Metering and Monitoring System; 2. the thresholds for each KPI in operation (based on the level of information available at this stage); and, 3. the Monitoring Points required to measure each KPI.	TS1 2.12.1 MMS 4.1.12	TS1 3.12.1 MMS 4.1.12	DD-S2-E40

Performance Monitoring Requirement		Applicable technical standard(s)		Evidence Requirement(s)
		Stage 2	Stage 3	
2.2.3.	The Monitoring Points Schedule shall be updated. The Monitoring Points Schedule shall contain: 1. the required Monitoring Points to measure KPIs; 2. the location of each Monitoring Point (which identifies the applicable Element); and, 3. a unique ID code, which follows a determined naming convention.	TS1 2.12.1 MMS 4.1.13	TS1 3.12.1 MMS 4.1.13	DD-S2-E40 DD-S2-E41 DD-S2-E42
2.2.4.	The Monitoring Points (all thermal energy meters, utility meters, and sensors for the Metering and Monitoring System) shall be sized and specified in accordance with the applicable technical standard(s). This requirement is only applicable at Stage 3.	N/A	TS1 3.12.2 TS1 3.12.3 TS1 3.12.4	DD-S2-E44 DD-S2-E45
2.2.5.	The Automatic and Remote Monitoring System (ARMS) shall be specified in accordance with the applicable technical standard(s). This requirement is only applicable at Stage 3.	N/A	TS1 3.12.5 TS1 3.12.6	DD-S2-E43

Performance Monitoring Requirement		Applicable technical standard(s)		Evidence Requirement(s)
		Stage 2	Stage 3	
2.2.6.	Diagram(s) indicating the flow of data between the Monitoring Points and the ARMS, in addition to any hierarchy of Monitoring Points, shall be produced. This requirement is only applicable at Stage 3.	N/A	TS1 3.12.1 MMS 4.1.11	DD-S2-E46
2.2.7.	Schematic(s) shall be produced which contain each Monitoring Point in the required location, each labelled with its unique ID code.	TS1 2.12.1 MMS 4.1.14	TS1 3.12.1 MMS 4.1.14	DD-S2-E07 DD-S2-E41

Table 3: Performance Monitoring Requirements for the District Distribution Network at Stage 2: Developed Design and Stage 3: Technical Design

2.3. Key Failures

The applicable Key Failures listed in Table 4 shall not be present.

Key Failure		Outcome to avoid	Evidence Requirement(s)
2.3.1.	Inappropriate selection of temperature profiles for the Distribution Network given the design life requirements of pipework material, and connecting Element requirements (end users, the District Distribution Network).	Network temperatures set higher than required to deliver heat to consumers, resulting in higher heat losses and reduced heat generation efficiency. Additionally, design life requirements of pipework (in combination with pressure requirements) not being met due to temperature selection.	DD-S2-E02
2.3.2.	Insulation type specified not sufficient to meet heat loss requirements.	Inadequate insulation type specified to meet requirements, resulting in high heat losses. Higher heat losses impact cost of heat for consumers.	DD-S2-E15
2.3.3.	Consideration not given to ageing and degradation of insulation over lifespan in heat loss calculations and insulation type specification.	Calculated heat losses, which inform the insulation specification, not representative of operational heat losses over the lifespan of the Heat Network. This may result in the specification of a lower thermal performing insulation type, resulting in higher heat losses in operation.	DD-S2-E16
2.3.4.	Inadequate surveys to inform optimal pipework route (statutory utility searches, ground penetrating radar and trial holes).	Having non-optimal routes selected and discovering obstructions during the Installation stage. Ensuring these surveys have been undertaken reduces the risk of unforeseen obstacles during the Installation stage, and thus programme delays, cost etc.	DD-S2-E04

Key Failure		Outcome to avoid	Evidence Requirement(s)
2.3.5.	Congested services pinch points not adequately surveyed.	Discovering obstructions during the Installation stage resulting in services having to be relocated, causing programme delays, increased cost, and safety risks.	DD-S2-E05 DD-S2-E06 DD-S2-E11
2.3.6.	Lack of appropriate isolation valve strategy across the District Distribution Network.	Lack of ability to isolate sections of the District Distribution Network for flushing, maintenance, replacement, resilience strategy etc.	DD-S2-E05 DD-S2-E07 DD-S2-E27 DD-S2-E29 DD-S2-E30
2.3.7.	Maintenance and access strategy for below ground infrastructure (isolation valves, fittings etc.) not considered.	Lack of maintainability of Heat Network in operation.	DD-S2-E12 DD-S2-E27 DD-S2-E32
2.3.8.	Lack of appropriate phased commissioning strategy. For example, the use of flushing loops, temperature-controlled bypasses to maintain circulation and temperatures during commissioning and build out.	Lack of circulation during phased build out of Heat Network, risking reduced heat delivery to consumers and water quality issues.	DD-S2-E07 DD-S2-E30
2.3.9.	Spacing between services and underground pipework not suitably designed.	Risk of heat transfer to cold water services or thermal runaway of electrical services in proximity to Heat Network pipework.	DD-S2-E05 DD-S2-E06 DD-S2-E12
2.3.10.	Incorrect or lack of thermal expansion design for steel pipework systems.	Pipework failure due to thermal expansion not being designed correctly.	DD-S2-E08 DD-S2-E22
2.3.11.	No Resilience Strategy developed and included within the design. This includes location and spatial allowance for disaster recovery plant and connections to the District Distribution Network at strategic points.	Failure of Heat Network with no resilience strategy or provision in place, resulting in lack of heat delivery to consumers.	DD-S2-E27

Key Failure		Outcome to avoid	Evidence Requirement(s)
2.3.12.	Consideration to given to topography of pipework routing and lengths within pressure requirements (static pressure and differential pressure).	Incorrect calculation of system pressure profiles, which impacts on pipework lifespan and subsequently may not meet design life requirements, pipe sizing and distribution pump calculations.	DD-S2-E03
2.3.13.	Failure to get necessary consent (third party approvals process) for pipework routing and maintenance requirements.	Heat Network route and/or maintenance of Heat Network unviable, causing programme delays and increased costs to resolve.	DD-S2-E34
2.3.14.	Traffic management strategy not developed and checked for viability at the Developed Design and Technical Design stages.	Heat Network route unviable due to restrictions imposed by traffic management (for example, highways agency restrictions).	DD-S2-E35
2.3.15.	Surveillance strategy for fault identification (including leak detection) not specified at the Developed Design and Technical Design stages.	Surveillance system not properly considered, which risks an appropriate surveillance system not being installed and operated. This risks failures from the Distribution Network and subsequently heat delivery to consumers.	DD-S2-E24

Table 4: Key Failures for the District Distribution Network at Stage 2: Developed Design and Stage 3: Technical Design

2.4. Evidence Requirements

The applicable Evidence Items listed in Table 5 shall be provided to demonstrate fulfilment with the Technical Requirements, Performance Monitoring Requirements, and avoidance of Key Failures.

Evidence Item		Detailed description and requirements
DD-S2-E01	Peak demand calculations and schedule	Methodology, calculations, and assumptions used to estimate peak heat demands shall be provided. Shall contain a schedule outlining the expected peak heat demand for each end consumer and section of Distribution Network to be provided. Sensitivity analysis on future demands shall be provided where applicable.
DD-S2-E02	Network operating temperature assessment	Shall contain the design operating temperature profile (flow and return), including rationale for the temperatures specified, which shall include considerations for lifecycle costs of temperatures assessed and selected. Shall include evidence of building survey reports (or equivalent) to demonstrate compatibility with end user connections. Shall also outline if weather compensation is to be used, or any planned future changes in temperature profiles.
DD-S2-E03	System pressure assessment	Assessment of working pressures in the system. Shall include: • calculation of the System Maximum Working Pressure; • calculation of the Local Maximum Working Pressure; • identification of the risks that arise as a result of calculated working pressures; • assessment of the likelihood and impact of the identified risk; • mitigation of the risks posed by working pressures (where appropriate).
DD-S2-E04	Route proving report	Shall contain evidence to justify the District Distribution Network route selection. Evidence of existing buried services drawings and any surveys undertaken to determine route shall be included. Justification to be provided where shortest route possible not taken.

Evidence Item		Detailed description and requirements
		Shall include statements in relation to applicable technical standard(s).
DD-S2-E05	General arrangement	Shall outline the District Distribution Network route, pipe sizes, weld locations, depth of pipe and fitting details (bends, tees etc.)
DD-S2-E06	General arrangement with utility overlay	Shall outline the general arrangement as above with the utility overlay.
DD-S2-E07	Schematic(s)	Schematic(s) shall outline hydraulic strategy, pipe sizes, Resilience Strategy provision (isolation valves and temporary plant connections).
DD-S2-E08	Thermal expansion design drawing	Drawing containing thermal expansion design, where applicable.
DD-S2-E09	HAZID drawing	Shall outline the network route with hazards identified and labelled in accordance with the HAZID study/risk register.
DD-S2-E10	Standard trench cross-section detail	Standard trench cross-section detail for each section of the District Distribution Network.
DD-S2-E11	Cross-section detail for congested areas	Shall outline cross-section drawing detail for identified congested areas of the District Distribution Network.
DD-S2-E12	Standard valve chamber detail	Standard valve chamber design for each valve chamber or type of valve chamber.
DD-S2-E13	Standard tee detail	Standard tee design for each section of the District Distribution Network.
DD-S2-E14	Standard entry detail	Standard above ground/building entry detail. Shall be provided for all above ground/building entries.
DD-S2-E15	Pipework system and insulation selection assessment	Evidence shall contain the inputs, assumptions, and methodology used to determine the pipework system and insulation specification.
DD-S2-E16	Heat loss calculations	Evidence shall contain the calculations, methodology and assumptions used to calculate District Distribution heat loss.
DD-S2-E17	Pipe sizing calculations	Evidence shall contain the inputs, assumptions and methodology used to determine the pipework size for each section of the District Distribution Network.
DD-S2-E18	Pipe schedule	Shall outline peak demand, flow rate, velocity, and size for each section of the District Distribution Network.

Evidence Item		Detailed description and requirements
		Each section of pipe shall be able to be identified on drawings.
DD-S2-E19	Pipework system specification	Pipework system specification. Shall include (where applicable): • predicted life given operating temperatures and pressures; • project class and any project class specific requirements; • stress calculation methodology; • inspection and NDT requirements; • jointing method and closure system; • site and factory welds; • water pressure test requirements.
DD-S2-E20	Predicted life for system assessment	Shall include inputs (operating pressures and temperatures), assumptions and methodology used to determined predicted life.
DD-S2-E21	Soil conditions assessment	Shall state the soil conditions. May be in the form of a soil contamination report.
DD-S2-E22	Pipework expansion design and specification	Shall contain the inputs, assumptions and methodology used to determine the pipework expansion design, and the specification.
DD-S2-E23	Stress analysis calculations	Shall contain the inputs, assumptions, methodology and calculations undertaken for the stress analysis.
DD-S2-E24	Surveillance strategy, design, and specification	Shall outline the surveillance strategy and contain the specification and design.
DD-S2-E25	Bypass valve strategy and specification	Shall outline the bypass valve strategy, and valve specification. Valve strategy shall contain justification for use of bypass valve. Valve specification shall contain the specification for the bypass valve, and the inputs, assumptions, and methodology used to size bypass valve.
DD-S2-E26	Distribution Network Specification(s)	Specification(s) of the District Distribution Network items, in addition to the pipework system specification. Items include valve chambers, isolation valves, draining and venting provision.
DD-S2-E27	Resilience Strategy	Shall outline the Resilience Strategy for the Heat Network, including: • system- and equipment- level threats;

Evidence Item		Detailed description and requirements
		• the risk score of each threat with no resilience measures in place; • the redundancy and recovery measures implemented; • the risk score of each threat with resilience measures in place; • any residual risks associated with each threat; • the Disaster Recovery Plan; • the critical spares log; • the plant replacement strategy.
DD-S2-E28	Disaster Recovery Plan	Documentation which details the procedures required in the event of a major incident on the Heat Network. Should include (but not be limited to) details outlining: • how temporary heat will be provided to consumers in the event of a shutdown to the system; • the assumed response time for restoring heat supply following shutdown of the system; • the required sizing of temporary plant; • where temporary heat connections are included in the design; • where temporary plant could be located; • any air quality and/or planning restrictions associated with the potential temporary plant provision; • the information (timing and reason) given to consumers in advance of a major outage (where known); and • contact details of who to contact in the event of an emergency; and • any utility supply provisions.
DD-S2-E29	Phasing Plan	Evidence shall contain how each connection will be connected, by when, and how the heat demand will build up over time. Shall contain requirements for circulation, flushing loops, temperature controlled-bypasses etc. required during build out. Shall also outline or reference the requirements for any temporary heat supply during the phased build out.

Evidence Item		Detailed description and requirements
DD-S2-E30	Water Quality Strategy	Documentation produced for each hydraulic system which includes information regarding the management of water quality in the system. Shall include: • the type of water quality system to be followed (e.g. Chemically Treated System or Depleted Water System); • the selection of the fill water source; • the selection of the material of plant, equipment, and distribution pipework (which, for retrofit scenarios, should include consideration of its compatibility with the current existing system); • the specification for water treatment and conditioning (e.g. filtration, softening, demineralisation, chemical dosing etc.); • the presence of hydraulic breaks between distribution pipework and space heating circuits on the Consumer Heat Systems; • initial specification of the flushing methodology (e.g. closed loop pre-treatment cleaning (CPC) or flush-to-drain).
DD-S2-E31	Water Quality Recording Programme	Documentation produced regarding the recording of water quality parameters throughout the Heat Network. Should typically include: • the water quality parameters that will be recorded; • the method for recording water quality parameters (e.g. through online monitoring or laboratory sampling); • the locations at which the water quality parameters will be recorded; • the frequency and dates at which the water quality parameters will be recorded; • the process to be followed when the value of a water quality parameter has exceeded its control limits.
DD-S2-E32	Access, maintenance, and repair and replacement strategy	Shall contain the strategy and requirements for access, maintenance and repair and replacement of the District Distribution Network, including valve chambers. Shall be used to aid justification of route selection, equipment selection, spatial requirements etc. Valve chamber maintenance strategy shall include how to deal with ground surface water and access.

Evidence Item		Detailed description and requirements
DD-S2-E34	Evidence of access rights	Shall contain evidence of access rights for construction and maintenance.
DD-S2-E35	Commissioning plan	Outline commissioning plan containing: • a list of required commissioning activities; • the key criteria to be achieved during commissioning; • the time order of commissioning activities and interdependencies; • any specific requirements for the Construction Phase commissioning plan.
DD-S2-E36	Acceptance Testing methodology and criteria	Shall outline: • a list of required parameters for testing; • the outline methodology to enable demonstration of required parameters; • any specific requirements for Construction Phase Acceptance Testing methodology and criteria.
DD-S2-E37	Specialist Construction Design Items Specification	Specification for the specialist Construction Design items. Shall include performance requirements and identify applicable HNTAS requirements based on the type of design item.
DD-S2-E38	Technical Parameters Schedule	Schedule which outlines all technical parameters in one location, with reference to applicable documents.
DD-S2-E39	Metering and Monitoring Strategy	The Metering and Monitoring Strategy shall contain a description of how data required to calculate KPIs will be measured, extracted, recorded, and stored at the required read frequency, how the raw data will be transformed, and how KPIs will be calculated and reported. The strategy shall also include: 1. a schedule of KPIs (item DD-S2-E40); 1. a schedule of Monitoring Points (item DD-S2-E41); 2. a Monitoring Points unique ID code naming methodology (item DD-S2-E42); 3. a schematic with labelled Monitoring Points; 4. a data flow diagram (item DD-S2-E46); 5. an ARMS specification (item DD-S2-E43);

Evidence Item		Detailed description and requirements
		6. a Monitoring Points specification (thermal energy meters, utility meters, sensors) (item DD-S2-E44 & DD-S2-E45).
DD-S2-E40	KPI Schedule	A schedule of all KPIs required to be measured by the Metering and Monitoring System. The KPI schedule shall contain: 1. the identified applicable KPIs to be measured and reported by the Metering and Monitoring System; 2. the thresholds for each KPI in operation (based on the level of information available at this stage); and, 3. the Monitoring Points required to measure each KPI.
DD-S2-E41	Monitoring Points Schedule	A schedule of all Monitoring Points required to measure KPIs. The Monitoring Points Schedule shall contain: 1. the required Monitoring Points to measure KPIs; 2. the location of each Monitoring Point (which identifies the applicable Element); and, 3. a unique ID code, which follows a determined naming convention.
DD-S2-E42	Unique ID code naming convention	Methodology used to label each Monitoring Point with a unique ID code.
DD-S2-E43	ARMS Specification	Shall provide description of the intended system operation and the materials, products to be used, standard of work required, performance requirements and the condition of which the work is to be executed.
DD-S2-E44	Monitoring Point Specification	Specification for each type of Monitoring Point (thermal energy meter, utility meter, sensors etc.) Shall provide description of the intended system operation and the materials, products to be used, standard of work required, performance requirements and the condition of which the work is to be executed.
DD-S2-E45	Meter sizing calculations	Shall outline the inputs, methodology and calculations used to size pipework applicable meters.

Evidence Item		Detailed description and requirements
DD-S2-E46	Data flow diagram(s)	Diagrams illustrating the route of data flow from the Monitoring Point to the ARMS, including hierarchy of Monitoring Points.

Table 5: Evidence Requirements for the District Distribution Network at Stage 2: Developed Design and Stage 3: Technical Design