Heat Network Technical Assurance Scheme – Technical Specification – Consumer Connection

Overview

HNTAS-TS-CC-P0

Version History

Revision	Notes	Date
V0.4	Draft issue alongside consultation	10/04/25

Disclaimer

The following technical document has been prepared for issue ahead of the Heat Networks Technical Standards consultation and is published in a draft format. This document is intended to provide background context to the structure, style and contents of HNTAS draft Code documents, as they currently exist. The information in this document has been developed to facilitate understanding of the scheme.

DESNZ is not currently seeking views on specific individual technical requirements in the draft Code documents due to their large number and technical complexity.

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. We are seeking views on individual requirements through further, facilitated workshops with sector technical experts and through our pilot programme. The content of this document is therefore still in development and is subject to change. Requirements should not be considered as fixed at this stage.

You can sign up to receive updates and provide views 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. These referenced documents will be published at a later date. References to the Heat Networks Code of Practice (CP1) 2020 found within this document will also be subject to change following the publication of updated standards.

Contents

Foreword

This Technical Specification forms part of the UK Government's Heat Network Technical Assurance Scheme (HNTAS, the Scheme) delivered by the Department of Energy Security and Net Zero, in partnership with the Scottish Government and Ofgem. The Department of 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, 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 provides an overview of the series of Technical Specifications for the Consumer Connection element.

This document sits within a series of Technical Specifications and supplementary specifications for the Consumer Connection as outlined in Table 1 and Table 2 below.

This Technical Specification – Consumer Connection: Overview is current and valid as of [XX/XX/XX].

For further information on the Heat Network Technical Assurance Scheme please refer to [Heat Network Technical Assurance Scheme – Scheme Rules – New Build Heat Networks: Assessment Regime (HNTAS-SR-NB-AS).]

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Normative document structure

Technical Specifications

Document type	Element	Part/phase					
		Overview	Phase 1: Feasibility	Phase 2: Design	Phase 3: Construction	Phase 4: Operation (initial)	Phase 5: Operation (ongoing)
		P0	P1	P2	P3	P4	P5
Technical Specifications (TS)	Energy Centre (EC)	HNTAS-TS-EC-P0	HNTAS-TS-EC-P1	HNTAS-TS-EC-P2	HNTAS-TS-EC-P3	HNTAS-TS-EC-P4	HNTAS-TS-EC-P5
	District Distribution Network (DD)	HNTAS-TS-DD-P0	HNTAS-TS-DD-P1	HNTAS-TS-DD-P2	HNTAS-TS-DD-P3	HNTAS-TS-DD-P4	HNTAS-TS-DD-P5
	Substation (SS)	HNTAS-TS-SS-P0	HNTAS-TS-SS-P1	HNTAS-TS-SS-P2	HNTAS-TS-SS-P3	HNTAS-TS-SS-P4	HNTAS-TS-SS-P5
	Communal Distribution Network (CD)	HNTAS-TS-CD-P0	HNTAS-TS-CD-P1	HNTAS-TS-CD-P2	HNTAS-TS-CD-P3	HNTAS-TS-CD-P4	HNTAS-TS-CD-P5
	Consumer Connection (CC)	HNTAS-TS-CC-P0	HNTAS-TS-CC-P1	HNTAS-TS-CC-P2	HNTAS-TS-CC-P3	HNTAS-TS-CC-P4	HNTAS-TS-CC-P5
	Consumer Heat System (CH)	HNTAS-TS-CH-P0	HNTAS-TS-CH-P1	HNTAS-TS-CH-P2	HNTAS-TS-CH-P3		

Table 1: Technical Specification structure

Supplementary specifications

Document type	Element		Reference
Acceptance Testing specification (AT)	Energy Centre	EC	HNTAS-AT-EC
	District Distribution Network	DD	HNTAS-AT-DD
	Substation	SS	HNTAS-AT-SS
	Communal Distribution Network	CD	HNTAS-AT-CD
	Consumer Systems - Consumer Connection and Consumer Heat System	CS	HNTAS-AT-CS

Table 2: Supplementary specifications structure

Introduction

HNTAS is a performance-based assurance scheme, which contains impartial assessment and independent certification, to ensure that heat network performance outcomes are achieved, and maintained.

An impartial assessment is to be made with regards to claims made by a Responsible Party as to whether Technical Standards have been fulfilled, and Key Performance Indicators (KPIs) will be achieved (validation) or have been achieved (verification), for identifiable elements of a heat network.

The Technical Standards to be fulfilled are contained within Technical Specifications.

The Technical Standards consist of the following technical obligations:

- The Technical Requirements to be met
- The Performance Monitoring Requirements to be met
- The Key Failures to be avoided at each stage
- The Evidence Requirements to be provided, to demonstrate conformity with the Technical Standards and avoidance of Key Failures

The Technical Standards also contain the KPIs for each element, to be achieved and maintained in operation. The fundamental principle of the Scheme is to ensure throughout all the HNTAS Stages, that the KPIs will be achieved (design, installation) or have been achieved (commissioning, operation), to ensure performance outcomes.

There are separate Technical Specifications for each heat network element, at each phase of a heat network development and operation.

This document specifically provides an overview of the series of Technical Specifications for the Consumer Connection element. It contains the following:

- A description of the scope of the Consumer Connection
- An outline of the structure of the series of Technical Specification and of each individual Technical Specification document
- A description of the KPIs specific to the Consumer Connection, including the minimum monitoring points required to calculate KPIs

More information on HNTAS assessment can be found within [Heat Network Technical Assurance Scheme – Scheme Rules (HNTAS-SR-NB-AS)].

1. Scope

This document specifies Technical Standards for a Consumer Connection.

It is applicable to a Consumer Connection, which is defined as a connection between Distribution Network (either District or Communal) and a single Consumer Heat System, where the instantaneous hot water system is ≤ 70 kW and/or the heating/cooling system is ≤ 20 kW. Where the capacity exceeds these limits, the Substation Technical Specification is applicable.

The Consumer Connection typically includes HIUs and ancillary hot water storage (where applicable), direct hot water storage, dwelling level heat pumps and ancillary hot water storage (where applicable), CIUs, meters and monitoring equipment and other ancillary equipment.

Examples of Consumer Connections are illustrated in Figure 2, with boundaries to surrounding elements.

The Consumer Connection boundary, for the purpose of measuring performance via Key Performance Indicators, is determined by the Consumer Connection boundary monitoring point location (CC1) as illustrated in Figure 1.

The physical boundary of the Consumer Connection, for where the Technical Requirements apply, will be determined by physical barriers (for example, equipment boundary or isolation valves) or contractual relationships.

Figure 1: Illustrative drawing of Consumer Connection boundary

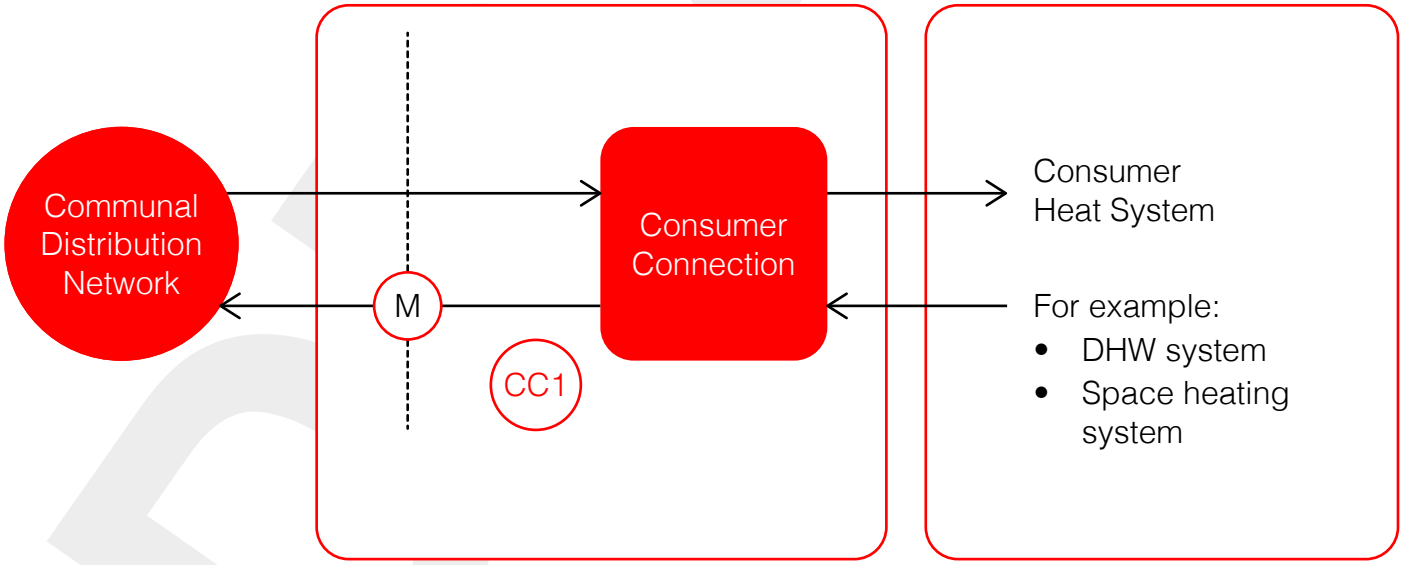
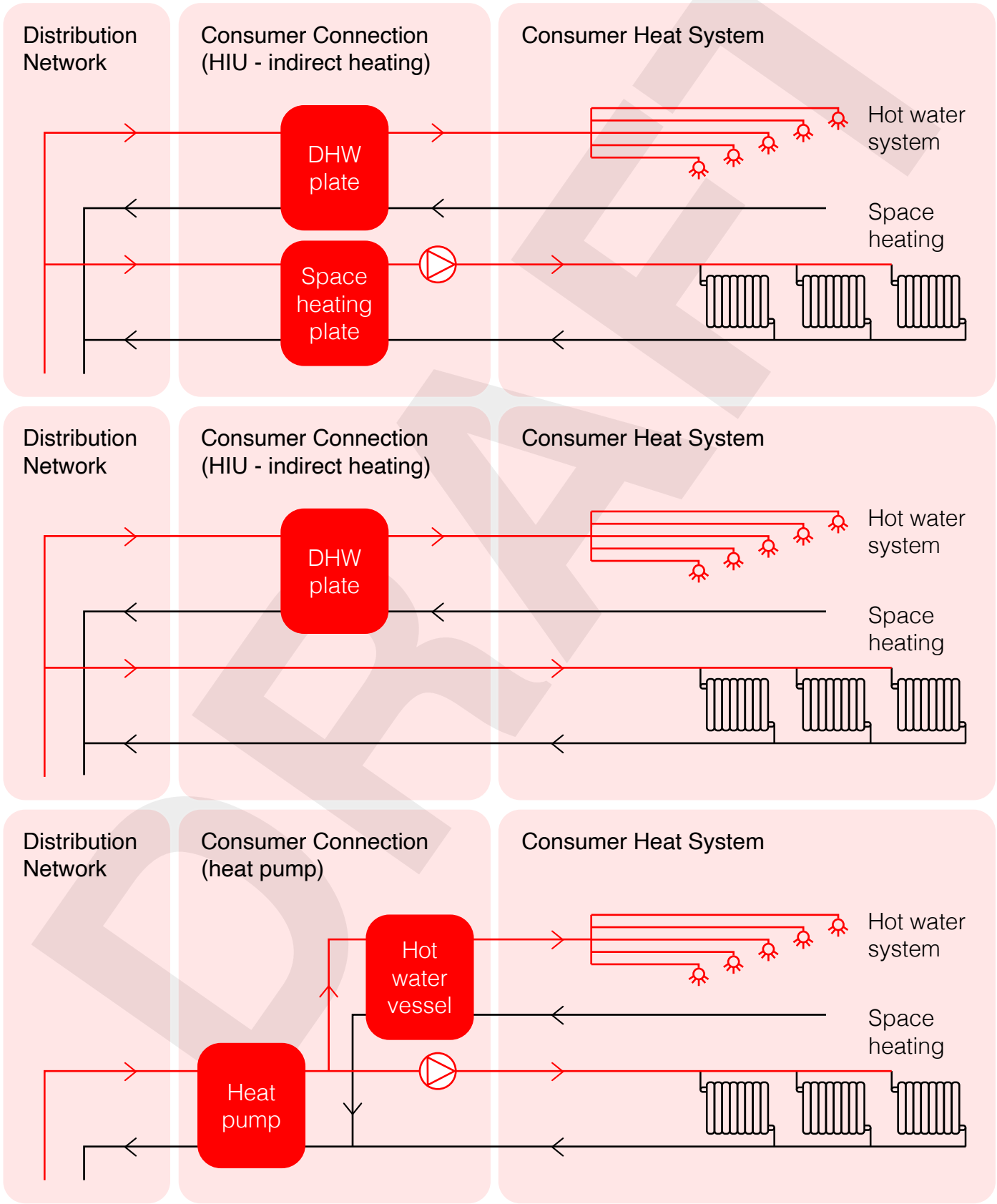


Figure 2: Illustrative drawing of Consumer Connection examples – indirect space heating (top), direct space heating (middle), heat pump system (bottom)



1.1 Equipment in scope of element

The following equipment is within scope of the Consumer Connection element:

- Heat exchange equipment (HIUs, CIUs, heat pumps)
- Storage equipment (hot water cylinder)
- Pumps (where not contained within heat exchange equipment)
- Insulation
- Control and field equipment (valves and actuators, sensors, switches)
- Ancillary equipment
  - Valves, test points, drain points, air vents, orifice plates
- Metering and Monitoring Systems
  - Monitoring points (meters and sensors)
  - Automatic and Remote Monitoring Systems

2. 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.

i. [Heat Network Technical Assurance Scheme – Scheme Rules – New Build Heat Networks: Assessment Regime (HNTAS-SR-NB-AS)]

3. Terms and definitions

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

Term	Definition
Construction Phase	The third phase of a heat network development. This phase covers the construction of a heat network. This phase contains Construction Design (Stage 4), Installation (Stage 5) and Commissioning (Stage 6) Stages.
Consumer Connection	Connection between Distribution Network (either District or Communal) and a single Consumer Heat System, where the instantaneous hot water system is ≤ 70 kW and/or the heating/cooling system is ≤ 20 kW. The Consumer Connection typically includes HIUs and ancillary hot water storage (where applicable), direct hot water storage, dwelling level heat pumps and ancillary hot water storage (where applicable), CIUs, meters and monitoring equipment and other ancillary equipment.
Evidence Requirements	Lists of evidence items, with descriptions and requirements, expected to be provided to demonstrate conformity with the Technical Requirements, Performance Monitoring Requirements and avoidance of Key Failures.
Heat Network	A network that, by distributing a liquid or a gas, enables the transfer of thermal energy for the purpose of supplying heating, cooling or hot water to a building or persons in that building (and includes any appliance the main purpose of which is to heat or cool the liquid or gas).
Key Failures	Key Failures are identified failures which occur frequently within the industry and lead to poor performance outcomes.
Key Performance Indicators (KPIs)	A quantifiable metric used to measure the performance of a heat network. Key Performance Indicator values and thresholds are to be defined during the design stages, and the heat network shall be designed to ensure KPIs can be achieved in operation.
Performance Monitoring Requirements	Requirements of a technical nature which relate to the performance monitoring of the heat network, using KPIs, and the Metering and Monitoring systems that facilitate performance monitoring.

Term	Definition
Stage 1: Concept Design	Stage 1 is the first HNTAS Stage. This stage corresponds to RIBA Stage 2. This will likely align with pre-planning applications and will be prior to the progression of design, with potential handover of design to additional parties.
Stage 2: Developed Design	Stage 2 is the second HNTAS Stage. This stage corresponds to RIBA Stage 3 design. Assessment at this stage is optional. This stage occurs prior to progression of design in RIBA Stage 4. This will likely align with submission of planning applications and may have potential handover of design to additional parties.
Stage 3: Technical Design	Stage 3 is the third HNTAS Stage. This stage corresponds to pre-construction activities at RIBA Stage 4 design, prior to design sign off and procurement and construction commencing.
Stage 4: Construction Design	Stage 4 is the fourth HNTAS Stage. This stage corresponds to RIBA Stage 4/5 design items that occur within the Construction Phase.
Stage 5: Installation	Stage 5 is the fifth HNTAS Stage. This stage corresponds to the installation activities of a heat network.
Stage 6: Commissioning	Stage 6 is the sixth HNTAS Stage. This stage corresponds to the commissioning activities of a heat network, prior to commissioning sign off, practical completion and handover to the heat network operator.
Stage 7: Operation and Maintenance (initial 2 years)	Stage 7 is the seventh HNTAS Stage. This stage corresponds to the operation and maintenance activities of a heat network during the first two years of operation.
Stage 8: Ongoing Monitoring	Stage 8 is the eighth HNTAS Stage. This stage corresponds to the ongoing operation and maintenance of a heat network during operation.
Technical Requirements	Requirements of a technical nature which relate to the generation and delivery of heat, specific to an element and stage, which are to be fulfilled. The Technical Requirements are predominantly based on existing industry requirements (from codes, guidance and other standards). Where existing industry requirements could not be identified, these have been developed.

Term	Definition
Technical standards	Technical Standards consist of all the types of technical obligations under HNTAS. These include: • Conformity with the Technical Requirement • Conformity with Performance Monitoring Requirements • Avoidance of Key Failures • Submission of evidence

Table 3: Terms and definitions

4. Technical Specification structure

4.1 Structure of Technical Specification: series

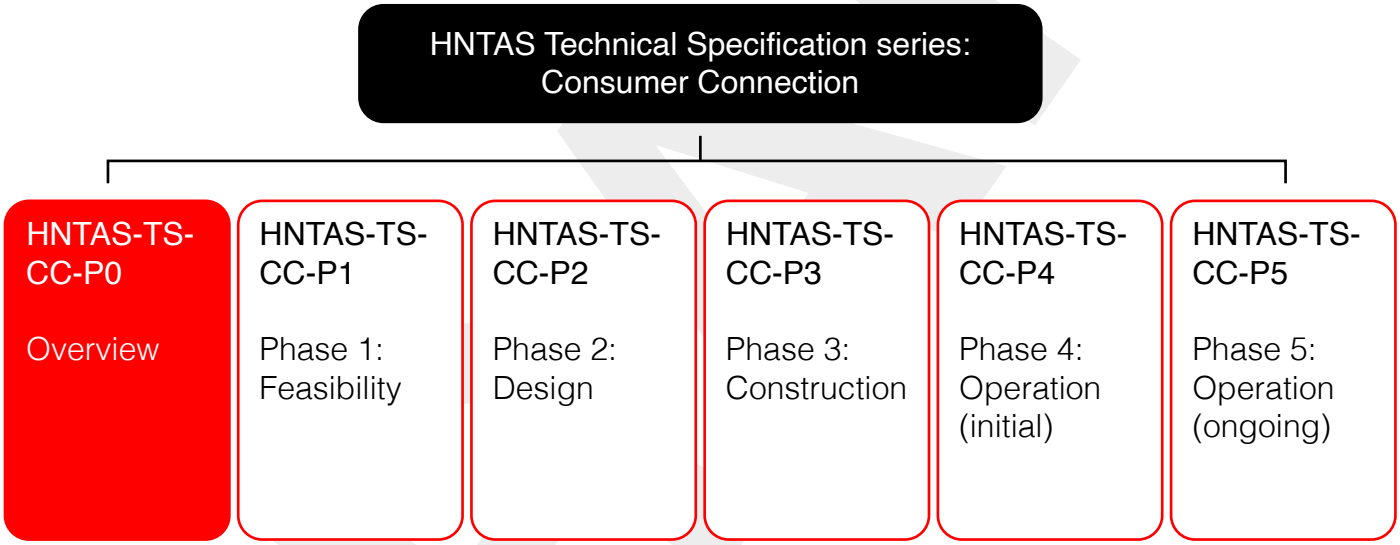
This document provides an overview of the Technical Specification for the Consumer Connection element.

This document sits within a series of Technical Specifications for the Consumer Connection.

The series contains five separate documents for each HNTAS phase, which contains the specific Technical Standards for the Consumer Connection at each stage.

Figure 3 illustrates the Technical Specification series for an element. Table 1 outlines this series of Consumer Connection Technical Specifications alongside the other HNTAS elements.

Figure 3: Illustration of Technical Specification series



4.2 Structure of Technical Specifications: individual phase document

The Technical Specifications for each phase are split into sections for each HNTAS Stage.

A description of HNTAS phases and stages is provided in [Heat Network Technical Assurance Scheme – Scheme Rules – New Build Heat Networks: Assessment Regime (HNTAS-SR-NB-AS)].

Each section contains the Technical Standards for each HNTAS Stage. This consists of the following:

- The Technical Requirements to be met
- The Performance Monitoring Requirements
- The Key Failures to be avoided at each stage
- The Evidence Requirements to be provided, to demonstrate conformity with the Technical Standards and avoidance of Key Failures

4.2.1 Technical Requirements section

Within each Technical Requirements section, a table is presented which contains a list of the HNTAS Technical Requirements and any applicable referenceable Technical Standards that must be achieved to meet the requirement. For each HNTAS Technical Requirement a reference to the expected evidence item has been outlined.

All Technical Requirements are based on current industry documentation. The predominant technical standard referenced is CP1 (CIBSE, 2020). CP1 (CIBSE, 2020) is a code of practice but is being treated as a reference standard. For topics which were not present in any reference industry documentation, additional Technical Requirements have been added to address these gaps. A new heat network standard is currently being developed which will be published later in 2025. This will supersede CP1 (CIBSE, 2020) and be used as the predominant technical standard referenced in HNTAS.

4.2.2 Performance Monitoring Requirements section

Within this section, the requirements in relation to Key Performance Indicators and the Metering and Monitoring System are outlined.

It is expected that the Metering and Monitoring System for the Consumer Connection will also cover multiple other elements within a heat network. For example, it would be likely that the Metering and Monitoring System for a Consumer Connection is provided by monitoring points within other elements, such as Energy Centre and Consumer Connections. As a result, the evidence provided for the Metering and Monitoring System will likely contain multiple elements.

Whilst the evidence can be provided which covers multiple elements, all KPIs are to be assessed on an element basis.

4.2.3 Key Failures section

Within each Key Failures section, a table is presented which contains a list of Key Failures, the outcome to avoid, and a reference to the expected evidence item to demonstrate that the Key Failure is or has been avoided.

4.2.4 Evidence Requirements section

Within each Evidence Requirements section, the expected evidence item, which is referred to within Key Failures and Technical Requirements sections for each stage, is detailed.

A table is presented which contains a description and the requirements of each evidence item to provide clarity as to what evidence is expected to prove fulfilment of the Technical Standards.

The evidence is expected to be appropriate for the scale of heat network and project specifics.

It is understood that the evidence items referenced in each table may be presented in different formats or multiple Evidence Requirements may be contained together within larger reports.

It is also expected that evidence items may be applicable to multiple elements across the heat network. Therefore, evidence does not need to be provided on an element-specific basis where it covers multiple elements.

Further evidence may be required by the Assessor to demonstrate fulfilment with the Technical Standards.

5. Note on applicability

The applicability of the Technical Standards within the Technical Specifications for Consumer Connection will depend on the specific heat network characteristics. This includes the typology of heat network and materials selection.

At each stage a Statement of Applicability shall be produced, which determines the applicable Technical Standards for the specific heat network.

Further requirements on the Statement of Applicability are outlined in [Heat Network Technical Assurance Scheme – Scheme Rules – New Build Heat Networks: Assessment Regime (HNTAS-SR-NB-AS)].

6. Key Performance Indicators

Table 4 contains the Key Performance Indicators for the Consumer Connection.

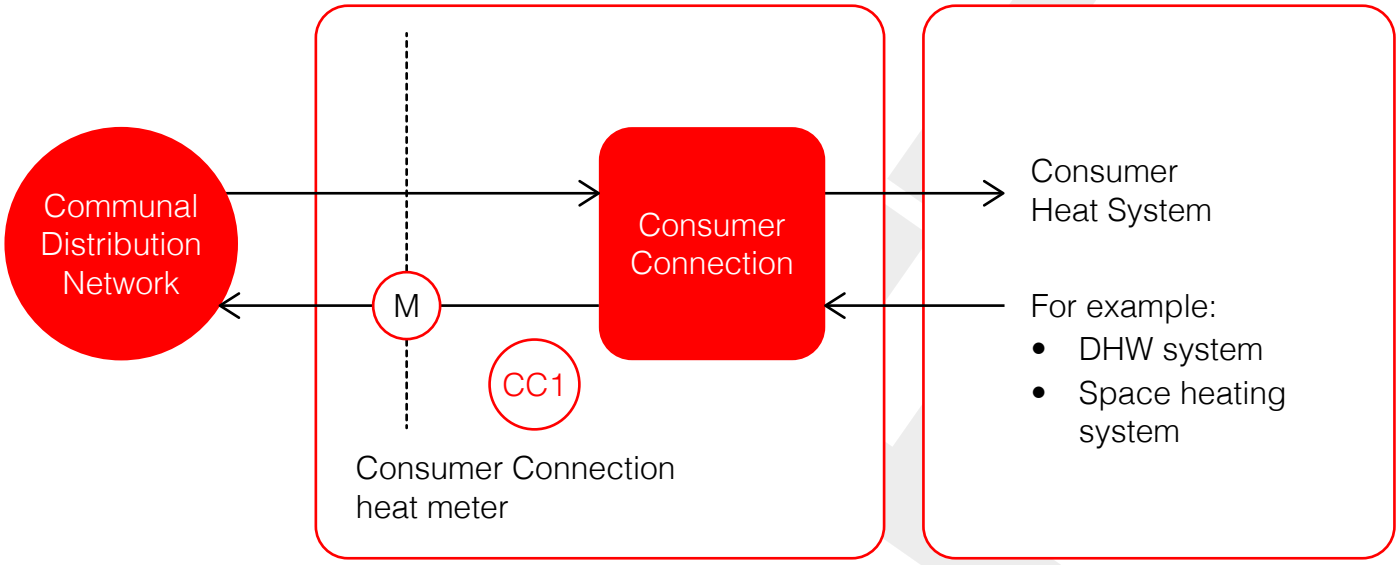
KPIs are split into two types:

- **Assessed KPIs:** These are KPIs which are assessed against pre-determined targets at Commissioning and throughout the Operation and Maintenance phase in order to achieve and maintain HNTAS Certification.
- **Reported KPIs:** These are KPIs which are not assessed against a pre-determined target through the Operation and Maintenance phase, but still provide valuable information, so are to be reported in the same format.

The specific requirements for each stage in relation to KPIs are included in the Performance Monitoring Requirements section, including setting KPI targets on a project-specific basis. Where this is required, the target is illustrated in green in Table 4.

Figure 4 illustrates the required monitoring points for measuring Consumer Connection KPIs. The monitoring points are also listed in Table 5, along with the data required from each monitoring point and the minimum read frequency. The monitoring points to be used to measure KPIs are illustrated in orange in Table 4.

Figure 4: Diagram indicating required Consumer Connection monitoring points



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KPI ID	KPI	KPI description	KPI measurement methodology	Assessed KPI or Reported KPI	KPI target (at O&M stages unless specified)	Time period (at O&M stages unless specified)
CC-KPI-01	Automatic Remote Monitoring System (ARMS) connectivity	Total number of days where monitoring points have connected to the ARMS system within 24 hours of last connection.	(Number of monitoring point days) / (total monitoring points * total days in period). Number of monitoring point days = Σ number of days each monitoring point has connected to the (ARMS) system within 24 hours of last connection.	Assessed KPI (assessed on a combined Consumer Connection basis)	Commissioning stage: 100% O&M stage: ≥ 99%.	Monthly
CC-KPI-02	Consumer Connection monitoring point data completeness	Number of total reads received in comparison to the total reads expected within the given [time period] for each monitoring point.	(Total number of reads recorded across [time period] / total reads expected across [time period]) x 100. Total reads expected = Σ (monitoring point x frequency of monitoring point x [time period]).	Assessed KPI (assessed on a combined Consumer Connection basis)	≥ 85%.	Monthly

KPI ID	KPI	KPI description	KPI measurement methodology	Assessed KPI or Reported KPI	KPI target (at O&M stages unless specified)	Time period (at O&M stages unless specified)
CC-KPI-03	Consumer Connection monitoring points operational	Of the monitoring points which are connected to the ARMS system (as per CC-KPI-01) and have complete data (as per CC-KPI-02), the number of which are operating as expected. Monitoring points that are operating as expected will have (dependent on type of monitoring point): • No error codes (meters) • No negative readings (meters) • No signals outside of operating parameters (sensors)	Verification that each monitoring point is operating as expected. Measurement will be dependent on ARMS and may be automated.	Assessed KPI (assessed on a combined Consumer Connection basis)	100% of monitoring points, which are connected to ARMS (as per CC-KPI-01) and have complete data (as per CC-KPI-02)	Monthly

KPI ID	KPI	KPI description	KPI measurement methodology	Assessed KPI or Reported KPI	KPI target (at O&M stages unless specified)	Time period (at O&M stages unless specified)
CC-KPI-04	Consumer Connection unplanned interruptions*	Number of unplanned interruptions reported per annum for a heat network. A Consumer Connection interruption is defined as any reported issue at the Consumer Connection that leads to consumers not receiving heating or hot water for more than 12 hours, due to an issue originating in the Consumer Connection. Note this is not to include issues within the Consumer Heat Systems (for example, a problem with the heating circuit), issues under the control of the consumer rather than the Heat Network Operator, or issues originating in upstream elements. An unplanned interruption is an interruption as defined above, where the network end user has not been provided with at least 48 hours written notice of such interruption.	Number of unplanned interruptions = ∑ (unplanned interruptions for given [time period]).	Assessed KPI (assessed on an individual Consumer Connection basis)	≤ 3 interruptions per annum.	Previous 12 months Measured on monthly rolling basis

KPI ID	KPI	KPI description	KPI measurement methodology	Assessed KPI or Reported KPI	KPI target (at O&M stages unless specified)	Time period (at O&M stages unless specified)
CC-KPI-05	Consumer Connection planned interruptions*	Number of planned interruptions reported per annum for a heat network. A Consumer Connection interruption is defined as any reported issue at the Consumer Connection that leads to consumers not receiving heating or hot water for more than 12 hours, due to an issue originating in the Consumer Connection. Note this is not to include issues within the Consumer Heat Systems (for example, a problem with the heating circuit), issues under the control of the consumer rather than the Heat Network Operator, or issues originating in upstream elements. A planned interruption is an interruption as defined above where notice has been given to the end user at least 48 hours prior to the interruption occurring.	Number of unplanned interruptions = ∑ (unplanned interruptions for given [time period]).	Assessed KPI (assessed on an individual Consumer Connection basis)	≤ 1 interruption per annum.	Previous 12 months Measured on monthly rolling basis

KPI ID	KPI	KPI description	KPI measurement methodology	Assessed KPI or Reported KPI	KPI target (at O&M stages unless specified)	Time period (at O&M stages unless specified)
CC-KPI-06	Efficiency of each heat generation item (%). *Note: only applicable for Consumer Connections where there is heat generation (for example, heat pump).*	Useful heat delivered to the Consumer Heat System divided by the input fuel energy (%).	Efficiency = heat generated at the Consumer Connection (kWh) for given [time period] / energy input to Consumer Connection (kWh) for given [time period].	Assessed KPI (assessed on an individual Consumer Connection basis)	≥ 90% of **[design efficiency target]**.	Previous 12 months Measured on monthly rolling basis

KPI ID	KPI	KPI description	KPI measurement methodology	Assessed KPI or Reported KPI	KPI target (at O&M stages unless specified)	Time period (at O&M stages unless specified)
CC-KPI-07	Overall Volume Weighted Average Return Temperature (VWART).	Consumer Connection return temperature weighted against volumetric flow rate, measured at the **Consumer Connection boundary (CC1)**.	$\text{VWART} = \frac{\sum(T_r \times q_r)}{\sum q_r}$ Where T_r = return temperature for each time recording (t) for given [time period], and qr = flow rate for each time recording (t) for given [time period] or cumulative volume for each time recording (t) for given [time period].	Assessed KPI (assessed on an individual Consumer Connection basis)	≤ 45 °C To be assessed alongside CC-KPI-08 (VWATD). At least one of CC-KPI-07 or CC-KPI-08 shall be met to achieve and maintain compliance.	Monthly

KPI ID	KPI	KPI description	KPI measurement methodology	Assessed KPI or Reported KPI	KPI target (at O&M stages unless specified)	Time period (at O&M stages unless specified)
CC-KPI-08	Volume weighted average temperature difference (VWATD)	Temperature difference between the volume weighted flow temperature (VWAFT) and volume weighted average return temperature (VWART) at the Consumer Connection, measured at the **Consumer Connection boundary (CC1)**.	$\mathrm{VWATD} = \mathrm{VWAFT} - \mathrm{VWART} = \frac{\sum(T_f \times q_f)}{\sum q_f} - \frac{\sum(T_r \times q_r)}{\sum q_r}$ Where T = flow/return temperature for each time recording (t) for given [time period], and q = flow rate for each time recording (t) for given [time period] or cumulative volume for each time recording (t) for given [time period].	Assessed KPI (assessed on an individual Consumer Connection basis)	≥ 5 °C To be assessed alongside CC-KPI-07 (overall VWART). At least one of CC-KPI-07 or CC-KPI-08 shall be met to achieve and maintain compliance.	Monthly

KPI ID	KPI	KPI description	KPI measurement methodology	Assessed KPI or Reported KPI	KPI target (at O&M stages unless specified)	Time period (at O&M stages unless specified)
CC-KPI-09	Standby return temperature	Consumer Connection return temperature during standby operation, measured at the **Consumer Connection boundary (CC1)**.	Standby return temperature (°C) = stabilised return temperature measured at the **Consumer Connection boundary (CC1)** during standby operation.	Assessed KPI (assessed on an individual Consumer Connection basis)	≤ **[design return temperature limit during standby]** Note the design return temperature limit shall allow for a tolerance of no more than + 3 °C on the expected return temperature.	N/A Measured at commissioning stage only

KPI ID	KPI	KPI description	KPI measurement methodology	Assessed KPI or Reported KPI	KPI target (at O&M stages unless specified)	Time period (at O&M stages unless specified)
CC-KPI-10	Domestic hot water (DHW) return temperature	Consumer Connection return temperature during DHW operation, measured at the **Consumer Connection boundary (CC1)**.	DHW return temperature (°C) = stabilised return temperature measured at the **Consumer Connection boundary (CC1)** during DHW operation.	Assessed KPI (assessed on an individual Consumer Connection basis)	≤ **[design return temperature limit during space heating operation]** Note the design return temperature limit shall allow for a tolerance of no more than + 3°C on the expected return temperature.	N/A Measured at commissioning stage only

KPI ID	KPI	KPI description	KPI measurement methodology	Assessed KPI or Reported KPI	KPI target (at O&M stages unless specified)	Time period (at O&M stages unless specified)
CC-KPI-11	Space heating return temperature	Consumer Connection return temperature during space heating operation, measured at the **Consumer Connection boundary (CC1)**.	Stabilised space heating return temperature (°C) measured at the **Consumer Connection boundary (CC1)** during DHW operation.	Assessed KPI (assessed on an individual Consumer Connection basis)	≤ **[design return temperature limit during space heating operation]** Note the design return temperature limit shall allow for a tolerance of no more than + 3 °C on the expected return temperature and be adjusted for the ambient temperature.	N/A Measured at commissioning stage only

KPI ID	KPI	KPI description	KPI measurement methodology	Assessed KPI or Reported KPI	KPI target (at O&M stages unless specified)	Time period (at O&M stages unless specified)
CC-KPI-12	DHW generation temperature	The DHW temperature generated at the Consumer Connection during DHW operation.	DHW generation temperature (°C) = temperature measured at a Consumer Heat System DHW outlet (where the temperature has not been blended) during stabilised DHW operation.	Assessed KPI (assessed on an individual Consumer Connection basis)	**[Design set point]** ± 3°C.	N/A Measured at commissioning stage only
CC-KPI-13	Space heating generation temperature	The space heating temperature generated at the Consumer Connection during space heating operation.	Space heating generation temperature (°C) = temperature measured at the Consumer Connection space heating outlet during stabilised space heating operation.	Assessed KPI (assessed on an individual Consumer Connection basis)	**[Design set point]** ± 3 °C.	N/A Measured at commissioning stage only

Table 4: Key Performance Indicators for Consumer Connection

**It should be noted that interruptions are to be assigned to the element which they originated in. Therefore, an interruption at an element which was caused by an issue outside of the control of that element, would not count towards the total interruptions for that element.*

6.1 Monitoring Points

ID	Element	Monitoring point	Data required at monitoring point	Minimum frequency of reads	Further comments
CC1	Consumer Connection	Boundary (intake)	Meter read (kWh) Instantaneous power (kW) Flow rate (m^3/h or l/s) Flow temperature (°C) Return temperature (°C) Volume (m^3 or l)	30 minutes	Shall be located on the intake boundary to the Consumer Connection. To measure heat delivered to the Consumer Connection. An example of this monitoring point would be a HIU heat meter.

Table 5: Minimum required monitoring points - Consumer Connection

References

CIBSE (2020) Heat networks: Code of Practice for the UK CP1 (2020) (London: Chartered Institution of Building Services Engineers)