Heat Network Technical Assurance Scheme – Technical Specification – District Distribution Network

Overview

HNTAS-TS-DD-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 District Distribution Network element.

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

This Technical Specification – District Distribution Network: 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 District Distribution Network element. It contains the following:

A description of the scope of the District Distribution Network

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 District Distribution Network, 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 – New Build Heat Networks: Assessment Regime (HNTAS-SR-NB-AS).

1. Scope

This document specifies Technical Standards for a District Distribution Network.

It is applicable to a District Distribution Network, which 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.

The District Distribution Network is applicable to buried pipework underground and above ground pipework which is external to a building. It typically contains pipework, insulation, valves, and other ancillary equipment.

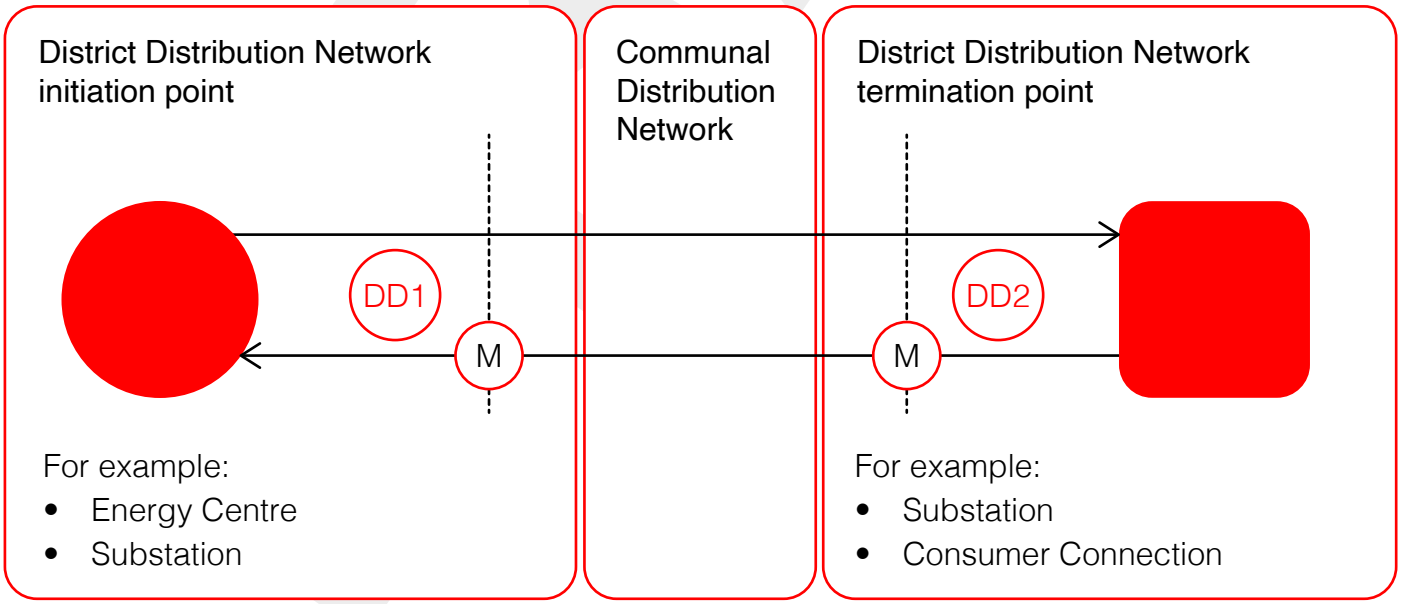
The District Distribution Network boundary is defined by the initiation and termination points, which are project specific. The initiation point may be an Energy Centre or Substation (for example, a plot connection), and the termination point may be a Substation (for example, a building connection or a plot connection) or Consumer Connection.

For the purposes of measuring performance, via Key Performance Indicators, the boundary is determined by the initiation and termination point monitoring point locations (DD1 and DD2) as indicated in Figure 1.

The physical boundary of the District Distribution Network, for where the Technical Requirements apply, may be determined by physical barriers (for example, building/ground entry points) or contractual relationships.

For clarity, all other heat network elements are not in the scope of this Technical Specification.

Figure 1: Illustrative drawing of District Distribution Network boundary



1.1 Equipment in scope of element

The following equipment is within scope of the District Distribution Network element:

- Pipework
- Pipework expansion provision
- Insulation
- Valve chambers
- Control and field equipment (valves and actuators, sensors, switches)
- Ancillary equipment
  - Valves, test points, drain points, air vents, orifice plates
- Surveillance systems
- Metering and Monitoring Systems
  - Monitoring points (meters and sensors)
  - Automatic and remote monitoring systems

1.2 Example typologies

There are many different typologies of District Distribution Network. Within the Evidence Requirements sections of this Technical Specification, common typologies are referred to, to demonstrate differences in the evidence requirement.

A description of each example typology is outlined in Table 3.

ID	Example typology	Description
A	Network-led District Heat Network	A District Distribution Network which is part of a network-led District Heating Network. A network-led District Heating Network is a network which supplies two or more buildings, and that is developed independently of the boundaries of any particular development, with third parties connecting to that heat network. This would cover both District Heating Networks which are connecting to existing buildings and/or pre-existing heat networks (such as city-wide district heating networks constructed with Heat Network Investment Project (HNIP) or Green Heat Network Fund (GHNF) funding connecting to public buildings, campus networks, etc.), and those which serve new building developments developed by plot developers (but developed and constructed independently of the new buildings). An example is shown in Figure 2.

ID	Example typology	Description
B	Developer-led District Heat Network (medium-large)	A District Distribution Network which is part of a new build developer-led District Heating Network. A developer-led District Heating Network refers to a heat network that is built to service a single development, which contains two or more buildings. Normally the heat network would be constructed simultaneously with the wider building works, but this can also include networks retrofitted to a single building or estate. Examples would typically be a self-contained District Heating Network with large amounts of buried pipework serving a multiple new build apartment blocks or other consumer connections, where the construction of the heat network is linked to the build out of a new development. An example is shown in Figure 3.
C	Developer-led District Heat Network (small)	A District Distribution Network which is part of a new build developer-led District Heating Network. This example is the same as above, however, this would cover where there are only small amounts of District Distribution Network pipework. For example, a District Heating System where there are only two buildings, with one small length of buried pipework connecting them together. This would also cover where there are small amounts of external pipework within the Distribution Network, for example, pipework routed within an external space (such as a car park) between buildings. An example is shown in Figure 4.

Table 3: Descriptions of example typologies used within the District Distribution Network Technical Specification

Figure 2: Example typology A: network-led district heat network schematic

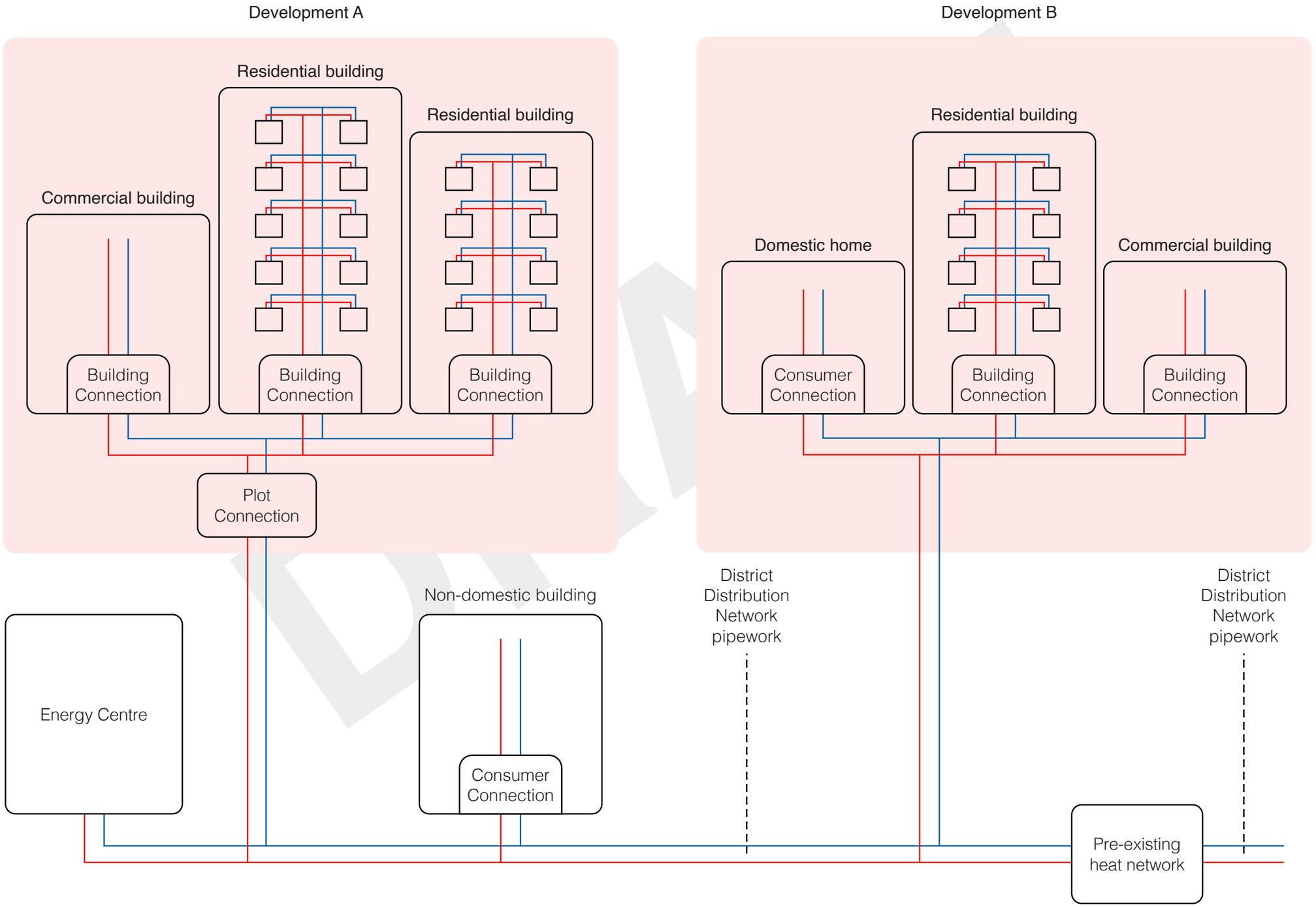


Figure 3: Example typology B: developer-led district heat network (medium-large) schematic

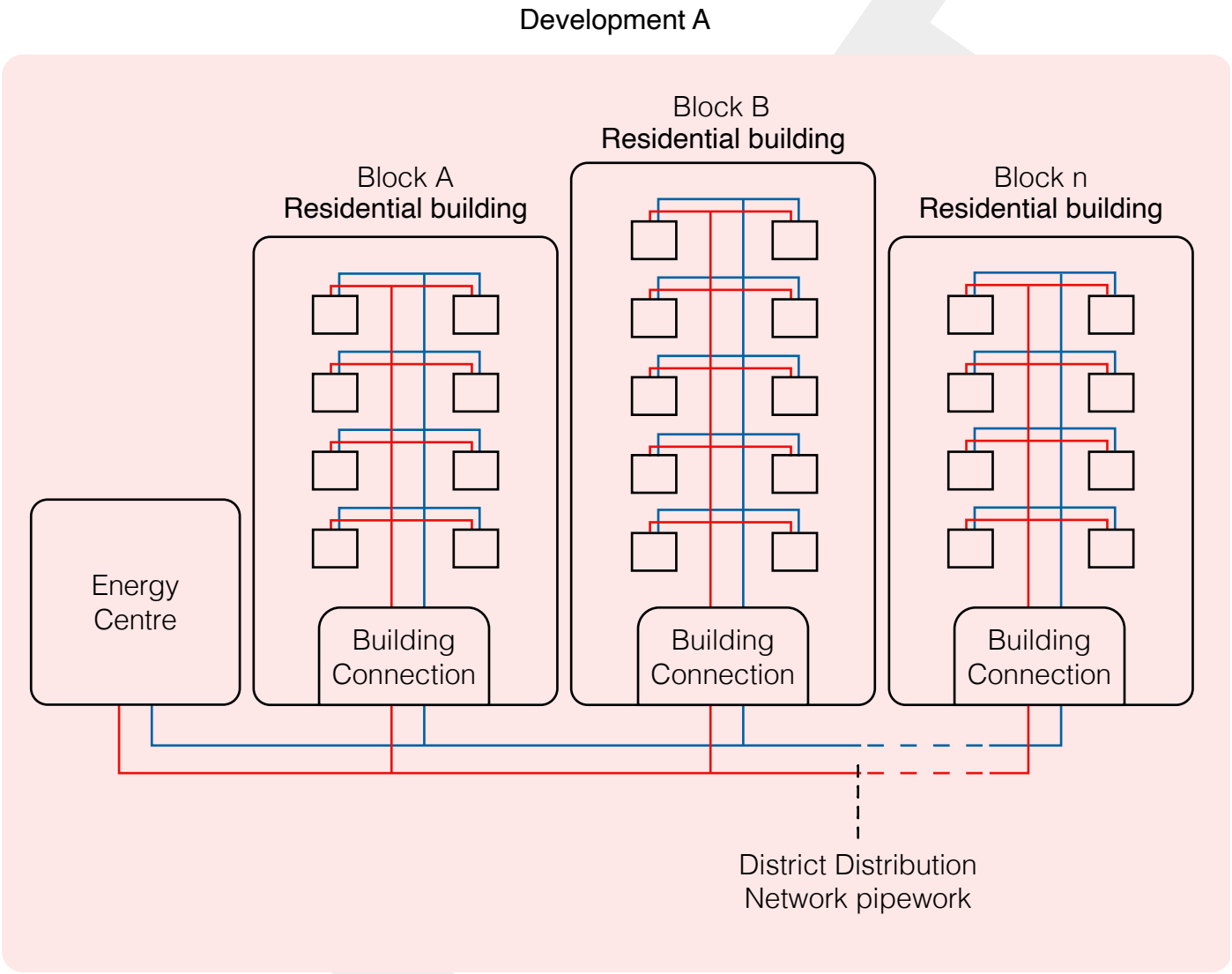
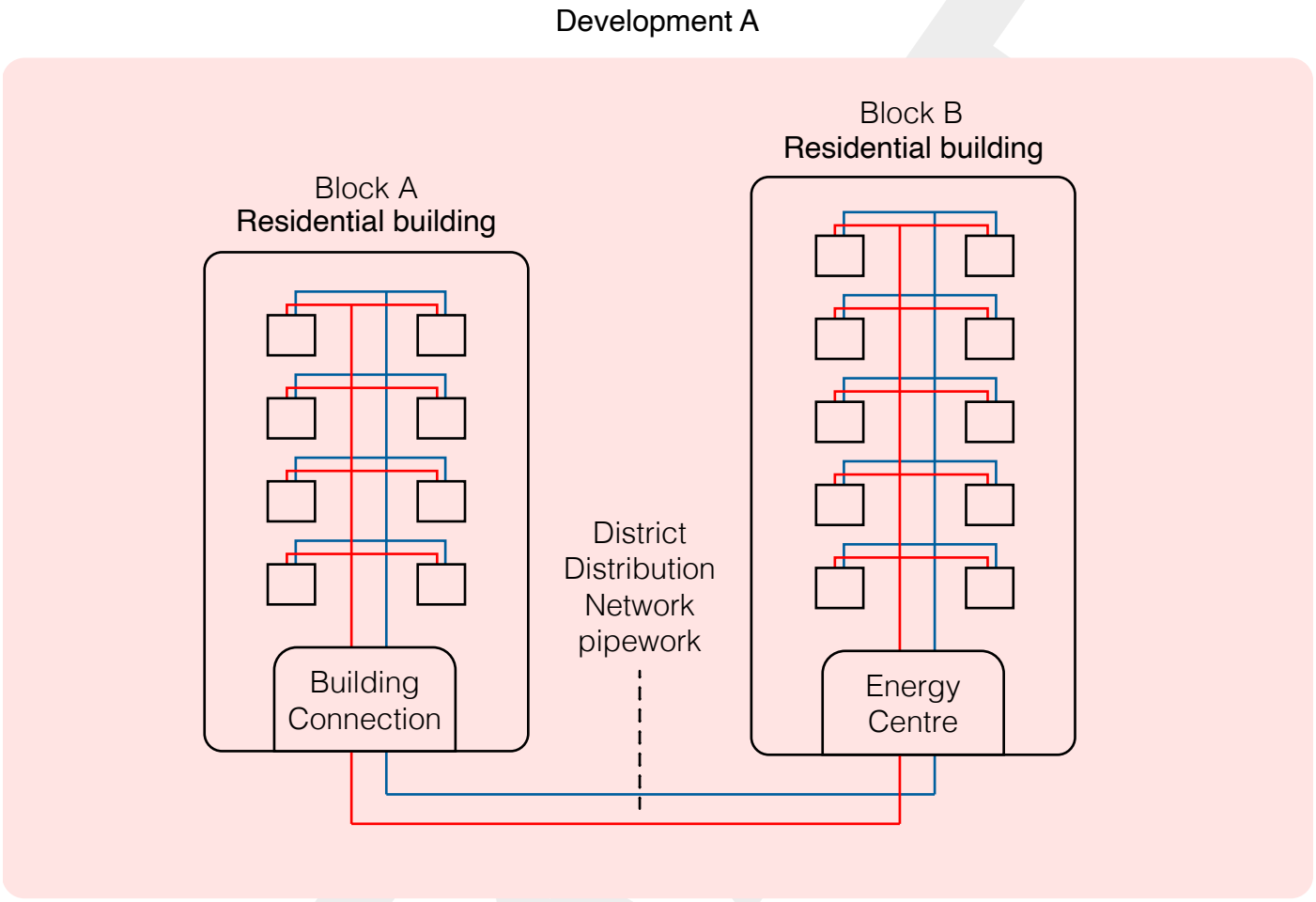


Figure 4: Example typology C: developer-led district heat network (small) schematic



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 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.
Developer-led heat network	A heat network that is built to service a single development. Normally the heat network would be constructed simultaneously with the wider building works, but this can also include networks retrofitted to a single building or estate. Examples would typically be communal heating systems or a self-contained district heating system where the construction of the heat network is linked to the build out of a new development.
District Distribution Network	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. Typically contains pipework, valves, heat meters, and other ancillary equipment.
District Heat network	A heat network by means of which heating, cooling or hot water is supplied to two or more buildings or persons in those buildings.
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.

Term	Definition
Network-led heat network	A heat network that is developed independently of the boundaries of any particular development, with third parties connecting to that heat network. This would cover both district heating networks that serve new building developments developed by plot developers, and those connecting to existing buildings and/or pre-existing heat networks (such as district heating networks constructed with HNIP or GHNF funding connecting to public buildings, campus networks, etc.).
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.
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: ConstructionDesign	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.

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

Table 4: Terms and definitions

4. Technical Specification structure

4.1 Structure of Technical Specification: Series

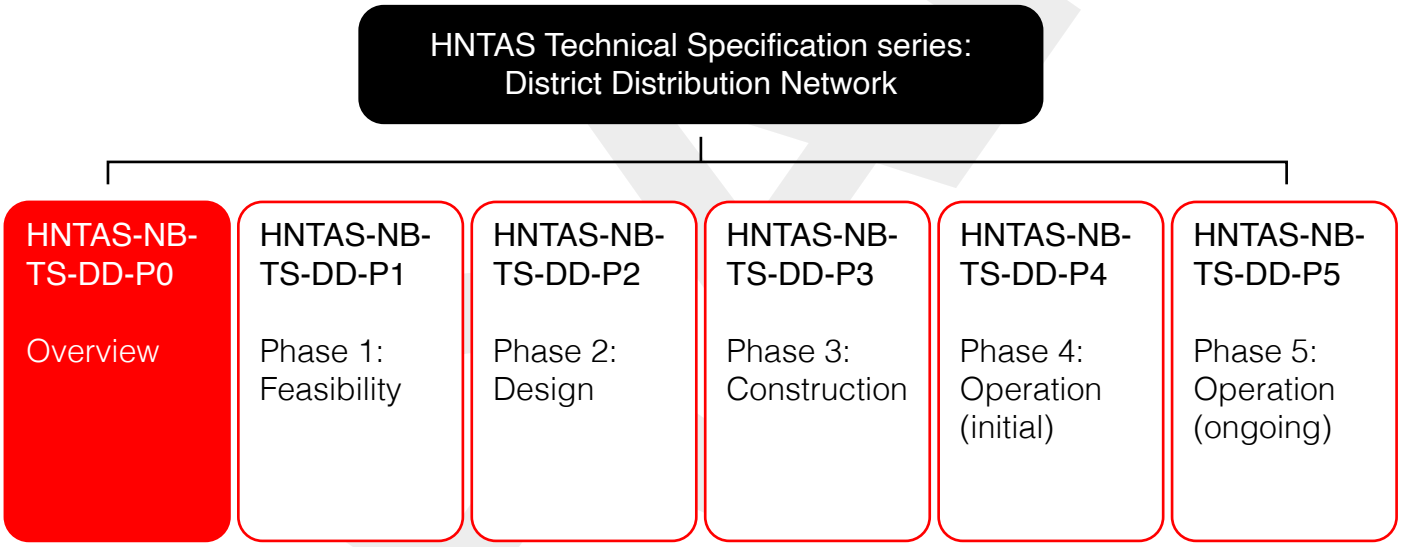
This document provides an overview of the Technical Specification for the District Distribution Network element.

This document sits within a series of Technical Specifications for the District Distribution Network.

The series contains 5 separate documents for each HNTAS phase, which contains the specific Technical Standards for the District Distribution Network at each stage.

Figure 5: Illustration of the Technical Specification series illustrates the Technical Specification series for an element. Table 1 outlines this series of District Distribution Network Technical Specifications alongside the other HNTAS elements.

Figure 5: Illustration of the Technical Specification series



4.2 Structure of Technical Specifications: individual phase documents

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 the Heat Network Technical Standard (HTS1). For topics which were not present in any reference industry documentation, additional Technical Requirements have been added to address these gaps.

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 District Distribution Network will also cover multiple other elements within a heat network. For example, it would be likely that the Metering and Monitoring System for a District Distribution Network is provided by monitoring points within other elements, such as Energy Centre and Substations. 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. The example typologies are outlined in Section 1.1.

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 District Distribution Network 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 5 contains the Key Performance Indicators for the District Distribution Network.

KPIs are split into two types:

- **Assessed KPIs:** These are KPIs which are assessed against pre-determined targets 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 Requirement section, including setting KPI targets on a project specific basis. Where this is required, the target is illustrated in green in Table 5.

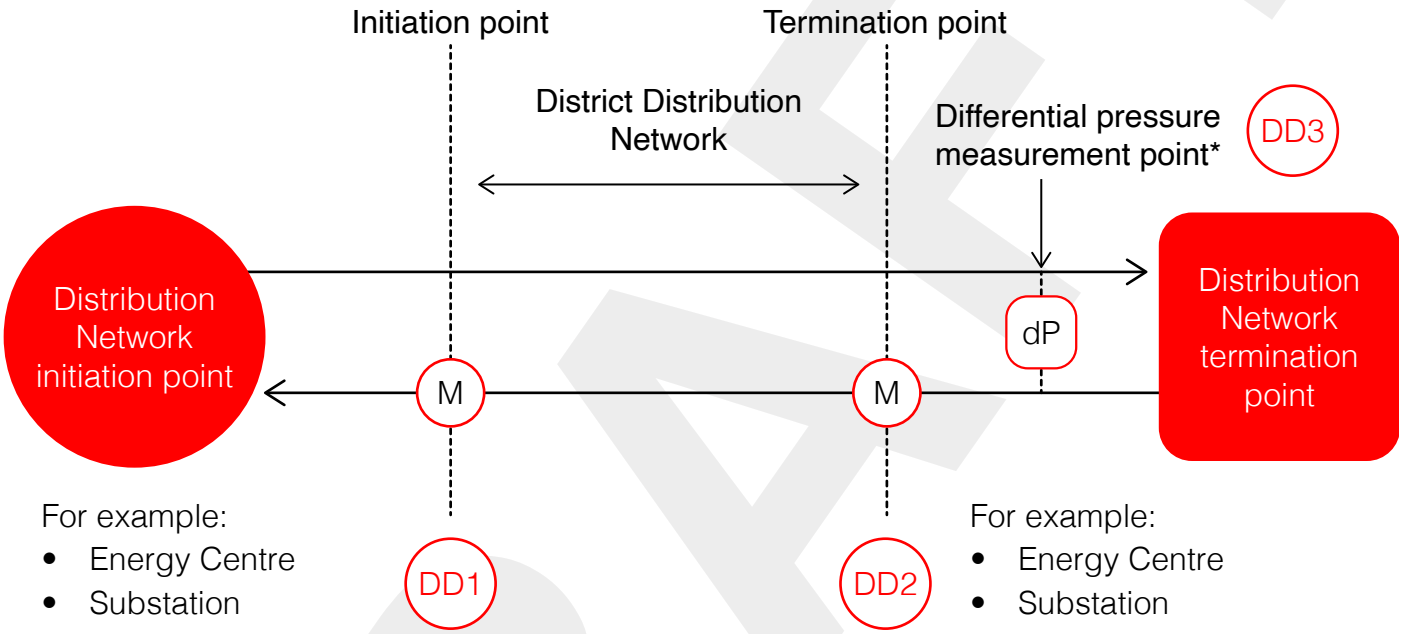
Figure 6: Diagram indicating required District Distribution Network monitoring points illustrates the required monitoring points for measuring Energy Centre KPIs. The monitoring points are also listed in Section 6.1, along with the data required from each monitoring point and the minimum read frequency. The monitoring points to be used to measure KPIs are illustrated in orange in Table 5.

Note that the monitoring points (that is, heat meters) at the initiation and termination points of the District Distribution Network can be the same monitoring points at the boundary of that element. For example, the network initiation monitoring point could be the Energy Centre boundary monitoring point (EC3) and the termination point could be the Substation intake monitoring point (SS1). In these cases, where there are different Heat Network Operators, there would need to be a contract which would enable the sharing of data from that monitoring point to enable KPIs to be calculated and reported for the District Distribution Network. Where data from shared monitoring points cannot be utilised by both Heat Network Operators, separate monitoring points will need to be installed.

Note that DD-KPI-01 to DD-KPI-03 are only applicable where there are monitoring points on the District Distribution Network which are within the element boundary. If monitoring points to measure and calculate KPIs are shared with boundary elements, which are not within the responsibility or control of the District Distribution Network element (for example, utilisation of

an Energy Centre monitoring point (EC3) as the initiation monitoring point, or the Substation intake monitoring point (SS1) as a termination monitoring point), they will not be accounted for under DD-KPI-01 to DD-KPI-03. Where there is a direct plot connection on the District Distribution Network, which does not contain a hydraulic break, the monitoring point (meter) will be accounted for under the District Distribution Network element and would be applicable under DDN-KPI-01 to DD-KPI-03.

Figure 6: Diagram indicating required District Distribution Network monitoring points



For example:
- Energy Centre
- Substation
- Plot Connection

For example:
- Energy Centre
- Substation
- Building Connection
- Plot Connection
- Consumer Connection

*Location(s) to be identified by the designer

KPI ID	KPI	KPI description	KPI measurement methodology	Assessed KPI or reported metric	KPI target (at O&M stages unless specified)	Time period (at O&M stages unless specified)
DD-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	Commissioning stage: 100% O&M stage: ≥ 99%.	Monthly
DD-KPI-02	District Distribution Network 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	≥ 95%.	Monthly

KPI ID	KPI	KPI description	KPI measurement methodology	Assessed KPI or reported metric	KPI target (at O&M stages unless specified)	Time period (at O&M stages unless specified)
DD-KPI-03	District Distribution Network monitoring points operational	Of the monitoring points which are connected to the ARMS system (as per DD-KPI-01) and have complete data (as per DD-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	100% of monitoring points, which are connected to ARMS (as per DD-KPI-01) and have complete data (as per DD-KPI-02)	Monthly

KPI ID	KPI	KPI description	KPI measurement methodology	Assessed KPI or reported metric	KPI target (at O&M stages unless specified)	Time period (at O&M stages unless specified)
DD-KPI-04	District Distribution Network unplanned interruptions*	Number of unplanned interruptions reported per annum. A District Distribution Network interruption is defined as an event causing: • The flow temperature at the **District Distribution Network termination point (DD2)** to be below the minimum required flow temperature for more than 12 hours, due to an issue originating in the District Distribution Network. • The differential pressure at the **specified differential pressure measurement point(s) (DD3)** (note that this location may change during operation) to be below the minimum required differential pressure for more than 12 hours, due to an issue originating in the District Distribution Network. 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	≤ 3 interruptions per annum.	Monthly

KPI ID	KPI	KPI description	KPI measurement methodology	Assessed KPI or reported metric	KPI target (at O&M stages unless specified)	Time period (at O&M stages unless specified)
DD-KPI-05	District Distribution Network planned interruptions*	Number of planned interruptions reported per annum. A District Distribution Network interruption is defined as an event causing: • The flow temperature at the **District Distribution Network termination point (DD2)** to be below the minimum required flow temperature for more than 12 hours, due to an issue originating in the District Distribution Network • The differential pressure at the **specified differential pressure measurement point(s) (DD3)** (note that this location may change during operation) to be below the minimum required differential pressure for more than 12 hours, due to an issue originating in the District Distribution Network 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 planned interruptions = ∑ (planned interruptions for given [time period]).	Assessed KPI	≤ 1 interruption per annum.	Monthly

KPI ID	KPI	KPI description	KPI measurement methodology	Assessed KPI or reported metric	KPI target (at O&M stages unless specified)	Time period (at O&M stages unless specified)
DD-KPI-06	District Distribution Network heat loss	Calculated heat loss between the **District Distribution Network initiation point (DD1)** heat meter and the **District Distribution Network termination point(s) (DD2)** heat meter(s).	**Design:** Heat losses (kW) = ∑ (heat losses for each pipe size (kW)) + ∑ (heat losses from fittings, ancillary equipment etc. within District Distribution Network (kW)). **Operation:** Heat losses (kW) = ∑ (heat demand at each meter at the **District Distribution Network initiation point (DD1)** (kW) for given [time period]) - ∑ (heat demand at each meter at the **District Distribution Network termination point(s) (DD2)** (kW) for given [time period]).	**Stage 1 – Stage 4:** Assessed KPI **Stage 5 onwards:** Reported KPI	**Stage 1 – Stage 4: [domestic target]** † + **[non-domestic target]** Domestic *target: ≤ 265 W/dwelling* *Non-domestic target: ≤ 12 W/kWconnection* † Applicable only to domestic Consumer Connections (for example, houses) which are directly connected to the District Distribution Network. A connection to a Communal Distribution Network (containing multiple Consumer Connections) is considered as a non-domestic connection to the District Distribution Network, and the design kW at the connection point shall be applied to the non-domestic target.	Previous 12 months Measured on monthly rolling basis

KPI ID	KPI	KPI description	KPI measurement methodology	Assessed KPI or reported metric	KPI target (at O&M stages unless specified)	Time period (at O&M stages unless specified)
DD-KPI-07	District Distribution Network average flow temperature	Average flow temperature for given [time period] measured at the **District Distribution initiation point (DD1)**.	Average flow temperature = ∑ (Flow temperature at each time point for given [time period])/ ∑(time points for given [time period]).	Reported metric	**[expected average flow temperature]**	Monthly
DD-KPI-08	District Distribution Network average return temperature	Average return temperature for given [time period] measured at the **District Distribution initiation point (DD1).**	Average return temperature = ∑ (Return temperature at each time point for given [time period])/ ∑(time points for given [time period]).	Reported metric	**[expected average return temperature range]**	Monthly

KPI ID	KPI	KPI description	KPI measurement methodology	Assessed KPI or reported metric	KPI target (at O&M stages unless specified)	Time period (at O&M stages unless specified)
DD-KPI-09	District Distribution Network flow temperature uptime	The percentage of time flow temperature, measured at the **District Distribution termination point(s) (DD2)** is above the Minimum Required Flow Temperature. Minimum required flow temperature will be project specific and is to be set for each District Distribution Network. Minimum required flow temperature of the network is the flow temperature required to deliver >45 °C domestic hot water (DHW) to outlets within Consumer Heat Systems, or is the minimum flow temperature required at the Substation to deliver the minimum required flow temperature for the network it is supplying.	Uptime = ∑ (time points spent above minimum required flow temperature for given [time period])/ ∑ (time points for given [time period]).	Assessed KPI	≥ 98 % above **[minimum required flow temperature]**	Monthly

KPI ID	KPI	KPI description	KPI measurement methodology	Assessed KPI or reported metric	KPI target (at O&M stages unless specified)	Time period (at O&M stages unless specified)
DD-KPI-10	District Distribution network bypass flow rate	Sum of measured flow rates from all termination points against the flow rate measured at the initiation point.	Bypass flow rate = [(volume delivered from **District Distribution Network initiation point (DD1)** (m^3) for given [time period]) - ∑ (volume consumed at all **District Distribution Network termination point(s) (DD2)** (m^3) for given [time period])] / [time period].	Assessed KPI	Design: Design bypass flow rate is to be ≤ 1% of design peak load flow rate. Justification is to be provided where design bypass flow rate is ≥ 1% of design peak load flow rate. To be calculated separately for each bypass. **Operation**: ≤ **[Design maximum bypass flowrate]**.	Monthly

Table 5: Key Performance Indicators - District Distribution Network

*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	Location	Data required at monitoring point	Minimum frequency of reads	Further comments
DD1	District Distribution Network	Distribution network initiation point	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	Can be the same measurement point as an Energy Centre boundary measurement point, Substation offtake measurement point, or a plot/building connection measurement point (where not a Substation).
DD2	District Distribution Network	Distribution network termination point	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	Can be the same measurement point as a Substation intake measurement point, or a plot/building connection measurement point (where not a Substation), or a Consumer Connection measurement point.
DD3	District Distribution Network	Defined differential pressure measurement point	Differential pressure (kPa, bar)	5 minutes	Location(s) shall be determined by the Designer on a project basis. Likely to at the District Distribution Termination Point(s).

Table 6: Minimum required monitoring points – District Distribution Network