UNIFORM NETWORK CODE – OFFTAKE ARRANGEMENTS DOCUMENT

SECTION D

MEASUREMENTS

1 General

1.1 Introduction

1.1.1 This Section D sets out requirements for the installation, operation and maintenance of Measurement Equipment for the purposes of measuring gas flows from the upstream System to the downstream System at an Offtake, and certain related issues.

1.1.2 The requirements of this Section D differ as between Offtakes of the following classes:

(a) CV-Directed Offtakes;

(b) NTS/LDZ Offtakes which are not CV-Directed Offtakes;

(c) LDZ/LDZ Offtakes which are not CV-Directed Offtakes and are not Unmetered Offtakes;

(d) Unmetered LDZ/LDZ Offtakes.

1.1.3 For the purposes of this Document:

(a) a "**CV-Directed**" Offtake is an NTS/LDZ Offtake or LDZ/LDZ Offake which is a place in relation to which the Authority has given directions pursuant to regulations 6(a) and (b) of the Gas (Calculation of Thermal Energy) Regulations; and

(b) an "**Unmetered**" LDZ/LDZ Offtake is an LDZ/LDZ Offtake in relation to which (pursuant to paragraph 1.5) Measurement Equipment is not required to be installed and at which Measurement Equipment is not actually installed.

1.1.4 The quantity of gas flowing on (or in any period within) a Day at an Offtake shall be determined:

(a) where the Offtake is a CV-Directed Offtake, on the basis of the measurements at that Offtake under this Section D, for the purposes of determining the daily CV for the LDZ served by that Offtake as described in Section F;

(b) for all other purposes of the Code, on the basis of the daily CV determined (as described in Section F) for the LDZ.

1.2 Measurement Equipment

1.2.1 In this Section D:

(a) "**Measurement Equipment**" means:

(i) any gas flow volume or energy measurement device; and

(ii) (where the context admits) any other instrumentation required for the monitoring at points of telemetry (as provided in Section E);

and includes any associated equipment and installations (including associated sensors, pipework, regulator, filters, valves, sample lines, seals, housings and mountings) installed or to be installed at an Offtake; any other instrumentation required for the measurement of calorific value; and any system (forming part of or connected to any of the foregoing) for converting or otherwise processing data or signals obtained from any such device or instrumentation so as to derive the quantities which are to be provided in accordance with this Section D;

(b) the "**Permitted Range**" of any Measurement Equipment comprises:

(i) the permitted uncertainty level in the Measurement Equipment, for all steady-state flow conditions, determined (in the case of an NTS/LDZ Offtake, consistent with paragraph 1.2.3) at the telemetry boundary as provided in Section E; and

(ii) the specified range (of values of the measured property or characteristic) within which the permitted uncertainty levels apply;

(c) a requirement that Measurement Equipment read within the Permitted Range is a requirement that it read within the permitted uncertainty levels for all values (of the relevant measured property or characteristic) within the specified range comprised in the Permitted Range, and references to reading within the Permitted Range shall be construed accordingly; and

(d) "**measured data**" means data which is or has been or (as the context may require) is required to be measured by Measurement Equipment and provided to the upstream Party pursuant to this Section D, and includes data calculated or otherwise derived by the operation of any component of the Measurement Equipment.

1.2.2 The Measurement Equipment and (for each item thereof) the Permitted Range at each Offtake are specified in Appendix D to the Supplemental Agreement relating to that Offtake.

1.2.3 The Measurement Equipment shall be treated as including Telemetry Connection Facilities or Daily Read Facilities to be provided pursuant to Section E.

1.3 Units

1.3.1 Measured data shall be recorded in or (before being provided) converted to metric standard temperature and pressure conditions as set out in BS ISO 13443:1996 "Natural Gas Standard Reference Conditions".

1.3.2 Measured data shall be provided pursuant to this Section D in the units specified in Annex D-1.

1.4 Permitted Range

1.4.1 Annex D-1 sets out Permitted Ranges for Measurement Equipment as applicable for different classes (as provided in paragraph 1.1.2) of Offtakes.

1.4.2 The applicable Permitted Range (as set out in Annex D-1) shall apply in respect of all Measurement Equipment, unless otherwise provided in the Supplemental Agreement but subject to paragraph 1.4.3.

1.4.3 In relation to any Offtake, where:

(a) the Supplemental Agreement permits or provides for a Permitted Range (in relation to any Measurement Equipment) less stringent than is required in Annex D-1; and

(b) any existing Measurement Equipment at the Offtake is at any time substantially modified or replaced;

the modified or replaced Measurement Equipment shall (notwithstanding the Supplemental Agreement, but subject to paragraph 1.4.4) comply with the applicable Permitted Range specified in Annex D-1, and the Supplemental Agreement shall be amended to reflect such requirement.

1.4.4 Where the Measurement Equipment or component thereof (being modified or replaced as described in paragraph 1.4.3) measures or records certain gas properties or characteristics only, the requirement in paragraph 1.4.3 shall apply only to that extent; and accordingly such requirement in paragraph 1.4.3 shall not apply as to any Measurement Equipment or any component thereof which measures or records other gas properties or characteristics and is not being modified or replaced.

1.5 Unmetered Offtakes

1.5.1 In the case of an LDZ/LDZ Offtake which is not a CV-Directed Offtake, Measurement Equipment is required to be installed only:

(a) where Measurement Equipment was installed at the LDZ/LDZ Offtake as at the date of this Document; or

(b) where all of the following conditions are satisfied:

(i) the LDZ/LDZ Offtake (or Individual Offtake Point) is a new Offtake or Individual Offtake Point, or is substantially modified after the date of this Document; and

(ii) the quantities to be measured by such Measurement Equipment cannot in the reasonable opinion of the upstream Party be derived with reasonable accuracy from measurement equipment located at another point on the upstream System or downstream System; and

(iii) the normal operating pressure at the LDZ/LDZ Offtake is greater than 75 mbar.

1.5.2 No Measurement Equipment is required to be installed at a Closed Offtake.

1.5.3 The Supplemental Agreement will record what Measurement Equipment (if any) is or is to be installed at an LDZ/LDZ Offtake (but without prejudice to paragraphs 1.4.3 and 2.2.2).

1.5.4 Where (pursuant to paragraph 1.5.1 or 1.5.2, or otherwise as agreed between the Parties and provided in the Supplemental Agreement) Measurement Equipment is not required to be installed at an LDZ/LDZ Offtake:

(a) the requirements (as to the installation, maintenance, operation, validation and rectification of Measurement Equipment) of this Section D shall not apply (but subject to any provision of the Supplemental Agreement pursuant to which the disapplication of such requirements may lapse or be withdrawn); and

(b) the Parties shall establish a methodology for determining or estimating and providing the data which would be otherwise measured by such equipment; and the Parties will

comply with such methodology; and for the purposes of this Document the data determined and provided according to such alternative basis shall be treated as the relevant measured data.

2 Measurement Equipment

2.1 Installation, Operation and Maintenance

2.1.1 The downstream Party shall ensure that at each of its Offtakes (save as otherwise agreed and provided in the relevant Supplemental Agreement), in respect of each Individual Offtake Point, there is installed, operated and maintained in proper working order Measurement Equipment for the purposes of registering or determining and recording:

(a) the properties or characteristics specified in the applicable provisions of Annex D-1; and

(b) in the case of an NTS/LDZ Offtake, the further matters specified as points of telemetry in Annex E-1; and

(c) such further properties of gas (if any) as are set out in the Supplemental Agreement.

2.1.2 The downstream Party shall ensure that the Measurement Equipment is:

(a) installed, operated and maintained to the standard of a Reasonable and Prudent Operator and in accordance with the requirements of paragraph 2.2;

(b) installed so as to measure the relevant property or characteristic of gas flowing at, or as nearly as practicable at, the Point of Offtake;

(c) capable of reading and set to read without systematic bias and within the Permitted Range; and

(d) operated so as to enable the downstream Party to provide measured data in accordance with paragraph 2.3.

2.1.3 The downstream Party shall notify the upstream Party of any planned maintenance in relation to Measurement Equipment, in accordance with the provisions on Measurement Equipment Maintenance in Section G.

2.2 Technical Specifications

2.2.1 The Measurement Equipment shall be of a type, standard of design and accuracy which complies with, and shall be operated and maintained in accordance with applicable provisions of:

(a) the Gas Act 1986, the Gas (Calculation of Thermal Energy) Regulations 1996 and any other applicable Act of Parliament, regulation, or licence;

(b) any other relevant Directive of a Competent Authority; and

(c) unless otherwise provided in the relevant Supplemental Agreement, the applicable industry standards and best practice recommendations set out in Annex D-2.

2.2.2 Where (at any time or from time to time) there is any revised, updated or new version of any of the standards or recommendations referred to in paragraph 2.2.1(c), then (subject to any contrary Legal Requirement):

(a) (save as otherwise agreed) such revised, updated or new version shall apply for the purposes of this Document prospectively (in accordance with paragraph 2.2.2(c) where applicable) with effect from the date such version is stated to be effective;

(b) the version of such requirement, standard or recommendation applicable in relation to particular Measurement Equipment shall be the version in force for the purposes of this Document (pursuant to paragraph 2.2.2(a)) at the Supplemental Agreement Date; and

(c) where any existing Measurement Equipment (or component thereof) at an Offtake is substantially modified or replaced, the modified or replaced Measurement Equipment (or component thereof) shall comply (in accordance with paragraph 2.2.1(c)) with the version of the applicable requirement, standard or recommendation which is in force for the purposes of this Document (pursuant to paragraph 2.2.2(a)) at the time of such modification or replacement.

2.3 Provision of Measured Data

2.3.1 In relation to a NTS/LDZ Offtake, the downstream DNO shall transmit measured data to Transco NTS by means of the Telemetry Connection Facilities in accordance with Section E.

2.3.2 In relation to a LDZ/LDZ Offtake, the downstream Party shall transmit measured data to the upstream Party by means of Daily Read Equipment (unless otherwise provided in the Supplemental Agreement) in accordance with Section E.

2.4 Access and Inspection Rights

2.4.1 The upstream Party shall be entitled at any time, upon giving not less than five Business Days' prior notice to the downstream Party, to inspect the Measurement Equipment (or any component thereof) and for that purpose to have access (in accordance with Section B6) to the Offtake Site.

2.4.2 Nothing in this paragraph 2.4 shall prejudice the upstream Party's right to request the Exceptional Validation of Measurement Equipment in accordance with paragraph 3.3 below.

3 Validation

3.1 General

3.1.1 In this paragraph 3:

(a) "**validation**" means validation that Measurement Equipment is reading within the Permitted Range and without systematic bias; and "**validate**" and "**validated**" shall be construed accordingly; and

(b) the "**Validation Procedures**" are the procedures established by the Parties for validation of Measurement Equipment, comprising (as applicable) the documents known as T/PR/ME2 Parts 1, 2 and 3 and T/PR/GQ/3.

3.1.2 The Validation Procedures shall be subject to review and revision by the Offtake Committee pursuant to Section N1.2.

3.1.3 Any validation of Measurement Equipment pursuant to this Section D:

(a) shall be carried out:

(i) by the downstream Party;

(ii) in accordance with the provisions of this paragraph 3 and the Validation Procedures;

(b) shall be planned and carried out as Measurement Equipment Maintenance (and in the case of Exceptional Validation, as Urgent Maintenance) in accordance with applicable provisions of Section G.

3.1.4 The upstream Party shall be entitled, but shall not be obliged, at its own cost to attend and witness any validation carried out by the downstream Party in accordance with this paragraph 3.

3.2 Routine Validation

3.2.1 The downstream Party shall carry out validation:

(a) of the Measurement Equipment installed at an Offtake, no less frequently than once every 12 months; and

(b) of any new Measurement Equipment or new or modified component of the Measurement Equipment, prior to such Measurement Equipment or component (as appropriate) being used to register or determine and record any measured data in paragraph 2.1.1 above.

3.2.2 Validation pursuant to this paragraph 3.2 is "**Routine Validation**".

3.2.3 The downstream Party shall bear the costs of any Routine Validation.

3.3 Exceptional Validation

3.3.1 The upstream Party shall be entitled to request that a validation of Measurement Equipment (or any component thereof) be carried out at any time, by notice to the downstream Party specifying the Offtake and the Measurement Equipment or component thereof to be validated and the upstream Party's reason(s) for requesting such validation.

3.3.2 Validation pursuant to this paragraph 3.3 is "**Exceptional Validation**".

3.3.3 The downstream Party shall:

(a) acknowledge receipt of a request for Exceptional Validation pursuant to paragraph 3.3.1 above not later than the required time after receipt of such request;

(b) as soon as reasonably practicable following receipt of such request and in any event within the required time after the day on which such request is received, carry out the Exceptional Validation; and

(c) notify the upstream Party of the date, time and place of the Exceptional Validation as much in advance thereof as is practicable.

3.3.4 With the approval (not to be unreasonably withheld) of the upstream Party, the downstream Party may limit the scope or level of the Exceptional Validation.

3.3.5 Notwithstanding paragraph 3.3.3(b) above, if as soon as reasonably practicable following receipt of a request for Exceptional Validation, and in any event within the required time after the day on which such request is received, the downstream Party:

(a) ceases or, where such cessation is not possible for safety reasons, minimises the flow of gas at the relevant Offtake or Individual Offtake Point, until the Exceptional Validation has been carried out; and

(b) gives notice to the upstream Party undertaking that the flow of gas has been and will be ceased or minimised in accordance with paragraph 3.3.5(a);

the downstream Party shall be entitled to defer the carrying out of the Exceptional Validation up to the permitted period after the date of receipt of the upstream Party's request.

3.3.6 For the purposes of paragraphs 3.3.3 and 3.3.5 the required times and permitted periods applicable to different Offtakes are as follows:

Relevant provision	***NTS/LDZ Offtake***	***LDZ/LDZ Offtake***
3.3.3(a)	4 hours	2 Business Days
3.3.3(b)	3 Business Days	5 Business Days
3.3.5 (required time)	3 Business Days	5 Business Days
3.3.5 (permitted time)	10 Business Days	10 Business Days

3.3.7 The costs of an Exceptional Validation shall be borne:

(a) by the upstream Party, where the Measurement Equipment (or relevant component thereof, as the case may be) is found to read without bias and accurately within the Permitted Range; and

(b) by the downstream Party, in all other circumstances.

3.4 Validation Report

3.4.1 The downstream Party shall prepare a report (the "**Validation Report**") of each validation carried out pursuant to this paragraph 3, setting out:

(a) the methodology used for the validation;

(b) the results of the validation;

(c) the steps taken or which are to be taken in accordance with paragraph 3.5 for adjustment or replacement of Measurement Equipment as a result of such validation; and

(d) any other matter required pursuant to the Validation Procedures.

3.4.2 The downstream Party shall provide the Validation Report to the upstream Party:

(a) in the case of an NTS/LDZ Offtake:

(i) no later than 14 days after the completion of any Routine Validation; and

(ii) no later than 12 hours after the completion of any Exceptional Validation; and

(b) in the case of an LDZ/LDZ Offtake:

(i) if requested by the upstream Party, no later than 14 days after the later of such request and the completion of any Routine Validation; and

(ii) no later than five days after the completion of any Exceptional Validation.

3.4.3 Unless disputed by the upstream Party in accordance with paragraph 6, the results of the Validation Report shall be binding on both Parties (including for the purposes of paragraph 3.3.7).

3.5 Post-Validation Adjustments to Measurement Equipment

3.5.1 Upon or immediately following validation pursuant to paragraphs 3.2 or 3.3 above, the downstream Party shall at its own cost ensure that the Measurement Equipment (or the relevant component thereof) is adjusted or replaced as necessary so that the Measurement Equipment (or such component) reads without bias and accurately within the Permitted Range, in accordance with paragraph 2.1.2(c) above.

3.5.2 Where the downstream Party is unable to ensure the adjustment or replacement of the Measurement Equipment (or any component thereof) upon or immediately following validation pursuant to paragraph 3.5.1 above, the downstream Party shall rectify such Measurement Equipment (or such component) in accordance with paragraph 4 below.

4 Rectification of Measurement Equipment

4.1 Fault

4.1.1 For the purposes of this paragraph 4, a "**fault**" in Measurement Equipment is any failure or defect in the Measurement Equipment or its operation or other circumstance in or as a result of which the Measurement Equipment is not reading within the Permitted Range or without systematic bias.

4.1.2 The downstream Party shall take measures to enable it to identify faults in Measurement Equipment in accordance with the standard of a Reasonable and Prudent Operator.

4.1.3 Where a fault is found in any Measurement Equipment, except where:

(a) such finding is made in the course of validation pursuant to paragraph 3; and

(b) the adjustment or replacement required under paragraph 3.5 is made upon or immediately following such validation;

paragraph 4.2 shall apply.

4.2 Steps to be taken upon occurrence of a fault

4.2.1 In the circumstances referred to in paragraph 4.1.3, the downstream Party shall:

(a) (except in the case where the fault has been reported pursuant to validation under paragraph 3) notify the upstream Party of the fault no later than one hour (or, in the

case of an LDZ/LDZ Offtake where Daily Read Equipment is installed, 24 hours) after having identified or been informed of the fault; and

(b) rectify the fault as soon as reasonably practicable in accordance with the standard of a Reasonable and Prudent Operator (and in accordance with paragraph 4.2.2 where applicable).

4.2.2 In relation to a CV-Directed Offtake, the downstream Party shall:

(a) where it is practicable for the downstream Party (acting as a Reasonable and Prudent Operator) to do so, rectify the fault within eight hours of the fault having been identified; and

(b) where it is not practicable for the downstream Party so to rectify the fault:

(i) submit to the upstream Party proposals for initiating and carrying out the rectification of such failure or error;

(ii) ensure such rectification as soon as reasonably practicable and in accordance with the downstream Party's proposals; and

(iii) cease or, where such cessation is not possible for safety reasons, minimise the flow of gas through the relevant Offtake or Individual Offtake Point until the fault has been rectified.

5 Correction and Estimation of Readings

5.1 General

5.1.1 Following validation pursuant to paragraph 3 or (as the case may be) the identification of a fault as provided in paragraph 4, readings (of the relevant Measurement Equipment) shall be corrected or estimated subject to and in accordance with paragraph 5.2 or 5.3 respectively.

5.1.2 The downstream Party shall be responsible for correcting or estimating readings pursuant to paragraphs 5.2 and 5.3.

5.1.3 Readings are to be corrected or estimated for each hour of each Day of the relevant period in accordance with paragraph 5.2 or 5.3.

5.1.4 Unless disputed by the upstream Party in accordance with paragraph 6, the corrected or estimated readings (as the case may be) shall be binding on both Parties.

5.1.5 Only measured data relating to volume or energy shall be corrected or estimated pursuant to this paragraph 5.

5.2 Correction of Readings

5.2.1 Where, on validation pursuant to paragraph 3, the Measurement Equipment (or, as the case may be, any component thereof) is found:

(a) to read with systematic bias, whether within or outside the Permitted Range, the relevant readings shall be adjusted in accordance with this paragraph 5.2;

(b) to read outside the Permitted Range but without systematic bias, no adjustment of the relevant readings shall be made and such readings shall be deemed to be correct.

5.2.2 Where the period over which the Measurement Equipment (or the relevant component thereof) was reading with systematic bias can be determined with reasonable accuracy, then:

(a) if the amount of the bias at all times during such period can be determined with reasonable accuracy, all readings over that period shall be adjusted accordingly to account for the bias within that period;

(b) if the amount of the bias at all times during such period cannot be determined with reasonable accuracy, then the Measurement Equipment (or the relevant component) shall be deemed to have read (over such period) with half the amount of the bias determined at the time of the relevant validation, and the readings over the period shall be adjusted accordingly to account for such deemed bias within that period.

5.2.3 Where the period over which the Measurement Equipment (or the relevant component thereof) was reading with bias cannot be determined with reasonable accuracy, then:

(a) the Measurement Equipment (or such component) shall be deemed to have read, over the period since the last time at which (pursuant to validation or rectification or otherwise) it was adjusted to read without bias and accurately within the Permitted Range, with half the amount of the bias determined at the time of the relevant validation; and

(b) all readings over such period shall be adjusted accordingly to account for such deemed bias.

5.2.4 The downstream Party shall, not later than 14 Days after the carrying out of the relevant validation, provide to the upstream Party the corrected readings together with an explanation of the basis on which the readings were corrected and supporting information.

5.3 Estimation of Readings

5.3.1 Where, as a result of a fault in respect of any Measurement Equipment (or any component thereof), readings are not available for any period, the required readings for such period shall be estimated in accordance with this paragraph 5.3.

5.3.2 Where the other components of the Measurement Equipment are functioning and reading without bias and accurately within their respective Permitted Ranges, the required readings shall be estimated, so far as is feasible, using data from such other components.

5.3.3 Where an estimated reading pursuant to paragraph 5.3.2 is not feasible, the required readings relating to any Day (or period within a Day) shall be estimated using data derived from gas flows through the relevant Offtake on all Days (when the Measurement Equipment or relevant component thereof was functioning and reading without bias and within the Permitted Range) of comparable demand and operating conditions over the preceding 12 months.

5.3.4 Any estimation by downstream Party shall be made to the standard of a Reasonable and Prudent Operator, and as accurately as is practicable in the circumstances.

5.3.5 The downstream Party shall, not later than 5 Days after the identification of the relevant fault, provide to the upstream Party the estimated readings together with an explanation of the basis on which the readings were estimated and supporting information.

6 Disputes

6.1.1 The upstream Party shall be entitled to dispute the accuracy of any Validation Report or any corrected or estimated reading received pursuant to paragraphs 3.4, 5.2 and 5.3 respectively by giving notice to the downstream Party not later than 14 days after receipt of the same.

6.1.2 The Parties shall, as soon as reasonably practicable after the date of the upstream Party's notice in accordance with paragraph 6.1.1 and in any event within 30 days from the date of such notice, consult together in good faith and use their reasonable endeavours to settle the dispute.

6.1.3 Where the Parties are unable to resolve the dispute within 30 days from the date of the notice in accordance with paragraph 6.1.2 above, either of them shall be entitled to refer the dispute to an Expert for determination, in accordance with GT Section A2.

7 Records and Inspection Rights

7.1 Records

7.1.1 The downstream Party shall record all measured data (including corrected and estimated data) at the intervals and in the format and otherwise as provided in Section M.

7.1.2 The downstream Party shall in addition maintain auditable records relating to the installation, maintenance, testing, operation, calibration, setting and validation of Measurement Equipment, including (without limitation):

(a) the configuration of flow computers and programmable devices forming part of the Measurement Equipment; and

(b) the results of all tests and validations carried out in relation to the Measurement Equipment.

7.1.3 The downstream Party shall retain all records of measured data for a period of no less than three years after the Day or last Day to which such measured data relates.

7.1.4 The records required to be maintained and retained under this paragraph 7.1 may be stored either:

(a) as hard copy written documents or charts; or

(b) in electronic format.

7.1.5 Records stored in electronic format shall be stored so as:

(a) to be capable of immediate access or retrieval within a period of not less than 12 months after the Day (or last Day) to which such records relate;

(b) thereafter, to be retrievable from archive within five Business Days after a request to retrieve such data.

7.2 Access to Records and Inspection Rights

7.2.1 The downstream Party shall, as soon as reasonably practicable and without charge, provide to the upstream Party on request a copy of such records maintained in accordance with paragraph 7.1 above (provided that if the upstream Party requires more than one copy, or a copy on more

than one occasion, of records relating to the same matter, the downstream Party may charge the upstream Party the costs incurred in providing such additional or further copies).

7.2.2 The upstream Party shall in addition be entitled at any time, upon giving five Business Days' prior notice to the downstream Party, to inspect the records of the measured data for any Day or Days within the preceding 12 months.

Annex D-1

Measured Data and Permitted Ranges
(Paragraphs 1.3.2, 1.4 and 2.1.1(a))

Part 1 – NTS/LDZ Offtakes

Property	Unit	Specified Range	Permitted Uncertainty Level
Instantaneous Volume Flow Rate (Note 1)	MCM/day	Per relevant Supplemental Agreement	± 1.0%
CV (for CV-Directed NTS/LDZ Offtakes)	MJ/m^3	35 – 44	± 0.1 MJ/m^3
CV (other NTS/LDZ Offtakes)	MJ/m^3	35 – 44	± 0.3 MJ/m^3
Instantaneous Energy Flow Rate (Note 1)	TJ/day	Per relevant Supplemental Agreement	± 1.1%
Pressure	barg	0 – 85	± 0.5 barg
Temperature	°C	0 – 40	± 1.0 °C
Carbon Dioxide (where applicable – Note 2)	Mole %	0 – 5	± 0.01 mole %.
Nitrogen (where applicable – Note 2)	Mole %	0 – 10	± 0.01 mole %.
Relative Density (where applicable – Note 2)		0.5 – 0.8	± 0.001
Wobbe Number (where applicable – Note 2)	MJ/m^3	45 – 55	± 0.1 MJ/m^3

Note 1: Measurement Equipment must also be capable of integrating Instantaneous Volume Flow Rate and Instantaneous Energy Flow Rate to give volume and energy flows over any period.

Note 2: These properties are applicable where they are required in relation to a CV-Directed Offtake pursuant to the arrangements made (in relation to that Offtake) for the purposes of regulation 4A of the Gas (Calculation of Thermal Energy) Regulations 1996, as amended.

Part 2 – LDZ/LDZ Offtakes

Property	Unit	Specified Range	Permitted Uncertainty Level
Instantaneous Volume Flow Rate	MCM/day	Per relevant Supplemental Agreement	Sufficient to demonstrate 'requisite metering' as defined in the Gas (Calculation of Thermal Energy) Regulations 1997 (as amended).
CV (for CV-Directed LDZ /LDZ Offtakes)	MJ/m^3	35 – 44	As determined by Ofgem in letters of approval and letter of direction
Pressure	barg	Per relevant Supplemental Agreement	±0.5 barg
Temperature	°C	0 – 40	±1 °C
Relative Density		0.5 – 0.8	±0.02

Annex D-2

Best Practice Recommendations and Standards

(Paragraph 2.2.1(c))

1. General

- IGE Meter Recommendations (IGE/GM/1 and IGE/GM/4)
- BS EN 1776 "Gas supply. Natural gas measuring stations. Functional requirement"
- ISO 5168 "Measurement of fluid flow. Evaluation of uncertainties"
- BS 1042 "Measurement of Fluid Flow in Closed Conduits"
- ISO 6976 (1995) "Natural gas. Calculation of calorific values, density, relative density and Wobbe index from composition"

2. Specific Metering Systems

- For orifice plate metering systems:

  BS EN ISO 5167 "Measurement of fluid flow by means of pressure differential devices inserted in circular cross section conduits running full"

- For turbine metering systems:

  BS 7834 (ISO 9951) "Specification for turbine meters used for the measurement of gas flow in closed conduits"

- For ultrasonic metering systems:

  BS 7965 "The selection, installation, operation and calibration of diagonal path transit time flowmeters for industrial gas applications"

  BS ISO/TR 12765 "Measurement of fluid flow in closed circuits. Methods using transit time ultrasonic flowmeters"

  AGA 9 "Measurement of Gas by Multipath Ultrasonic Meters"

- For process gas chromatographs:

  ISO 10723 (1995) "Natural gas. Performance evaluation for on-line analytical systems"

- For any other measurement system, such standards/guidelines as may be set out in Appendix C to the relevant Supplemental Agreement.