WORK PROCEDURE FOR

VALIDATION OF EQUIPMENT ASSOCIATED WITH MEASUREMENT SYSTEMS FOR THE CALCULATION OF MASS, VOLUME AND ENERGY FLOWRATE OF GAS

PART 1: GENERAL REQUIREMENTS

June 2010

June 2010

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FORWARD

This Work Procedure was approved by the Uniform Network Code (UNC) Offtake Committee on 10 June 2010 for use by managers, engineers and supervisors throughout the NTS and the DNs.

This is an Offtake Subsidiary Document as defined in Section N 1.2. of the Offftake Arrangements Document (OAD) of the UNC These documents are revised, when necessary, by the Offtake Committee in accordance with OAD N 8.5. Users shall ensure that they are in possession of the latest edition by referring to the Joint Office of Gas Transporters website.

Compliance with this document does not confer immunity from prosecution for breach of statutory or other legal obligations.

BRIEF HISTORY

First published as T/PR/ME2 Part1	March 2001	EPSG/L00/214
Editorial update to reflect demerger November 2000	June 2001	
Editorial update to reflect Safety Case version 3 taking into account issues as detailed in the comments below. Additionally, compliance with mandatory terms along with the removal of no specific normative phrases.	July 2004	
Editorial update to comply with GRM	October 2004	
Re-branded and approved by the Offtake Committee	June 2010	

DISCLAIMER

This Offtake Subsidiary Document is provided for use by the Transporters and such of their contractors as are obliged by the terms and conditions of their contracts to comply with this document. Where this document is used by any other party it is the responsibility of that party to ensure that this document is correctly applied.

MANDATORY AND NON-MANDATORY REQUIREMENTS

In this document:

shall: indicates a mandatory requirement.

should: indicates best practice and is the preferred option. If an alternative method is used then a suitable and sufficient risk assessment shall be completed to show that the alternative method delivers the same, or better, level of protection.

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PART 1: GENERAL REQUIREMENTS

INTRODUCTION

This Work Procedure has been produced to ensure that validation of gas flow metering systems is performed consistently by the Transporters.

1. SCOPE

This Work Procedure shall be used to demonstrate that instrumentation and equipment associated with measurement systems for the calculation of mass, volume or energy flowrate of gas are functioning correctly, thus ensuring that the complete metering system continues to perform within the uncertainty requirements as defined in the Gas Requirements Manual (GRM) or equivalent.

This Work Procedure forms a suite to cover the validation of differing types of metering systems installed at connections to the Transporters' above 7 bar networks:

Part 1: General Requirements

Part 2: Generic Procedures

Part 3: Flow Weighted Average Calorific Value Offtakes

Part 4: Power Stations (with Daniel S500 flow computers using firmware AGI 3V0_0)

Part 5: Very Large Daily Metered Consumers (with Flow Computers)

Parts 4 and 5 are not Offtake Subsidiary Documents and are therefore governed by the relevant Transporters outside UNC governance.

This Work Procedure is to be used by the Transporters for the following types of connection:

a) NTS to LDZ transfer

b) Inter-LDZ transfer

c) NTS supplied very large daily metered consumers (VLDMC)

d) LTS supplied very large daily metered consumers (VLDMC)

This Work Procedure may also be used to validate 3rd party measurement systems for the calculation of mass, volume and energy flowrate of gas connected to the national balancing point (NBP) in the absence of any other procedures.

2. REFERENCES

This document makes reference to documents listed in Appendix A. Unless otherwise specified, the latest editions of the documents apply, including addenda and revisions.

3. DEFINITIONS

For the purpose of this Work Procedure the following definitions apply:

FWACV	Flow Weighted Average Calorific Value
MSC	Metric Standard Conditions (P = 1.01325 bar, T = 15 C).
Relative Density	The ratio of the density of the gas to the density of air under referenced conditions.

4. GENERAL PREPARATIONS AND PRECAUTIONS

The following list is intended as a guide to the preparations/precautions that are required prior to the commencement of validation/calibration work. It is not a substitute for the local safe working practices or controls.

a) Ensure the Safe Control of Operation (SCO) procedures are followed.

b) Check the calibration records of the equipment to be checked/calibrated. Assess the calibration stability and investigate any operating problems that occurred since its last check/calibration.

c) Ensure that the latest revision of the flow computer configuration is available for use with this Work Procedure.

d) Ensure that all portable calibration/test equipment is fully charged/ready for use and covered by a current calibration certificate.

e) Where main process lines are broken/opened, ensure that a gas detector is available and suitable protective clothing is worn.

f) Confirm that suitable power supplies are available and observe work permit conditions.

5. TEST EQUIPMENT AND SOFTWARE

All test equipment used shall be have a suitable and current calibration certificate no greater than twelve (12) months old, from a facility having accreditation at the appropriate level for the equipment and ranges under test eg UKAS, verifying the uncertainty of the equipment. Details of the test equipment used for a particular test shall be recorded on the records of that test.

The test equipment required to meet the calibration/check tolerances required for these procedures is as follows:

Description

a)	Digital multimeter:	0.005% of actual reading;
b)	Low pressure Source/Tester:	0.025% of actual reading;
c)	High pressure Source/Tester	0.025% of actual reading;
d)	Decade resistance box (0 -1000 Ω):	0.02% of reading at 100 Ω;
e)	Digital thermometer:	0.25 C of actual reading;
f)	Current source:	0.05% of actual reading;
g)	Linear flow meter simulator, eg oscillator:	!0.05% of actual reading.

All software used as part of the procedures for the checking of calculations within the flow computer shall be traceable and auditable.

6. TESTING

The procedure detailed in the relevant part of this suite shall be undertaken at the appropriate interval for the item being tested.

All results shall be recorded on a test results forms and signed by the tester and, where appropriate, by a witness. All records shall be retained for future inspection and audit.

7. FAILURE OF A TEST

Where the results of a test procedure do not meet the stated pass criteria, the tester should re-check the figures that have been used in the calculations, the figures that have been entered into the flow computer and the method of testing. The test should then be re-performed.

If the test subsequently fails, the instrument in question shall be recalibrated and the test re-performed. Results of any retest shall be entered onto the test results form with a comment to explain what actions were taken.

This Work Procedure does not permit the adjustment of any differential pressure transmitters that have a footprint calibration. Failure to meet the pass criteria in these cases shall result in replacement of the failed instrument.

APPENDIX A

LIST OF REFERENCES

This Work Procedure relies on the documents listed below. All shall be complied with generally, and specific references in the text shall be strictly observed. It is the responsibility of the user to gain familiarity with these documents as necessary. Unless otherwise specified or agreed, the latest editions of these documents, including all addenda and revisions, shall apply.

Statutory Requirements

The Gas Act 1986 as amended 1995

The Gas (Calculation of Thermal Energy) Regulations 1996 and Amendment 1997

British and European Standards

BS EN ISO 12213 2005	Natural gas - Calculation of compression factor. Part 2: Calculation using molar-composition analysis Part 3: Calculation using measured physical properties
BS EN ISO 5167 - 1:	Measurement of fluid flow by means of pressure differential devices inserted in circular cross-section conduits running full. General principles and requirements.
BS EN ISO 5167 - 2:	Measurement of fluid flow by means of pressure differential devices inserted in circular cross-section conduits running full. Orifice plates.
BS 7834: 1995 (≡ISO 9951: 1993)	Specification for turbine meters used for the measurement of gas flow in closed conduits.
BS 7965: 2000	The selection, installation, operation and calibration of diagonal path transit time ultrasonic flowmeters for industrial gas applications.
BS EN ISO 6976: 2005	Natural gas. Calculation of calorific values, density, relative density and Wobbe index from composition.

American Gas Association Standards

AGA Report No. 8: Compressibility Factor of Natural Gas and Related Hydrocarbon Gases (1994)