

METER ERROR REPORTFINAL

Reconcile?	Y
Safety Issue?	N
Thesis Report No.	

1. EXECUTIVE SUMMARY

SITE NAME	Aylesbeare	
LDZ	SW	
START DATE (actual)	11th May 2010 (01:12)	
LAST GOOD DATE		
END DATE	11th May 2010 (02:47)	
SIZE OF ERROR (No reconciliation required if under 0.1%)	7,034.72 SCM over registration (equivalent to 1.129%)	
ESTIMATE – Y/N?		
ROOT CAUSE	Pressure transducer locked in over range state	
ANALYSIS	HPMIS RBD Data	
METER TYPE	Orifice Plate	
AUTHOR	S Western	
CHECKED BY	C Stock	
ACCEPTED BY UKD NETWORK		
RECONCILIATION	Distribution	Transportation

2. BACKGROUND

Gas is supplied to part of the South West LDZ, Wales & West Utilities Network, at Aylesbeare FWACV offtake. The site metering system comprises a single Orifice meter with an isolated bypass.

During a period of 1hr 35mins (01:12 to 02:47) on Gas Day 11th May 2010, for some undiscovered reason the pressure transducer locked. This caused the standard flow rate to be incorrectly calculated. The condition was rectified by turning the power to the instrument off and then back on again.

3. ERROR QUANTIFICATION AND IMPACT

The RBD data was reviewed before and after the pressure transducer (PT) locked up. The PT readings, 5 prior and 5 after, were averaged to estimate the actual pressure reading during the period of the PT locking up. See spreadsheet.

Using the HPMIS orifice plate design calculation (See Fig. 1a & 1b) together with the 4 minute RBD and gas composition data the volume flow for each 3/4/5 minute period was calculated. In each instance, the volume flows for the locked up PT and the estimated PT reading were calculated. By comparing these calculated flows over the period of the PT locking up it was estimated that orifice metering system over-registered 7,034.72 scm of gas.

From HPMIS, the Dvol for Gas Day the 11th of May 2010 was 0.622946mscm so the over-registration equates to 1.129% of Dvol. See spreadsheet.

Fig. 1a - HPMIS screen shot for flow calculation using locked pressure value (01:12).

Orifice Plate Meter Design (ISO5167(BS EN 1042)) and Deflection Calculations

Site: AYLESBEARE OFON
Stream: MTA

Site Design Capacity: 2.928 mscmd Design Mode: Flowrate RBD Approved Design

Design Conditions

Site Operating Pressure: Max 70.0000 BarG, Min 38.0000 BarG
Temperature: 8.766 °C
Pressure: 87.6116 BarA
Diff. Pressure: 3.80 mBar

Gas Properties

User Defined Calculated

Gas Density: 85.5791400 kg/m³
Isentropic Index: 1.469
Viscosity: 134.7 µPoise
Calorific Value: 39.199 MJ/scm
Relative Density: 0.62488
Air Density: 1.22541 kg/scm

Dimensions

Temp Corrected Dimensions Drain Hole Correction

Drain Hole: No
Drain Hole Bore: mm

Certified Dimensions: Pipe Diam. 304.800 mm at 19.00 °C, Orifice Diam. 169.085 mm at 19.00 °C, Beta Ratio 0.5547

Corrected Dimensions: Pipe Diameter mm, Orifice Diameter mm, Beta Ratio

Plate Expn Coeff: 1.60E-05 /°C Pipe Expn Coeff: 1.10E-05 /°C

Flow Rates

Gas Design Flow Rates: Mass Flow 13,091.31 kg, Volume Flow 17,096.50 scm, Energy Flow 670,173.13 MJ

Meter Operating Flowrate: Max 2.928000 mscmd, Min 0.000000 mscmd

Buttons: List Designs, Save Design, Delete Designs, Calc Flowrate, Upstream Temp Correct, Calculate Gas Properties, View History, Plate Deflection, Comment

Fig. 1b - HPMIS screen shot for flow calculation using calculated average pressure value (01:12).

Orifice Plate Meter Design (ISO5167(BS EN 1042)) and Deflection Calculations

Site: Stream: ...

Site Design Capacity: mscmd Design Mode: RBD Approved Design

Design Conditions

Site Operating Pressure: Max BarG Min BarG

Temperature: °C

Pressure: BarA

Diff. Pressure: mBar

Gas Properties

User Defined Calculated

Gas Density: kg/m³

Isentropic Index:

Viscosity: µPoise

Calorific Value: MJ/scm

Relative Density:

Air Density: kg/scm

Dimensions

Temp Corrected Dimensions

Drain Hole Correction

Drain Hole:

Drain Hole Bore: mm

Certified Dimensions

Pipe Diam.: mm at °C

Orifice Diam.: mm at °C

Beta Ratio:

Corrected Dimensions

Pipe Diameter: mm

Orifice Diameter: mm

Beta Ratio:

Plate Expn Coeff: /°C Pipe Expn Coeff: /°C

Flow Rates

Time Base:

Gas Design Flow Rates:

Mass Flow: kg

Volume Flow: scm

Energy Flow: MJ

Discharge Coeff.:

Reynolds Number:

Meter Operating Flowrate

Max: mscmd

Min: mscmd

4. RECOMMENDATIONS AND LEARNING

HPMIS (RBD data) should be monitored to identify any such future errors. Should the error re-occur an assessment of the transmitter may be required to ensure its integrity.

REFERENCES

- ISO 5167
- HPMIS database

VERSION HISTORY

Version	Changes	Author	Date
Rev0	First issue	S Western	25/06/10