Base Load Power Hub (BLPH)

ULTRASONIC FLOWMETER

FAT (FINAL ACCEPTANCE TEST) PROCEDURES - ULTRASONIC FLOWMETER

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Baker Hughes

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HOLDS LIST

No.	Description
1.	
2.	
3.	
4.	

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1.0 Scope

This document defines the Factory Acceptance Test (FAT) procedure to be followed by the Baker Hughes Gas Flowlab for all ultrasonic gas flowmeters.

2.0 EQUIPMENT / DOCUMENTATION REQUIRED

Automated Flow Loop System
Flowmeter User's Manuals

3.0 OVERVIEW

The flowloop used by Baker Hughes to test all manufactured ultrasonic gas flowmeters consists of a 500mm diameter closed loop pipe section, transducer installation spoolpiece, reference meter and automated control system. Refer to Appendix A for schematic layout of the system. The flowtest medium is air, flowing at atmospheric pressure and room temperature.
The reference meter is calibrated every 24 months by an accredited calibration facility. The certificate of calibration is available to view at Baker Hughes during FAT.
The objective of the FAT is to determine if the flowmeter and transducers are in full functional condition prior to shipping the order. i.e. that there are no component failures in the flowmeter, either electronic / pcb issues or transducer signal issues.

4.0 FAT Procedure

Each FAT consists of testing the ultrasonic flowmeter console along with its allocated transducers on the Baker Hughes 20" gas flowloop system. The transducers are set up on the transducer installation spoolpiece as required for the particular instrument undergoing test and the console is connected to the control system. The flow test consists of taking and recording four active flow test points and checking two zero flow points in the following sequence:

Test Point	:	**Velocity (m/s)**	
1	:	Zero Flow	(***Checked by test system, but results not recorded)***
2	:	3.0	
3	:	6.0	
4	:	9.0	
5	:	12.0	
6	:	Zero Flow	(***Checked by test system, but results not recorded)***

Six flow measurement readings are taken at each flow point and the flowmeter output reading is compared with the Reference meter output. On 2-path systems, each channel is tested independently. After each test has been completed a test report, as presented in Fig 1 below shows the results format that is produced. The acceptance criteria for the test is + / - 10% deviation from the Reference meter reading. The Zero Flow conditions are just checked by the test system, but no Zero Flow results are reported as per the sample image below:

Fig. 1

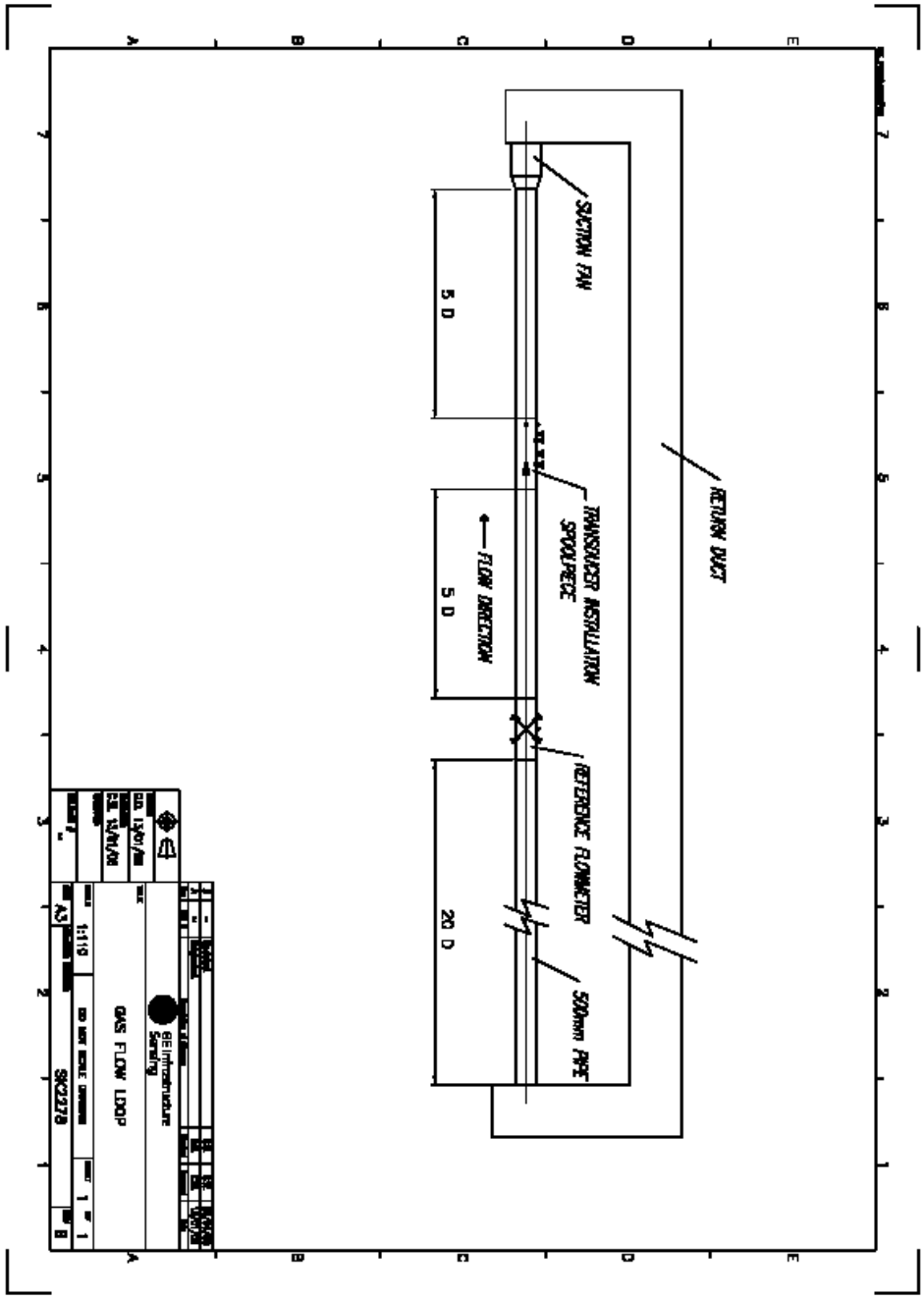
Time Stamp	Reference m/s	Flowmeter m/s	Flowmeter Error m/s	Flowmeter Error (%)
11:50:20	2.98	3.07	0.09	3.02
11:53:23	6.03	6.23	0.20	3.32
11:56:25	8.98	9.17	0.19	2.12
11:59:27	12.09	12.25	0.16	1.32

[The 10% criteria is used, as in many cases the transducers will have been designed for a different size pipe (i.e. not a 20” dia) so the transducer will be out of the desired position in the 20” flowloop pipe. Additionally the absence of process pressure, temperature and process gas etc, add a degree of uncertainty]

After the FAT has completed successfully, the instrument is programmed with the required specific dimensional data (i.e. path length, axial dimension and pipe diameter / wall thickness data) ready for field installation.

Appendix A

Gas Flowloop Schematic



APPROVALS / REVISION RECORD

REV NO.	PARA. NUMBER	REVISION	DCO NO.
A	ALL	Initial Release	
B	Appendix B	Removed original Appendix B, sample calibration certificate.	1868
C	Section 4 (previously section 6)	Section 6 edited to clarify the report format and the state that Zero Flow conditions are checked during testing. But no Zero Flow results are reported.	2166
	Throughout	Removal of redundant information and changed references from GE/GE Sensing to Baker Hughes	
	Approvals table	Updated the Approver Role name to more relevant roles in the business now; Q.A. Manager to Quality and General MGR to Subject Matter Expert / Area Manager	
D	3.0	Reference meter calibration changed from annually to every 24 months	2296

APPROVALS

REV	SIGN/DATE	SIGN/DATE	SIGN/DATE
D	Eoin Barron 28/Feb/2024	Niamh Cahalan 28/Feb/2024	Jody Bleach 28/Feb/2024
C	Robert Price 03/06/2021	Niamh Cahalan 9-July-2021	Tom O'Connor 24/06/2021
B	John Hickey 06/07/2015	Niall Mahony 06/07/2015	N/A
A	Noel Broderick 04/04/2012	Niamh Kinsella 04/04/2012	Paul Sheahan 04/04/2012
	PREPARED BY	**QUALITY**	**SUBJECT MATTER EXPERT / PROCESS OWNER**