CALIBRATION AND WITNESSING OF EFM DEVICES

ACADIANA FLOW MEASUREMENT SOCIETY 1999

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INTRODUCTION

The oil and gas industry has evolved immensely in the past ten years. One of these improvements has been the widespread use of electronics in the custody transfer area. Many companies are installing EFM as a replacement to chart based systems. Several factors are behind this change in equipment. The most obvious is the increased accuracy over chart based systems. EFM has an overall estimated accuracy of 0.25 percent versus the customary 1.0 percent of a chart recorder. EFM also offers the ability to communicate remotely to the measuring device enabling timely data acquisition, alarm notification, remote well opening and closing, and a host of other options.

CALIBRATION OF EFM DEVICES

Due to the increased accuracy of EFM, calibration equipment should be more accurate as well. Equipment used in the calibration of EFM devices should be a minimum of 2 times as accurate as the devices being calibrated. Calibration equipment should also be checked and calibrated on regular intervals to ensure the highest accuracy in the EFM devices. Since many manufacturers are producing electronic flow computers and transmitters, this paper recommends technicians be adequately trained on any devices they will be calibrating as per the manufacturer.

CALIBRATION PROCEDURES

This paper will not attempt to give specific direction on calibration since manufacturer recommended procedures vary. It will give some basic guidelines for the technician to follow.

1. Ensure calibration equipment has been checked for accuracy.
2. Check unit for leaks and repair any found prior to verification.
3. Lock all analog values prior to taking the flow computer out of service.
4. Remove unit from service.
5. Perform a verification check of the differential and static using a minimum of 6 points. All checkpoints should be logged into the audit trail.
6. Perform a verification check of the temperature using flowing temperature or a decade box. All checkpoints should be logged into the audit trail.
7. If the flow computer's analog values do not match the output of the calibration equipment, then a calibration of that input is necessary.
8. Calibrate, if necessary, using the manufacturer's recommended procedures.
9. After calibration, perform an "as left" verification of the input which was calibrated, logging all checkpoints into the audit trail.
10. Inspect the orifice plate and sealing ring for any damage.
11. Return unit to service, unlock all inputs and monitor values to ascertain the unit is functioning correctly.
12. Update any data needed such as gas composition, new plate size, etc..
13. Collect data for audit trail and post calibration printout.

WITNESSING OF EFM

The technician responsible for the witness of a custody transfer EFM device should be as knowledgeable about the device as the person calibrating the unit. An effective witness will ascertain

that the person calibrating the unit is capable of doing so, and that all industry accepted procedures are followed. He or she should also verify that the calibration equipment being used is a minimum of 2 times as accurate as the device being calibrated and the equipment has been recently checked for accuracy.

WITNESSING PROCEDURES

The witness should make certain all calibration guidelines above are followed. The witness is there to represent his or her company to assure the unit is calibrated and functioning correctly. This should be done in a professional manner. This can be accomplished by having knowledge about the unit which is being calibrated. The following guidelines are recommended for witnessing purposes. The witness is to ascertain the technician calibrating the unit performs the following:

1. Ensure calibration equipment has been checked for accuracy.
2. Make certain no leaks are present.
3. Lock all analog values prior to taking the flow computer out of service.
4. Remove unit from service.
5. Perform a verification check of the differential and static using a minimum of 6 points. All checkpoints should be logged into the audit trail.
6. Perform a verification check of the temperature using flowing temperature or a decade box. All checkpoints should be logged into the audit trail.
7. If the flow computer's analog values do not match the output of the calibration equipment, then a calibration of that input is necessary.
8. Calibrate, if necessary, using the manufacturer's recommended procedures.
9. After calibration, perform an "as left" verification of the input which was calibrated, logging all checkpoints into the audit trail.
10. Inspect the orifice plate and sealing ring for any damage.
11. Return unit to service, unlock all inputs and monitor values to ascertain the unit is functioning correctly.
12. Update any data needed such as gas composition, new plate size, etc..
13. Collect data for audit trail and post calibration printout.
14. Request a printout of the events and characteristic files and check for accuracy.

CONCLUSION

The calibration and witnessing procedures for EFM devices are very similar to those employed for chart based systems. Whether calibrating or witnessing, the technician needs to have a working knowledge of the system being verified. This includes the calibration procedures as well as the internal components of the flow computer. The technician should be able to trouble shoot and repair the unit from the orifice fitting to the solar panel. He or she also has to know how the unit calculates the volume it is measuring. This can only be accomplished by education and day to day work.

All technicians who work on EFM devices should be aware of the API documentation which is discussed in API Chapter 21.

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