

FROM PEN TIP TO VOLUME STATEMENT

David Pulley

Metron Gas Measurement

P.O. Box 2029, Tyler, TX 75710

INTRODUCTION

Accurate and reliable gas measurement depends on a combination of efforts from two groups of people. First, we have the *field personnel*. They have the responsibility of seeing that a readable chart is produced and that all information pertinent to volume calculation is supplied to our next group, which is the *office personnel*. This group will read the chart, apply information supplied by the field, calculate the amount of gas delivered, and generate and deliver volume statements to the customer.

It must be recognized that the office group can not calculate volumes until it receives the charts and other required data from the field, and that the volumes are only as accurate as the data received.

With this in mind, let's look at the two separate groups and see the team effort involved in producing accurate and reliable measurement from Pen tip to Volume Statement.

FIELD SERVICES

To produce accountable volumes, it is imperative to receive the correct information from the field. This is obtained from the Field Measurement Technician who submits an installation and/or inspection report on the metering station that he is testing or placing in service. Listed below is the data that must be furnished to the office group before an orifice meter chart can be read and the volume calculated accurately.

FIELD DATA REQUIRED

1. Station Name and I.D. number
2. Meter tube inside diameter size
3. Orifice Plate size
4. Tap connection (flange or pipe)
5. Differential and Static ranges of the meter
6. Temperature range (if recorded) or an estimate of flowing temperature.
7. Chart rotation (7 day, 8 day, 24 hour, etc.)
8. Gas Analysis for gravity, BTU and FPV calculation
9. Correct Dates and Times

It is also important to know if there are any problems with the equipment, meter calibration or outside influences that would affect accurate measurement. Some examples are as follows:

1. High or Low differential zeros
2. Fast or slow clocks
3. Wrong orifice size
4. Orifice in backwards
5. Pulsation
6. Liquid in line
7. Blown Bellows
8. Freezing causing erratic pattern
9. Etc.

If the technician notices any of the above, then it should be noted on the chart or field inspection report to the attention of the office personnel.

If the information supplied to the measurement office is not correct, or is incomplete, then reported volumes are unaccountable. Therefore, it is vital for the field personnel to work closely with the office personnel to determine what is needed to produce accurate volumes.

RECEIVING AND PROCESSING CHARTS

Once the measurement office receives the above information, then master files are set up for all involved meter stations. These master files are then updated on a regular basis from new information received via field reports, gas analysis, etc. Once all master files are in place and correct and current information has been entered, then we are ready to start processing charts.

The actual step by step procedures for processing charts may differ from company to company, but the basics are generally as follows:

CHART CENSORING

1. Receive and Identify stations
2. Put in processing order and verify information against the master files.
3. Censor for incorrect dates, times or erratic patterns
4. Check meter inspection reports for any information that would effect calculation.
5. Highlight any changes or notations for chart integrator.
6. Send to Integration Department

CHART INTEGRATION

The chart is placed on the integrator processor and an operator traces the original differential and static recordings. The integrator count or index represents the

square root of the differential times the square root of the static pressure over time; the result is the chart extension:

$$\text{Chart Extension} = \sqrt{Hw \times Pf} \times T$$

Where:

Chart Extension = Integrator Reading

Hw = Differential Recording

Pf = Absolute Pressure Recording

T = Chart Rotation

I think it is important to note here that the personnel at this level are a vital part of the overall process. It is extremely important for them to have gas measurement knowledge and proper training. Accurate integration of a chart is more than just tracing lines. The operator must also be able to recognize flow pattern irregularities such as meter freeze, fast or slow clocks, orifice plate changes, etc. If the process breaks down at this level, the overall process is affected.

VOLUME CALCULATION

Once integration of the charts is completed, then the integrator extension and field data are used to calculate a gas volume for the chart period.

VOLUME STATEMENT

The calculated volumes are censored for any discrepancies or unusual fluctuations in flow rate. Once satisfied, then a Volume Statement is generated. The purpose of this statement is to furnish the customer with a report on volume of gas delivered for a particular measurement station during a specific period of time. This statement is compared to master file information and against any special instructions that were noted by the field. If everything is correct, then the statement is sent to the customer and the month is closed out.

CONCLUSION

As stated above, the overall measurement process is a team effort that begins in the field before the pen tip is ever placed on the chart and ends with the generation of the volume statement. Therefore, it is essential to have good communication between the field technicians and the office personnel to keep the overall process smooth and accurate.



David Pulley