

FIELD TESTING BY TRANSFER PROVING An Explanation of the Techniques and Procedures

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INTRODUCTION

Aristotle once said, "Science begins and ends with Measurement." Without question, measurement is a function that truly influences the economics of the gas industry. This is true because the revenue of the industry, for the most part, is determined by the registration from meters. This is why it is said that meters are the "Cash Registers" of the business. Therefore, it is essential for service companies such as Reliant Energy to prove or test each meter. Transfer Proving is a portable method of meter performance testing. The methods to prove meters must continually be improved to assure accuracy of revenue at the lowest feasible maintenance costs.

HISTORY

During the early years there were many methods used for testing. Low pressure flow testing was used where the pressure was under 15 P.S.I.G. (pounds/square inch gauge). The critical flow orifice testing was used for 15 P.S.I.G and above. Both processes required many manual processes utilizing complicated calculations and equipment. Both methods used multiple metal orifice plates cut to specific sizes used in order to test the meter at multiple capacities. The long list of required and costly equipment included orifice plates, nipples, an orifice span wrench, manometers, a stop watch, gauges and many factor charts. Not only were these methods costly, but processes were complicated and time consuming. Flow charts were used to calculate the flow differential to find out if the meter was in proof. As time progressed, another method used was the rotary meter prover on a cart, similar to the model 3, which comes equipped with a console, pressure sensor, temperature probe, built in gauges and a hand throttle to set the flow rate. This method still required a minimal number of cumbersome calculation charts.

Our session today will go over a program of field testing used today with an emphasis on six fundamental components required for successful testing.

- The Skilled Measurement Technician
- Portable Test Equipment
- The Basis For Scheduling
- Pre-Work
- Testing
- Document Management

THE SKILLED MEASUREMENT TECHNICIAN

The field measurement technician of today must be an expert. He must possess natural mechanical aptitude and ability, have a knowledge of the laws and principles that apply to gas measurement, and a thorough knowledge of the instruments used for gas measurement. He must be familiar with Company policies relative to this function and because his work involves contact with customers, he must also have high customer service skills.

PORTABLE TEST EQUIPMENT

The transfer prover of today has simplified this method significantly. It has done away with many of the gauges and other equipped mentioned earlier. Today's prover comes equipped with a computerized method to run the tests. Temperature probes and pressure sensors are connected from the meter to the prover. The programs, which run on a laptop computer, calculate the temperature, pressure and flow differential of the meter. The laptop has the capacity to input pre-configured test rates to test all types and sizes of meters with a simple keystroke.

BASIS FOR SCHEDULING TESTS

The gas industry's revenue is dependent on the price of gas and the volume of gas delivered. This fact prompts a basis for scheduling meter testing on mileage or volume of gas used/delivered. Volume or usage reports provided by the billing department are used to schedule testing of meters. All companies set their own standards for performance testing based on volumes. Reliant Energy's standard is 40,000 MCF.

Another basis for meter testing is time elapsed since the last test. Meters that do not meet volume basis requirement for testing are tested every four (4) years. Improvements in meter design and refinements in the meter testing equipment have contributed to the "stretching" of the volume basis and extension of the time basis testing.

Of course there are exceptions to everything. Transfer proving is no different. Performance testing every three (3) months is oftentimes a requirement of clients with large volume contractual agreements. Another exception is the Standby Meter. Standby meters typically serve emergency generators. These meters are tested once every seven (7) years.

PRE-WORK

Customer Service Plus — For our business our Customer is #1. Without the customer, the company doesn't exist. This is why creating goodwill is so important. Goodwill is selling the client on your company's worth, reputation, friendliness, integrity and competence. You want the recipient to think well of the company and to keep it in mind for future purchases and service contracts. Remember, your competition knows that today's goodwill ensures tomorrow's profits. It is important, upon arrival, to notify your customer of what you will be doing. Transfer proving requires unsightly equipment with large hoses running across the customer's property. With some businesses, timing and cosmetics are important to the customer. A restaurant may be sensitive to us proving the meters during their peak times. Making the customer a part of the process maximizes Goodwill. Always put the customer first.

Safety First — Always check for potential hazards. When working with Natural Gas you are dealing with a substance in a gaseous state, which can be very flammable. Simple precautions can be taken to minimize combustibility. Natural Gas, as you know, has an odor to it. Because a purge, which is part of your **Pre-Work**, is necessary, notifying the client prior to your testing is vital. Also, making sure you don't get any gas in the return air ducts can avoid a panic. Even a small amount of gas can wreak havoc. Be aware of electrical boxes in the vicinity. A spark from an electrical box can be devastating. To minimize danger in these circumstances, you can attach a hose to the valve on top of the meter and burn the pressure down. Make sure to get the hose above head and away from the building, return air duct and/or electrical box and let the gas rise straight up into the atmosphere. Now you are ready for your pre-test work.

Pressure Reading. An inlet and outlet pressure reading are necessary to determine the direction of the flow of gas. Once you find the downstream side of the meter,

you can begin your By-Pass procedure. Use the $\frac{1}{4}$ " valve on top of the meter to purge the meter. If necessary, attach a hose as mentioned above to burn the pressure down. Check the valves for leaks. The two isolation valves must be checked to ensure test accuracy. Gas seeping through your valve will effect the integrity of your test. A leak also creates the potential for a flash fire since the blowers are sparking. If all is clear, you are Ready for Testing.

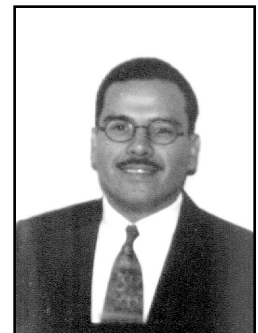
TESTING

1. Attach the prover hose to outlet side of meter. The prover pulls a vacuum to the test meter.
2. Verify test valves are open.
3. Center pick-up head over meter wiggler.
4. Verify temperature probe is properly installed to inlet side of meter.
5. A pressure sensor must be attached to both sides of the meter (inlet & outlet).
6. Check connectors and power sources and start the prover on a purge cycle first to prevent flash fires.
7. Begin the test.

DOCUMENTATION

Collect and save the test data on the laptop. The information is downloaded onto the Division Office Gas Measurement Computer. The meter data is also kept in the Houston General Office Chart Department in our permanent archives.

Meter data includes pertinent information such as make, size, manufacturer's number and other details of the meter and measurement equipment, together with test schedule dates, contract provisions affecting measurement, and data relative to the customer's operations. The field laptop is updated on a daily basis. This data will be referenced on the next performance test.



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