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|  | SPECIFICATION GUIDE FOR | Date: 1-2012 |
| | REHABILITATION SERVICES FOR PRESSURE VESSEL TYPE PRIMARY ELEMENTS Specification# PFS-Rehab PV | Presented By: Bruce Briggs |

SPECIFICATION FOR FIELD/FACTORY REHABILITATION OF CAST OR DUCTILE IRON VENTURI METERS

1.01 SCOPE OF SUPPLY

- A. Rehabilitation work shall be done by a manufacturer of venturi meters who has demonstrated experience in the evaluation for and execution of the work necessary to determine if the meter is a candidate for rehabilitation as well as the experience to direct such work. The term "rehabilitation provider" refers to organization performing the physical work. The term "venturi meter expert" refers to the individual who has at least 20 years of experience in the design, building, testing and execution of rehabilitation work. In addition, the venturi meter expert company shall have a valid and current ISO 9001 quality certification. No exceptions to this requirement will be allowed.
- B. The venturi meter manufacturer shall provide documentation that demonstrates expertise in these areas to the engineer prior to any work.

1.02 INITIAL FIELD EVALUATION

- A. Each venturi meter shall be field evaluated by the venturi meter rehabilitation expert. This evaluation will take the form of an external and internal inspection of each meter proposed for rehabilitation in order to determine the following:
 - 1. That rehabilitation will result in a meter that has an installed accuracy of at least ____% of actual rate of flow. Specific types of meters that have been proven to be poorer in new condition than the stated accuracy requirement shall not be considered candidates for rehabilitation unless by prior consent of the owner/engineer.
 - 2. If the meter has original design flaws such as annular chambers, the provider shall advise the engineer of any limitations both in terms of successful rehabilitation, in-service reliability or long term life expectancy.
 - 3. That the basic overall internal and external condition of the meter will likely result in a successful rehabilitation in terms of extending the useful life for at least ____ years.

4. The rehabilitation provider shall provide the engineer with a detailed report concerning the above noted areas as well as a statement qualifying any concerns with the proposed work.

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5. Based on the field evaluation, the provider shall provide the engineer with cost and time options for performing the rehabilitation work as follows:
 - a. Rehabilitation in the field (if possible) and under the direction and full responsibility of the rehabilitation provider.
 - b. Removal of the meters to a re-manufacturing facility to include re-work of any portion of the meter and any risks associated.

1.03 FIELD REHABILITATION

- A. If field rehabilitation is determined to be the acceptable, cost effective conclusion, the rehabilitation provider shall submit written procedures to the engineer for approval. Included with each procedure, the provider shall detail all materials that will be used (coatings, et/c).
- B. Procedures shall detail the following major points:
 1. Instructions on the proper removal of the meter.
 2. Description of the proper environment within which the work should be executed.
 3. Environmental safeguards concerning contaminated and hazardous materials handling.
 4. Interior and exterior cleaning.
 5. Preparatory work prior to coating.
 6. Polishing and buffing procedures.
 7. Interior and exterior primer and finish coating.
 8. Inspection of critical cross sections and matters related to their integrity.
 9. Final inspection and measuring.
- C. The rehabilitation provider shall submit a revised operation and maintenance manual which includes the following components:
 1. Revised shop order form which provides important performance information.

2. Revised flow calculation based on the as-rehabilitated meter tolerances.
3. Revised as built drawing reflecting all critical tolerances.

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4. Revised rate of flow vs differential curve and tabulation for the range of flow rates as determined by the engineer.
5. Statement of expected accuracy based on a review of the original manufacturers technical literature, a knowledge of the performance of the meter and a full review of the actual piping conditions in which the meter is installed.
6. Statement of expected life.

1.04 FACTORY REHABILITATION

- A. If it is determined that the meter is not a candidate for the field rehabilitation procedure as noted above, a written procedure list shall be provided to the engineer for approval (see 1.03B) and shall also include any expected machining or mechanical work that the provider deems necessary.
- B. In cases where the rehabilitation work includes the removal and replacement of any portions of the meter (throat, inlet tap bushing, etc) a summary of this work shall be provided to the engineer for approval along with an estimate of the risks involved in performing it.
- C. No further work will be performed without the written approval of the engineer.
- D. Once the work is completed, a new operation and maintenance manual shall be provided per para. 1.03C.
- E. A new name plate with current dimensional data shall be affixed to the top of the inlet flange. If the original nameplate is available, it shall also be attached but the new nameplate shall state that "This is the revised dimensional information" along with the date that the rehabilitation work was completed.

1.05 SPECIAL SITUATIONS

- A. Meters which are judged to be candidates for rehabilitation but contain either internal components or add-on equipment that is not conducive to long term, reliable performance shall be evaluated by the venturi meter expert for alteration.

- B. Meters with annular chambers which have become partially or fully plugged shall be evaluated by the venturi meter expert to see if a conversion to single tap pressure sensation or sealed diaphragm technology applies.

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- C. Rate of flow controllers that have built-in butterfly valves shall be evaluated for installed performance if the valve portion is abandoned and the valve located at an alternate location. In this case, if the valve is re-located the venturi meter expert shall provide the engineer with a revised system K-factor performance curve which shows the position of the valve disc in relation to the system headloss. In cases where the meter is a filter effluent rate controller, the entire filter system hydraulic grade line shall be analyzed and the performance of the rehabilitated meter incorporated into the hydraulic profile.

1.06 FIELD INSTALLATION AND CALIBRATION OF SECONDARY INSTRUMENTATION

- A. The rehabilitation provider shall direct the contractor's installation of the meter and certify that it has been properly installed to provide the stated accuracy.
- B. The contractor shall use only new bolts, nuts, washers and gaskets as prescribed by the engineer.
- C. Once the meter has been installed, the venturi meter expert shall direct a field calibration of the secondary instrumentation (DP transmitter) using a manometer. The test shall include zero and span check and re-set as well as manometer readings over at least 6 flow rates.
- D. Once the calibration of the transmitter is complete, a certified calibration report shall be provided to the engineer as part of the operation and maintenance manual.

END OF SPEC...

