

Review of the EN 1434 flow disturbance test and its ongoing development

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This lecture contains the results of an ongoing joint WIPANO research project between Physikalisch-Technische Bundesanstalt (PTB) and Wärmemähler-Service GmbH (WSG). In accordance with the project approach, the presentation is divided into two parts. The first aim of the project is to assess the necessity for an extension of the flow disturbance test in the heat meter standard EN 1434. As of now, the test is conducted using the asymmetric swirl generator alone. The second aim of the project is to develop a disturbance generator that can realistically reproduce a 90° bend in the near field range.

The first part is a comparative study on the measurement deviation of heat meters downstream of bend configurations and the asymmetric swirl generator. It contains a large number of test results with different heat meters in DN 15 and DN 25. In previous works, the need to expand the scope of testing for heat meters was demonstrated based on performance indicators and the investigation of an ultrasonic meter and an electromagnetic meter. For the revision of the flow disturbance test of EN 1434, however, it was demanded as a necessary requirement by the TC 176 / WG 2 at the CEN to place the experimental investigations on a broader basis. For this reason, the WIPANO project includes measurements carried out at WSG with ten different heat meters from market-relevant manufacturers in the nominal diameters DN 15 and DN 25. As a state-approved test center for heat meters (KNW1), WSG has an optimised test bench on which many commercially available heat meters can be tested. These meters are exposed to the flow conditions downstream of a 90° bend, a double bend out-of-plane and the asymmetric swirl generator at various flow rates and distances on a WSG test stand. In the proposed lecture, these results will be presented and evaluated with regard to a possible extension of the flow disturbance test in EN 1434.

Part two of the presentation deals with the conception of the new disturbance generator that is designed to reproduce the flow properties in the close vicinity of a 90° bend. Its development is based on a combination of experimental and numerical methods. The new disturbance generator is intended to complement the existing scope of testing in the standardised flow test from 2025 to enable a justified approval for heat meters without the need for a straight inlet section upstream. This will lead to greater transparency and more accurate billing. It will also protect consumers from inferior, fault-prone meters. On the other hand, manufacturers of water and heat meters will have a standardized tool to optimise their own meters with smaller measurement deviations.