New primary standard facility *Bell Prover* for calibrations of gas meters and sonic nozzles

At the end of October 2016 a new standard facility *Bell Prover* was put into operation and also assessed by Czech Accreditation Body. *Bell Prover* will serve as the primary standard in the field of gas flow. It is planned that it will be declared as the national standard at the beginning of 2017. *Bell Prover* allows calibrations of standard gas meters and of gas flow meters that are used by authorized metrological centers and by manufacturers of these instruments not only in Czech Republic but also abroad. Calibrations of sonic nozzles up to 280 m3/h can be also performed with this facility. *Bell Prover* can operate in two modes. In “sinking mode” the measurement uncertainty is in ideal case U(k=2)=0.07 % which is the one with the lowest measurement uncertainties in this field of measurement not only among European metrology institutes. In the “rising mode” it is possible to set the inlet pressure up to 6 bar for some meters under test and to reach the uncertainty of measurement U(k=2)=0.15 %. These measurement uncertainties have been confirmed by interlaboratory comparisons conducted in August 2016 among existing national standards of Czech Republic and the PTB and new Bell Prover.

The test facility *Bell Prover* will also participate in the project EURAMET no. 1396. Other comparison tests between PTB and this Bell Prover and oil stability and other properties tests of the oil used in Bell Prover will be performed during this project, too.

In November 2016 colleagues from the Polish National Metrology Institute (Główny Urząd Miar) will arrive in the framework of *TC-Q EURAMET* to perform a peer review assessment of department no. 5012 in CMI Pardubice where Bell Prover is installed. This should help to include the Bell Prover in the database of calibration and measurement capabilities (CMC) in web site of BIPM <http://kcdb.bipm.org/AppendixC/default.asp>.

The technical parameters of Bell Prover:

minimum flow rate: 0.5 m3/h

maximum flow rate: 280 m3/h

medium: air

working volume: up to 1.5 m3

temperature range: (18 - 24) °C

inlet pressure in a rising mode: up to 6 bar

uncertainty in sinking mode: U(k=2) = 0.07%

The construction of the facility is made of stainless steel including the connecting pipes. Before installation a bell with a diameter of 1.4 m was geometrically evaluated in PTB every 5 mm of its working height of 1.6 m. During the tests of gas meters the temperature of the air under the bell is continuously measured and correction to the thermal expansion of the material of bell is calculated. The shift of the bell is measured using two incremental rulers with a resolution of 0.001 mm.

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Construction of *Bell Prover:* Control unit of *Bell Prover*:

 