Recent Innovations in the field of traceable calibration of liquid milli-flow rates with liquids other than water

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Milli-, micro- and nano-flow calibrations are important in several areas of pharmaceutical, flow chemistry and health care applications where volumetric dosage or delivery at given flow rates are crucial for the process. After developing a facility for the micro-flow range, METAS has developed a facility to extend its international traceability for flow rates up to 100 ml/min with uncertainties of 0.1 %. The flow generators are homemade syringe pumps which allow measurements with liquids other than water in the range from 100 ml/min down to 100 nl/min. Traceability is guaranteed through the calibration of the generated flow rates of the syringe pumps by means of the dynamic gravimetric method where a liquid of well-known density and a well-controlled evaporation rate is used. Up to now, water has been used to perform these calibrations. The possibility to replace the water by oil with traceable properties will be investigated in the future with respect to its applicability. As the syringe pump is a volumetric flow generator, it can be operated with any liquid acting as a transfer standard to perform calibrations of flow meters. The design of the milli-flow facility will be discussed as well as first measurement results of flow meters and flow generators using other liquids than water.