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Development and first investigations of a new static expansion system based on aluminum technology

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The static expansion method is a well established method for realizing the pressure scale in medium and high vacuum by a fundamental method. The main component of uncertainty of the generated pressure in such a system is due to the temperature uncertainty of the vessels involved during an expansion. Stainless steel is a relative poor heat conductor so that considerable gradients of temperature can develop across a larger vessel. For this reason, PTB is developing a new static expansion system based on aluminum. First results indicate that the temperature uniformity of the vessel is greatly improved compared to stainless vessel under the same conditions. This justifies the expectation that the total uncertainty of the realized pressures will be considerably reduced. First results of temperature measurements and expansion ratio determinations will be presented.

In addition, the new system shall be completely automated. The concept of this automation will also be presented.

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