DKD-R 5-4

The guideline describes how dry block calibrators can be calibrated and their measurement uncertainty determined.

3.1 Axial temperature homogeneity along the bore in the measurement zone (δt_B) A

Measurements are taken both at the bottom of the adapter sleeve and at a distance of 20 / 40 mm.

SIKA Air Shield Insert:
Best results thanks to excellent axial temperature homogeneity

3.2 Temperature differences between the bores (δt_R) B

The radial temperature difference is determined between the bores which are apart.

SIKA Air Shield Insert:
Patented centering of the temperature adapter sleeve for unsurpassed temperature homogeneity

3.3 Influence upon the temperature in the measurement zone due to different loading (δt_L) C

For particularly small measurement uncertainties, further examinations of the temperature in the measurement zone are necessary, as this can vary due to different load.

Optimized SIKA blocks for maximum measurement certainty in the mK range with different loads

3.4 Stability with time (δt_V) D

The largest temperature difference shall be determined which occurs during an operating period of 30 minutes in the measuring zone of the block when the test temperature is set to a fixed value.

SIKA state control for stabilities up to <± 0.001 °C

3.6 Determination of the deviation between the display of the calibrator thermometer and the temperature in the measuring zone (δt_{iX}, δt_H) E

The temperature in the measuring zone of the block is determined with a standard thermometer whose traceability to national standards is given. Measurements shall be taken for at least three different calibration points.The temperature at the calibration points is set for one measurement series when the temperature increases and for the other series when the temperature decreases (hysteresis). The resolution of the display is also read on the calibrator.

Traceable calibration:
SIKA temperature calibrators with certificate

SIKA reference sensors:
Preconditioned – for minimum temperature drift and minimum hysteresis

Calculation of the simple measurement uncertainty (t_X)

$t_X = t_N + \delta t_N + \delta t_D - \delta t_{iX} + \delta t_H + \delta t_B + \delta t_R + \delta t_L + \delta t_V$

Due to standard thermometer:

t_N = Temperature of the resistance thermometer
δt_N = Temperature correction due to resistance measurement
δt_D = Temperature correction due to drift because of aging of the resistance thermometer since the last calibration

Due to dry block calibrator:

δt_{iX} = Temperature correction based on resolution of the display of the calibrator thermometer (3.6)
δt_H = Temperature correction due to hysteresis (3.6)
δt_B = Temperature correction due to insufficient axial homogeneity of the temperature distribution along the bore in the measurement zone (3.1)
δt_R = Temperature correction due to temperature difference between the individual measuring bores (3.2)
δt_L = Temperature correction due to loading of the calibration block with multiple thermometers (3.3)
δt_V = Temperature correction due to variations of the temperature within the measuring time (3.4)

Calculation of the expanded measurement uncertainty (U)

$U = ku(t_X)$

The specified expanded measurement uncertainty is the product of the simple measurement uncertainty and the coverage factor k = 1.74. It corresponds to a coverage probability of 95 %.