

Error source $x_i$	Type	Standard uncertainty $u(x_i)$	Sensitivity coefficient $c(x_i)$	Uncertainty contribution $u(x_i) \cdot c(x_i)$ , $\mu\text{m}$
Calibrated length of the RWP at 20 °C ( $l_{20\text{rwp}} = 125.0000$ mm)	B	0.1 $\mu\text{m}$	1	0.1
Measured length of the WP ( $l_{\text{wp}} = 125.0048$ mm)	B	1.4 $\mu\text{m}$	1	1.4
– random effects during measurements	A	0.9 $\mu\text{m}$		
– measuring instrument	B	1.0 $\mu\text{m}$		
Measured length of the RWP ( $l_{\text{rwp}} = 125.0043$ mm)	B	1.2 $\mu\text{m}$	–1	–1.2
– random effects during measurements	A	0.6 $\mu\text{m}$		
– measuring instrument	B	1.0 $\mu\text{m}$		
Measured temperature of the RWP ( $t_{\text{rwp}} = \Delta t_{\text{rwp}} + 20$ °C = 35 °C)	B	1.3 K	0 $\mu\text{m K}^{-1}$	0.0
– random effects during measurements	A	1.2 K		
– measuring instrument	B	0.5 K		
Calibrated CTE of the RWP ( $\alpha_{\text{rwp}} = 10.52 \times 10^{-6}$ K <sup>–1</sup> )	B	0.6 $\times 10^{-6}$ K <sup>–1</sup>	0 $\mu\text{m K}$	0.0
Known/assumed CTE of the scale ( $\alpha_{\text{rwp}} = 8 \times 10^{-6}$ K <sup>–1</sup> )	–	Can be neglected	0 $\mu\text{m K}^{-1}$	0.0
Possible temperature difference between the RWP and the scale during measurements of length of the WP ( $\delta t_{\text{sc}}^{\text{WP}} = 0$ K)	B	0.6 K	1.0 $\mu\text{m K}^{-1}$	0.6
Possible temperature difference between RWP and the scale temperature during measurements of length of the RWP ( $\delta t_{\text{sc}}^{\text{RWP}} = 0$ K)	B	0.6 K	–1.0 $\mu\text{m K}^{-1}$	–0.6
Possible temperature difference between the RWP and the WP ( $\delta t_{\text{wp}} = 0$ K)	B	0.6 K	–1.3 $\mu\text{m K}^{-1}$	–0.8
Possible CTE difference between RWP and WP ( $\delta \alpha_{\text{wp}} = 0 \times 10^{-6}$ K <sup>–1</sup> )	B	0.6 $\times 10^{-6}$ K <sup>–1</sup>	–1 874 416.2 $\mu\text{m K}$	–1.1
Calculated length of the WP at 20 °C	$l_{20\text{wp}} = 125.0005$ mm			
Combined standard uncertainty	$u_c(l_{20\text{wp}}) = 2.5$ $\mu\text{m}$			
Coverage factor $k_{95} = 2$ expanded uncertainty (confidence level $p = 95$ %)	$U_{95} = k_{95} \cdot u_c(l_{20\text{wp}}) = 2 \cdot 2.5$ $\mu\text{m} = 5.0$ $\mu\text{m}$			