

EVALUATION OF MEASUREMENT UNCERTAINTY

1. COMPANY NAME : Super Auto Forge Private Limited DATE : 22-02-2024

2. DEVICE UNDER CALIBRATION : 452

Range/Size (mm) : 96	Least Count (mm) : 96
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3. STANDARDS / EQUIPMENT USED FOR CALIBRATION :

Sr.No	Master Name	Range/Size (mm)	L.C. (mm)	Uncertainty (mm)	Accuracy (mm)	Material
Master 1	2D Height Gauge - UM-700-YE-112	0-700	96	25	36	Carbide

4. ENVIRONMENTAL PARAMETERS

Start Temp T1 (°C)	End Temp T2 (°C)	Mean Temp (TA= (T1+T2)/2)	Ref. Temp (TR)	Thermal Expansion of master (mm/m°C)(αM)	Thermal Expansion of DUC (mm/m°C)(αD)	Uncertainty of Temperature Indicator (°C) UT (±)
1	65	33.00	36	0.0047	0.0047	52

5. REPEATABILITY (mm)

R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	Standard Deviation	n
52	6	5	2	48	9	5	6	5	5	18.9153	10

6. UNCERTAINTY BUDGET

Source of uncertainty Xi		Estimates (Xi)	Probability Distribution	Type	Factor (x)	Standard Uncertainty u = (Xi / x)	Sensitivity Coefficient (y)	Uncertainty contribution ui = (x * y)	Degree of freedom vi = (n - 1)
U1	Uncertainty due to Calibration of Master 1 mentioned in the certificate	25.0000	Normal	Type B	2	12.5000	1	12.5000	∞
U2	Uncertainty due to Calibration of Master 2 mentioned in the certificate		Normal	Type B	2		1		∞
U3	Uncertainty due to Calibration of Master 3 mentioned in the certificate		Rect	Type B	√3		1		∞
U4	Uncertainty due to accuracy of Master 1	36.0000	Rect	Type B	√3	20.7846	1	20.7846	∞
U5	Uncertainty due to accuracy of Master 2		Rect	Type B	√3		1		∞
U6	Uncertainty due to accuracy of Master 3		Rect	Type B	√3		1		∞
U7	Standard Unc due to difference in thermal expansion coefficient of Master (10%)	0.0005	Rect	Type B	√3	0.0003	-0.2880	-0.0001	∞
U8	Standard Unc due to difference in thermal expansion coefficient of DUC (10%)	0.0005	Rect	Type B	√3	0.0003	-0.2880	-0.0001	∞
U9	Standard Unc due to uncertainty of temperature monitoring System	52	Normal	Type B	2	26.0000	0.0005	0.0130	∞
U10	Standard Unc due to repeatability	18.9153	Normal	Type A	√10	5.9815	1	5.9815	9

Combined Uncertainty (Uc) : 24.9806 mm Coverge Factor (k) : 2 Degree of freedom (veff): 2738

Expanded Uncertainty (U): ± 49.9612 mm

