EVALUATION OF MEASUREMENT UNCERTAINTY

1. COMPANY NAME : Super Auto Forge Private Limited **DATE :** 21-02-2024

2. DEVICE UNDER CALIBRATION : Micrometer

Range/Size (mm) : 50	**Least Count (mm) :** 0.001

3. STANDARDS / EQUIPMENT USED FOR CALIBRATION :

Sr.No	Master Name	Range/Size (mm)	L.C. (mm)	Uncertainty (mm)	Accuracy (mm)	Material
Master 1	Slip Gauge Set - I-GB-01	0.5-100 (Grade 0)		0.0003	0.0005	Steel

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 (±)
20.6	20.5	20.55	20	0.0115	0.0115	0.3

5. REPEATABILITY (mm)

R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	Standard Deviation	n
50.002	50.002	50.003	50.002	50.002	-	-	-	-	-	0.0004	5

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	0.0003	Normal	Type B	2	0.0001	1	0.0001	∞
U2	Uncertainty due to accuracy of Master 1	0.0005	Rect	Type B	√3	0.0003	1	0.0003	∞
U3	Uncertainity due to Least count of DUC	0.0005	Rect	Type B	√3	0.0003	1	0.0003	∞
U4	Standard Unc due to deviation from reference temperature	0.5500	Rect	Type B	√3	0.3175	0.0006	0.0002	∞
U5	Standard Unc due to difference in thermal expansion coefficient of Master (10%)	0.0011	Rect	Type B	√3	0.0006	0.0275	0.0000	∞
U6	Standard Unc due to difference in thermal expansion coefficient of DUC (10%)	0.0011	Rect	Type B	√3	0.0006	0.0275	0.0000	∞
U7	Standard Unc due to uncertainty of temperature monitoring System	0.3	Normal	Type B	2	0.1500	0.0006	0.0001	∞
U8	Standard Unc due to repeatability	0.0004	Normal	Type A	√5	0.0002	1	0.0002	4

Combined Uncertainty (Uc) : 0.0005 mm **Coverge Factor** (k) : 2 **Degree of freedom** (veff): 157

Expanded Uncertainty (U): ± 0.0010 mm

Metric Metric
Prepared By