



# Primary Standards Laboratory Mass and Force Project

## Fact Sheet

The Primary Standards Laboratory (PSL) maintains a variety of primary mass and force standards to assure accurate and traceable measurements for its customers. All primary mass and force standards are directly traceable to the Systeme International through the National Institute of Standards and Technology (NIST). Mass certifications are available from 1 milligram to 64 kilograms.

When the highest accuracy is needed, groups of weights are intercompared using specified sequences that have high redundancy. A certification is issued giving the mass and associated uncertainty of each weight in the customer set.

Force is measured either against dead weight-certified load cells or directly by dead weight. Force can be measured in both compression and tension.

### Major Resources

- State-of-the-art laboratory environmental controls (stability of  $\pm 0.1^\circ\text{C}$ ,  $\pm 5\%$  RH)
- 10,000 lbf, 30,000 lbf, and 100,000 lbf Morehouse load frames
- 1,000 lbf Morehouse dead weight tester
- Mass comparators (partial list):
  - Mettler AX64004 :100  $\mu\text{g}$  resolution, 64 kg capacity
  - Sartorius CC10000U-L: 10  $\mu\text{g}$  resolution, 10 kg capacity
  - Mettler AX1006AH :1  $\mu\text{g}$  resolution, 1 kg capacity
  - Mettler AT106 :1  $\mu\text{g}$  resolution, 100 g capacity
  - Mettler XP6U: 0.1  $\mu\text{g}$  resolution, 6 g capacity



Automatic Weighing of Kilogram Reference Standards

### Contacts

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## Scope

Measured Parameter or Device Calibrated	Range	Uncertainty ( $k=2$ )	Remarks
<b>FORCE (20/M06)</b> ASTM loading range classes (e.g., A, AA) are not used or reported.			
Force	100 lbf to 1000 lbf 1000 lbf to 100,000 lbf	0.0052 % 0.025 %	Primary Standard (Deadweight) Secondary Standards
<b>MASS DETERMINATION (20/M08)</b>			
Metric	25 kg	18 mg	Echelon II
	20 kg	12 mg	
	10 kg	4 mg	
	5 kg	1.7 mg	
	3 kg	0.7 mg	
	2 kg	0.6 mg	
	1 kg	0.11 mg	
	500 g	0.061 mg	
	300 g	0.069 mg	
	200 g	0.037 mg	
	100 g	0.033 mg	
	50 g	0.021 mg	
	30 g	0.020 mg	
	20 g	0.013 mg	
	10 g	0.0098 mg	
	5 g	0.0061 mg	
	3 g	0.0086 mg	
	2 g	0.0050 mg	
	1 g	0.0050 mg	
	500 mg	0.0033 mg	
	300 mg	0.0031 mg	
	200 mg	0.0030 mg	
	100 mg	0.0029 mg	
	50 mg	0.0027 mg	
	30 mg	0.0026 mg	
	20 mg	0.0025 mg	
	10 mg	0.0023 mg	
	5 mg	0.0020 mg	
	3 mg	0.0018 mg	
	2 mg	0.0016 mg	
	1 mg	0.0014 mg	

