

Mass Standards Handbook — Metric Weight Tolerances

The table below is a listing of the tolerances of various classes of masses. The weight value can deviate above or below the nominal value by the tolerance defined. To determine the tolerance of a mass, look at the denomination or nominal value of the weight and the appropriate class you need.

Table 9 - Metric Weight Tolerances

| Denomination Metric | International Organization of Legal Metrology Recommendation R 111* | | | | | | | Troemner Ultra- Class SM | ANSI/ASTM E617 | | | | |
|------------------------|--|-------|-------|-------|--------|--------|---------|---|-------------------|-------|-------|-------|--------|
| | E1 | E2 | F1 | F2 | M1 | M2 | M3 | | 0 | 1 | 2 | 3 | 4 |
| | mg | mg | mg | mg | mg | mg | mg | mg | mg | mg | mg | mg | g & mg |
| 5000 kg | | | 25000 | 85000 | 250000 | 850000 | 1250000 | | | | | | 100 g |
| 3000 kg | | | | | | | | | | | | | 60 |
| 2000 kg | | | 10000 | 33000 | 100000 | 330000 | 1000000 | | | | | | 40 |
| 1000 kg | | 1600 | 5000 | 16000 | 50000 | 160000 | 500000 | | | | | | 20 |
| 500 kg | | 800 | 2500 | 8000 | 25000 | 80000 | 250000 | | | | | | 10 |
| 300 kg | | | | | | | | | | | | | 6.0 |
| 200 kg | | 300 | 1000 | 3000 | 10000 | 30000 | 100000 | | | | | | 4.0 |
| 100 kg | | 160 | 500 | 1600 | 5000 | 16000 | 50000 | | | | | | 2.0 |
| 50 kg | 25 | 75 | 250 | 750 | 2500 | 7500 | 25000 | 75 | 63 | 125 | 250 | 500 | 1.0 |
| 30 kg | | | | | | | | 45 | 38 | 75 | 150 | 300 | 600 mg |
| 25 kg | | | | | | | | 37 | 31 | 62 | 125 | 250 | 500 |
| 20 kg | 10 | 30 | 100 | 300 | 1000 | 3000 | 10000 | 30 | 25 | 50 | 100 | 200 | 400 |
| 10 kg | 5 | 15 | 50 | 150 | 500 | 1500 | 5000 | 15 | 13 | 25 | 50 | 100 | 200 |
| 5 kg | 2.5 | 7.5 | 25 | 75 | 250 | 750 | 2500 | 7 | 6 | 12 | 25 | 50 | 100 |
| 3 kg | | | | | | | | 4.5 | 3.8 | 7.5 | 15 | 30 | 60 |
| 2 kg | 1.0 | 3.0 | 10 | 30 | 100 | 300 | 1000 | 3.0 | 2.5 | 5.0 | 10 | 20 | 40 |
| 1 kg | 0.5 | 1.5 | 5 | 15 | 50 | 150 | 500 | 1.5 | 1.3 | 2.5 | 5.0 | 10 | 20 |
| 500 g | 0.25 | 0.75 | 2.5 | 7.5 | 25 | 75 | 250 | 0.7 | 0.60 | 1.2 | 2.5 | 5.0 | 10 |
| 300 g | | | | | | | | 0.45 | 0.38 | 0.75 | 1.5 | 3.0 | 6.0 |
| 200 g | 0.10 | 0.30 | 1.0 | 3.0 | 10 | 30 | 100 | 0.30 | 0.25 | 0.50 | 1.0 | 2.0 | 4.0 |
| 100 g | 0.05 | 0.15 | 0.5 | 1.5 | 5 | 15 | 50 | 0.15 | 0.13 | 0.25 | 0.50 | 1.0 | 2.0 |
| 50 g | 0.030 | 0.10 | 0.30 | 1.0 | 3.0 | 10 | 30 | 0.07 | 0.060 | 0.12 | 0.25 | 0.60 | 1.2 |
| 30 g | | | | | | | | 0.044 | 0.037 | 0.074 | 0.15 | 0.45 | 0.90 |
| 20 g | 0.025 | 0.080 | 0.25 | 0.8 | 2.5 | 8 | 25 | 0.044 | 0.037 | 0.074 | 0.10 | 0.35 | 0.70 |
| 10 g | 0.020 | 0.060 | 0.20 | 0.6 | 2 | 6 | 20 | 0.030 | 0.025 | 0.050 | 0.074 | 0.25 | 0.50 |
| 5 g | 0.015 | 0.050 | 0.15 | 0.5 | 1.5 | 5 | 15 | 0.020 | 0.017 | 0.034 | 0.054 | 0.18 | 0.36 |
| 3 g | | | | | | | | 0.020 | 0.017 | 0.034 | 0.054 | 0.15 | 0.30 |
| 2 g | 0.012 | 0.040 | 0.12 | 0.4 | 1.2 | 4 | 12 | 0.020 | 0.017 | 0.034 | 0.054 | 0.13 | 0.26 |
| 1 g | 0.010 | 0.030 | 0.10 | 0.3 | 1.0 | 3 | 10 | 0.020 | 0.017 | 0.034 | 0.054 | 0.10 | 0.20 |
| 500 mg | 0.008 | 0.025 | 0.08 | 0.25 | 0.8 | 2.5 | | 0.005 | 0.005 | 0.010 | 0.025 | 0.080 | 0.16 |
| 300 mg | | | | | | | | 0.005 | 0.005 | 0.010 | 0.025 | 0.070 | 0.14 |
| 200 mg | 0.006 | 0.020 | 0.06 | 0.20 | 0.6 | 2.0 | | 0.005 | 0.005 | 0.010 | 0.025 | 0.060 | 0.12 |
| 100 mg | 0.005 | 0.015 | 0.05 | 0.15 | 0.5 | 1.5 | | 0.005 | 0.005 | 0.010 | 0.025 | 0.050 | 0.10 |
| 50 mg | 0.004 | 0.012 | 0.04 | 0.12 | 0.4 | | | 0.005 | 0.005 | 0.010 | 0.014 | 0.042 | 0.085 |
| 30 mg | | | | | | | | 0.005 | 0.005 | 0.010 | 0.014 | 0.038 | 0.075 |
| 20 mg | 0.003 | 0.010 | 0.03 | 0.10 | 0.3 | | | 0.005 | 0.005 | 0.010 | 0.014 | 0.035 | 0.070 |
| 10 mg | 0.002 | 0.008 | 0.025 | 0.08 | 0.25 | | | 0.005 | 0.005 | 0.010 | 0.014 | 0.030 | 0.060 |
| 5 mg | 0.002 | 0.006 | 0.020 | 0.06 | 0.20 | | | 0.005 | 0.005 | 0.010 | 0.014 | 0.028 | 0.055 |
| 3 mg | | | | | | | | 0.005 | 0.005 | 0.010 | 0.014 | 0.026 | 0.052 |
| 2 mg | 0.002 | 0.006 | 0.020 | 0.06 | 0.20 | | | 0.005 | 0.005 | 0.010 | 0.014 | 0.025 | 0.050 |
| 1 mg | 0.002 | 0.006 | 0.020 | 0.06 | 0.20 | | | 0.005 | 0.005 | 0.010 | 0.014 | 0.025 | 0.050 |
| 0.5 mg | | | | | | | | | | | | | |
| 0.3 mg | | | | | | | | | | | | | |
| 0.2 mg | | | | | | | | | | | | | |
| 0.1 mg | | | | | | | | | | | | | |
| 0.05 mg | | | | | | | | | | | | | |

* OIML - International Recommendation R 111 replaces International Recommendation numbers 1, 2, 20, 52.

** NIST 105-1 Class F tolerances are rounded to two significant figures



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| | | | National Bureau of Standards Circular 547 Section 1 | | | | | | | | | NIST Handbooks | | | |
|--------|--------|--------|--|--------|--------|--------|---------|-------|--------|--------|--------|----------------|-----------|----------|---------------------|
| 5 | 6 | 7 | J | M | | S | | S-1 | P | Q | T | 105-1** | 44 | | |
| g & mg | g & mg | g & mg | mg | Ind mg | Crp mg | Ind mg | Grip mg | mg | g & mg | g & mg | g & mg | g & mg | Accept mg | Maint mg | Denomination Metric |
| 250 g | 500 g | 750 g | | | | | | | | | | 500 g | | | 5000 kg |
| 150 | 300 | 450 | | | | | | | | | | 300 | | | 3000 kg |
| 100 | 200 | 300 | | | | | | | | | | 200 | | | 2000 kg |
| 50 | 100 | 150 | | | | | | | 20 g | 50 g | 150 g | 100 | | | 1000 kg |
| 25 | 50 | 75 | | | | | | | 10 | 25 | 75 | 50 | | | 500 kg |
| 15 | 30 | 45 | | | | | | | | | | 30 | | | 300 kg |
| 10 | 20 | 30 | | | | | | | 4.0 | 10 | 30 | 20 | | | 200 kg |
| 5 | 10 | 15 | | | | | | | 2.0 | 5 | 15 | 10 | | | 100 kg |
| 2.5 | 5 | 7.5 | | | | | | 500 | 1.0 | 2.5 | 7.5 | 5.0 | | | 50 kg |
| 1.5 | 3 | 4.5 | | | | | | | | | | 3.0 | | | 30 kg |
| 1.2 | 2.5 | 4.5 | | 125 | | | | 250 | 500 mg | 1.2 | 4.5 | 2.5 | | | 25 kg |
| 1.0 | 2 | 3.8 | | 100 | | | | 200 | 400 | 1 | 3.8 | 2.0 | 750 | 1500 | 20 kg |
| 500 mg | 1 | 2.2 | | 50 | | | | 100 | 200 | 500 mg | 2.2 | 1.0 | 500 | 1000 | 10 kg |
| 250 | 500 mg | 1.4 | | 25 | | | | 50 | 100 | 250 | 1.4 | 0.50 | 400 | 800 | 5 kg |
| 150 | 300 | 1.0 | | 15 | | 7.5 | | 30 | 60 | 150 | 1.0 | 0.30 | 250 | 500 | 3 kg |
| 100 | 200 | 750 mg | | 10 | | 5.0 | | 20 | 40 | 100 | 750 mg | 0.20 | 200 | 400 | 2 kg |
| 50 | 100 | 470 | | 5.0 | | 2.5 | | 10 | 20 | 50 | 470 | 0.10 | 120 | 250 | 1 kg |
| 30 | 50 | 300 | | 2.5 | | 1.2 | | 5.0 | 10 | 30 | 300 | 70 mg | 88 | 175 | 500 g |
| 20 | 30 | 210 | | 1.5 | | 0.75 | | 3.0 | 6.0 | 20 | 210 | 60 | 75 | 150 | 300 g |
| 15 | 20 | 160 | | 1.0 | | 0.50 | | 2.0 | 4.0 | 15 | 160 | 40 | 50 | 100 | 200 g |
| 9 | 10 | 100 | | 0.50 | | 0.25 | | 1.0 | 2.0 | 9.0 | 100 | 20 | 35 | 70 | 100 g |
| 5.6 | 7 | 62 | | 0.25 | | 0.12 | | 0.60 | 1.2 | 5.6 | 62 | 10 | 20 | 40 | 50 g |
| 4.0 | 5 | 44 | | 0.15 | | 0.074 | | 0.45 | 0.90 | 4.0 | 44 | 6.0 | 15 | 30 | 30 g |
| 3.0 | 3 | 33 | | 0.10 | | 0.074 | | 0.35 | 0.70 | 3.0 | 33 | 4.0 | 10 | 20 | 20 g |
| 2.0 | 2 | 21 | | 0.050 | | 0.074 | | 0.25 | 0.50 | 2.0 | 21 | 2.0 | 8 | 15 | 10 g |
| 1.3 | 2 | 13 | | 0.034 | | 0.054 | | 0.18 | 0.36 | 1.3 | 13 | 1.5 | 5 | 10 | 5 g |
| 0.95 | 2.0 | 9.4 | | 0.034 | | 0.054 | | 0.15 | 0.30 | 0.95 | 9.4 | 1.3 | 4 | 8 | 3 g |
| 0.75 | 2.0 | 7.0 | | 0.034 | | 0.054 | | 0.13 | 0.26 | 0.75 | 7.0 | 1.1 | 3 | 6 | 2 g |
| 0.50 | 2.0 | 4.5 | | 0.034 | | 0.054 | | 0.10 | 0.20 | 0.50 | 4.5 | 0.90 | 2 | 4 | 1 g |
| 0.38 | 1.0 | 3.0 | | 0.010 | | 0.025 | | 0.080 | 0.16 | 0.38 | 3.0 | 0.72 | 1.5 | 3.0 | 500 mg |
| 0.30 | 1.0 | 2.2 | | 0.010 | | 0.025 | | 0.070 | 0.14 | 0.30 | 2.2 | 0.61 | 1.0 | 2.0 | 300 mg |
| 0.26 | 1.0 | 1.8 | | 0.010 | | 0.025 | | 0.060 | 0.12 | 0.26 | 1.8 | 0.54 | 0.8 | 1.5 | 200 mg |
| 0.20 | 1.0 | 1.2 | | 0.010 | | 0.025 | | 0.050 | 0.10 | 0.20 | 1.2 | 0.43 | 0.5 | 1.0 | 100 mg |
| 0.16 | 0.50 | 0.88 | 0.010 | 0.010 | | 0.014 | | 0.042 | 0.085 | 0.16 | 0.88 | 0.35 | 0.4 | 0.8 | 50 mg |
| 0.14 | 0.50 | 0.68 | 0.010 | 0.010 | | 0.014 | | 0.038 | 0.075 | 0.14 | 0.68 | 0.30 | 0.3 | 0.6 | 30 mg |
| 0.12 | 0.50 | 0.56 | 0.010 | 0.010 | | 0.014 | | 0.035 | 0.070 | 0.12 | 0.56 | 0.26 | 0.2 | 0.4 | 20 mg |
| 0.10 | 0.50 | 0.4 | 0.010 | 0.010 | | 0.014 | | 0.030 | 0.060 | 0.10 | 0.40 | 0.21 | 0.15 | 0.3 | 10 mg |
| 0.080 | 0.20 | | 0.010 | 0.010 | | 0.014 | | 0.028 | 0.055 | 0.080 | | 0.17 | 0.05 | 0.1 | 5 mg |
| 0.070 | 0.20 | | 0.010 | 0.010 | | 0.014 | | 0.026 | 0.052 | 0.070 | | 0.14 | 0.05 | 0.1 | 3 mg |
| 0.060 | 0.20 | | 0.010 | 0.010 | | 0.014 | | 0.025 | 0.050 | 0.060 | | 0.12 | 0.05 | 0.1 | 2 mg |
| 0.050 | 0.10 | | 0.010 | 0.010 | | 0.014 | | 0.025 | 0.050 | 0.050 | | 0.10 | 0.05 | 0.1 | 1 mg |
| | | | 0.010 | 0.010 | | 0.014 | | 0.025 | | | | | | | 0.5 mg |
| | | | 0.010 | 0.010 | | 0.014 | | 0.025 | | | | | | | 0.3 mg |
| | | | 0.010 | 0.010 | | 0.014 | | 0.025 | | | | | | | 0.2 mg |
| | | | 0.010 | 0.010 | | 0.014 | | 0.025 | | | | | | | 0.1 mg |
| | | | 0.010 | 0.010 | | 0.014 | | | | | | | | | 0.05 mg |

