

MATERIAL – METAL ALLOYS

- Music Wire per ASTM A228, DIN 17223, BS 5216, EN 10270-1 or JIS-G-3522
- Stainless Steel Type 301/302/304 OR Type 316 PER ASTM A313, A666, AMS A5906, DIN 17224, BS 2056, EN 10270-3 or JIS-G-4314; Type 17-7pH per AMS 5529
- Oil Tempered MB per ASTM A229, DIN 17223, BS 2803 or EN 10270-2
- Oil Tempered Chrome Silicon per ASTM A401, DIN 17223, BS 2803 or EN 10270-2
- Elgiloy per AMS 5833 (Chemical Only)
- Beryllium Copper per ASTM B197
- Material specification may vary or be subject to change. Please consult www.leepring.com/materials.asp for updated information

STRESS RELIEF

All springs are stress relieved to remove coiling strains.

PLATING

All Lee Music Wire and Oil Tempered Standard and Heavy Duty Stock Springs are furnished zinc plated in accordance with specification ASTM B633 Class Fe/Zn 5 Type III (.0002" thick with clear chromate) and baked for hydrogen embrittlement relief.

All Lee Music Wire Instrument Compression and Extension Springs are furnished zinc plated or tin coated without supplemental zinc plating.

Lee Spring Stock Springs are manufactured RoHS compliant and do not use Cadmium, Lead, Mercury, Hexavalent Chromium, Polybrominated biphenyl (PBB) or Polybrominated Diphenyl Ether (PBDE) in plating or any other processes.

Lee Spring products are exempt from the OSHA Hazardous Communication Standard.

All Lee Spring Stainless Steel Standard and Heavy Duty Stock Springs or Instrument Springs are furnished passivated in accordance with specification ASTM A967 (supercedes QQ-P-35).

DIRECTION OF WIND

Left or Right (Lee Spring option)

ENDS– COMPRESSION SPRINGS

Standard and Heavy Duty Series

- Squared and ground (squareness within 3°).

Bantam Mini, Instrument and Lite Pressure Series

- Squared, Not Ground

ENDS– EXTENSION SPRINGS

Instrument and Standard Series

- Full diameter loops at random position
- Loop openings of approximately one wire diameter

TOLERANCES

Compression and Extension Diameters

.025" to .040" O.D. ± .001"	0.64mm to 1.02mm ± .03mm
.057" to .094" O.D. ± .003"	1.45mm to 2.36mm ± .08mm
.102" to .250" O.D. ± .003" ± .005"	2.59mm to 6.10mm ± .08mm ± .13mm
.300" to .500" O.D. ± .008"	7.62mm to 12.70mm ± .20mm
.540" to .850" O.D. ± .015"	13.97mm to 21.59mm ± .38mm
.875" to 1.125" O.D. ± .020"	22.23mm to 28.58mm ± .51mm
1.150" to 1.218" O.D. ± .025"	29.21mm to 30.94mm ± .64mm
1.250" to 1.460" O.D. ± .030"	31.75mm to 37.08mm ± .76mm
1.480" to 1.687" O.D. ± .040"	37.59mm to 42.85mm ± 1.02mm
1.937" to 2.000" O.D. ± .055"	49.20mm to 50.80mm ± 1.40mm
Spring rate: ± 10%	Solid height: + 5%, no lower limit

NOTES

1. Spring rates, maximum loads and initial tension shown in catalog are for Music Wire. For Stainless Steel, multiply figures shown by 5/6 (.833).

2. COMPRESSION SPRINGS — To find the load at any working length, when free length and rate are given, use the formula:

$$P = R \times F$$

where P is the load in lbs.; R is the rate in lbs. per inch; F is the deflection from free length.

Example: (Lee Stock Spring Catalog #LC 032C 08M) — Given a free length of .750" and a rate of 22 pounds per inch, find the load at .500" working length. $P = 22 \times (.750 - .500) = 22 \times .250 = 5.5\text{lbs.}$

3. EXTENSION SPRINGS — To find the load at any working length, when the free length, rate and initial tension are given, use the formula:

$$P = (R \times F) + I.T.$$

where P is the load in lbs.; R is the rate in lbs. per inch; F is the deflection from free length; I.T. is the initial tension.

Example: (Lee Stock Spring Catalog #LE 031C 01M) — Given a free length of 1", a rate of 6.9 pounds per inch, and .7 pounds initial tension, find the load at 1.500".
 $P = [6.9 \times (1.500 - 1.000)] + .7 = (6.9 \times .500) + .7 = 3.45 + .7 = 4.15\text{ lbs.}$

4. HOW TO DETERMINE RATE — Rate, which is the change in load per unit deflection, may be tested by the following procedure:

1. Deflect spring to approximately 20 percent of total available deflection (free length, minus solid height) and measure load (P₁) and spring length (L₁).
2. Deflect spring not more than 80 percent of total available deflection and measure load (P₂) and spring length (L₂). Be certain that no coils (other than closed ends) are touching at L₂.
3. Calculate rate (R) lb. per in.

$$R = \frac{(P_2 - P_1)}{(L_1 - L_2)}$$

If you cannot find the Stock Spring you need in our print or on-line catalogs, use the Custom Spring Specifications Forms on pages 230 - 251, submit your specification at www.leepring.com or contact our Engineering Department at (888) 777-4647, Extension 3.

METRIC CONVERSION TABLE

FORCE

To convert:

Newtons to Kilograms.....	Multiply by 0.1020
Newtons to Pounds.....	Multiply by 0.2249
Kilograms to Newtons.....	Multiply by 9.8070
Kilograms to Pounds.....	Multiply by 2.2046
Pounds to Newtons.....	Multiply by 4.4480
Pounds to Kilograms.....	Multiply by 0.4536

RATE

To convert:

KG/MM to LB/IN.....	Multiply by 55.9980
KG/MM to N/MM.....	Multiply by 9.8070
LB/IN. to KG/MM.....	Multiply by 0.0179
LB/IN. to N/MM.....	Multiply by 0.1751
N/MM to KG/MM.....	Multiply by 0.1020
N/MM to LB/IN.....	Multiply by 5.7099

LENGTH

To convert:

Inches to Meters.....	Multiply by 0.0254
Millimeters to Meters.....	Multiply by 0.0010
Inches to Feet.....	Multiply by 0.0833
Millimeters to Feet.....	Multiply by 0.0033
Inches to Millimeters.....	Multiply by 25.4
Millimeters to Inches.....	Multiply by 0.0394

Conditions of Sale

- **TERMS:** Net 30 days from date of invoice to all accredited customers. All purchases are subject to Lee Spring's Standard Terms and Conditions of Sale, as described below and in our invoice. No other terms and conditions apply to any purchase order. All prices are in U.S. Dollars. We accept American Express (Amex), Master Card (MC), and Visa.
- **CERTIFICATES OF COMPLIANCE:** Lee Spring will supply Certificates of Compliance at no charge with every order.
- **RAW MATERIAL CERTIFICATION:** Material Traceability (chemical and/or physical) Certifications are available only on Special Orders at an additional charge.
- **SHIPMENTS:** Free Standard Ground Shipping on Stock Springs within the continental United States.
- **SHORTAGES:** All claims for shortages must be filed within 15 days from customer's receipt of shipment.
- **RETURNS AND RESTOCKING:** All returns require a Return Material Authorization (RMA) number. Returns may incur restocking charges. Please call Lee Spring Customer Service toll free at 888 - 777- 4647 to obtain an RMA number prior to returning any merchandise.
- **PRICING:** All Prices are Subject to change without notice. Prices are based on Lee Spring's standard packaging.
- **ORDER ACCEPTANCE:** Orders for 100 pieces or under will only be accepted with a delivery date less than 90 days from the purchase order date.