

| Acoustoelastic constants ( $L_{ij}$ ) for longitudinal and shear waves in engineering materials <a href="http://brayengr.com/">http://brayengr.com/</a> 2012 |                    |          |          |          |          |          |
|--|--------------------|----------|----------|----------|----------|----------|
| Material   | Load               | $L_{21}$ | $L_{23}$ | $L_{22}$ | $L_{11}$ | $L_{12}$ |
| Aluminum [1]   | Compressive        | -2.0     | +0.6     |          |          |          |
| Aluminum [2]   | Compression        | -2.1     | +0.57    |          |          |          |
| Aluminum [3]   | Tension - RD       |          | +0.46    | +0.68    | -2.7     |          |
| Aluminum [3]   | Tension - TD       |          |          | +0.93    | -3.1     |          |
| Aluminum 6061 [4]  | Tension - RD       |          |          |          | -3.39    |          |
| Aluminum 7050 [4]  | Tension RD         |          |          |          | -2.9     |          |
| Aluminum 7175 [4]  | Tension RD         |          |          |          | -2.87    |          |
| Aluminum 7175 [4]  | Tension TD         |          |          |          | -2.93    |          |
| Aluminum 5052 [5]  | Tension RD         |          |          |          | -2.34    |          |
| Aluminum 5052 [5]  | Tension TD         |          |          |          | -2.46    |          |
| Aluminum 5086 [3]  | Tension RD         |          |          |          | -2.7     |          |
| Aluminum 5086 [3]  | Tension TD         |          |          |          | -3.1     |          |
| Aluminum 6056 [6]  |                    |          |          |          | -3.83*   |          |
| Aluminum 7198 T9 [7]   |                    |          |          |          | -3.77*   |          |
| Ductile Cast Iron [8]  |                    |          |          |          |          |          |
| As-cast  | Compressive        |          |          |          | -2.15    |          |
| Annealed   | Compressive        |          |          |          | -3.89    |          |
| Normalized   | Compressive        |          |          |          | -3.92    |          |
| Q & T  | Compressive        |          |          |          | -2.98    |          |
| Rail Steel [9] (1080)  | Tension            | -1.5     | +0.09    | +0.27    | -2.38    | -0.15    |
|  | Compressive        |          |          |          | -2.45    |          |
| Cold rolled Steel Bar [10]   | Tension            |          |          |          | -2.38    |          |
| 4140 Steel [11]  | Tension (2.25 MHz) |          |          |          | -2.2     |          |
|  | Tension (5 MHz)    |          |          |          | -2.36    |          |
| Steel P460 HLE [12]  | Tension            |          |          |          | -2.82*   |          |
| Steel P460 HLE [12]  | Tension            |          |          |          | -3.38*   |          |
| Steel P265 [13]  | Tension            |          |          |          | -2.66*   |          |
| Steel P265 [13]  | Tension            |          |          |          | -2.96*   |          |
| S355 steel RD [12]   | Tension            |          |          |          | -2.52    |          |
| S355 steel [12]  | Tension            |          |          |          | -2.2     |          |
| 316L Stainless Steel [12]  | Tension            | -1.5     | -1.2     | ~ 0      | -2.1     |          |
| Clear acrylic, aircraft grade [14]   | Tension            |          |          |          | -2.14    |          |
| Polyethylene – cross-linked natural [15]   | Tension            |          |          |          | -0.85    |          |
| Polyethylene – cross-linked black [15]   | Tension            |          |          |          | -1.2     |          |

\* Reported values for  $L_{11}$  were multiplied by the appropriate Young's modulus to obtain.

| Table 10.1(b). Acoustoelastic constants ( $LR_{ij}$ ) for Rayleigh waves in engineering materials [3] |              |           |           |
|---|--------------|-----------|-----------|
| Material  | Load         | $LR_{13}$ | $LR_{23}$ |
| Aluminum  | Tension - RD | -1.1      | +0.5      |
| Aluminum  | Tension - TD | -0.48     | +0.5      |
| 316L Stainless Steel  | Tension      |           |           |

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