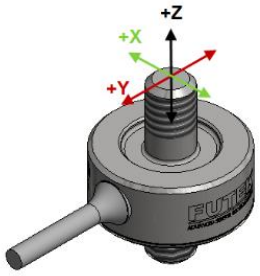
# Extraneous Load Factors




**Equation:** $\sigma_{max} \geq$ (A)Fx +(B)Fy +(C)Fz +(D)Mx +(E)My +(F)Mz

**Material:** 17-4 P.H. Stainless Steel

| Capacity (lb) | A | B | C | D | E | F |
|---|---|---|---|---|---|---|
| *2.2 (1000 g)* | 36000 | 36000 | 7500 | 180400 | 180400 | 14100 |
| *5 / 10* | 19500 | 19500 | 4000 | 98000 | 98000 | 12000 |
| *25* | 11100 | 11100 | 2300 | 57000 | 57000 | 11100 |
| *50* | 8470 | 8470 | 1320 | 69700 | 69700 | 10000 |

All Force and Moment to be calculated using lb and in-lb units

**$\sigma_{max}$ Table**

| Material | Static Load (=60% Y.S.) | Fatigue (Non Reversing Loads) | Fatigue (Full Reversing Loads) |
|---|---|---|---|
| 17-4PH S.S | 87,000 | 78,000 | 62,000* |

*Value is 75% of Fatigue Strength based on 10-20 x $10^6$ cycles and allow for factors that influence Fatigue such as surface finish, stress concentrations, corrosion, temperature and other variables for the production of the transducer, for infinite Fatigue Life (100 x $10^6$) use 75% of values shown.

# Deflection & Natural Frequency

| Capacity (lb) | Deflection (in.) | Natural Frequency (kHz) | $\beta$ |
|---|---|---|---|
| *2.2 (1000 g)* | *0.0001* | *19* | *0.0006* |
| *5* | *0.0001* | *26* | *0.0007* |
| *10* | *0.0002* | *26* | *0.0007* |
| *25* | *0.0002* | *42* | *0.0007* |
| *50* | *0.0005* | *42* | *0.00001* |

**Natural Frequency & Frequency Response Equation's:**

$$\text{Natural Frequency (FN)} = 3.13 \sqrt{\frac{1}{\frac{\beta}{Capacity} \bullet Deflection}} \text{ (Hz)}$$

$$\text{Frequency Response with load (FR)} = 3.13 \sqrt{\frac{1}{\frac{\beta + AppliedLoad}{Capacity} \bullet Deflection}} \text{ (Hz)}$$

*Where $\beta$ values are obtained by FUTEK Engineers