

## Extraneous Load Factors

**Equation:**  $\sigma_{max} \geq AF_x + BF_y + CF_z + DM_x + EM_y + FM_z$



### Extraneous Load Coefficients:

Capacity [lb]	A	B	C	D	E	F
0.25	2400	24200	45600	1500	15500	5360
0.5	1870	17000	24700	1160	11000	4010
1	1430	11600	12800	900	7630	2890
2.2	390	1800	6700	1000	220	1600
5	310	1100	2700	670	220	1000
10	290	810	1400	480	220	730
25	250	520	600	310	220	450
50	240	430	320	280	220	320
100	250	410	200	270	220	220

### $\sigma_{max}$ Table:

Material	Static Load (=60% Y.S.)	Fatigue (Non-Reversing Loads)	Fatigue (Full Reversing Loads)
2024-T4/T351	28,000	18,000	15,000*

\*Value is 75% of Fatigue Strength based on  $10\text{-}20 \times 10^6$  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 ( $100 \times 10^6$ ) use 75% of values shown.

This documentation was generated and completed to the best ability of FUTEK's Engineering Team using FEA Analysis, Empirical data and Multiple Testing Simulations. The information and recommendations on this document are presented in good faith and believed to be correct however, FUTEK Advanced Sensor Technology makes no representations or warranties as to the completeness or accuracy of the information.

## Deflection & Natural Frequency

Capacity [lb]	Deflection [in]	Natural Frequency [Hz]	$\beta$
0.25	0.008	120	0.023
0.5	0.007	170	0.023
1	0.007	260	0.023
2.2	0.008	210	0.063
5	0.007	350	0.063
10	0.006	520	0.063
25	0.005	860	0.064
50	0.005	1250	0.064
100	0.005	1760	0.063

\*Natural frequencies results are based on FEA analysis. Analysis was performed assuming constrained fixed end.

### Natural Frequency & Frequency Response Equations:

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

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

\* $\beta$  values are obtained by FUTEK Engineering

This documentation was generated and completed to the best ability of FUTEK's Engineering Team using FEA Analysis, Empirical data and Multiple Testing Simulations. The information and recommendations on this document are presented in good faith and believed to be correct however, FUTEK Advanced Sensor Technology makes no representations or warranties as to the completeness or accuracy of the information.