



圧電材料特性表

Piezoelectric Characteristics

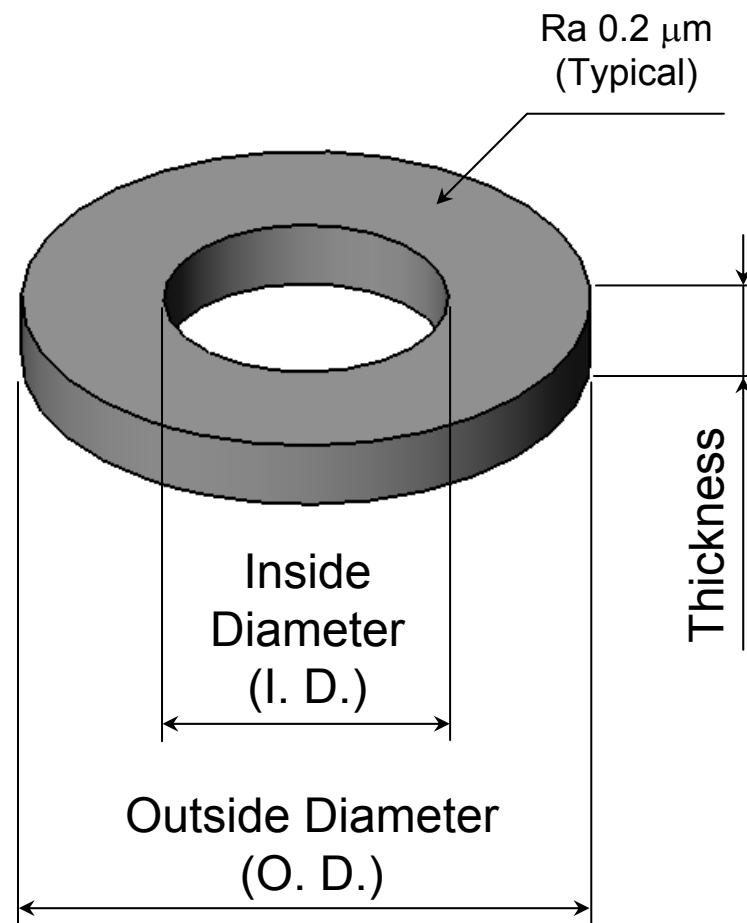
| Navy Type | | | | | | | | |
|--|------------------------------|-------|--------|--------|--------|--------|--------|---------------|
| Material | | MT-18 | MT-18K | MT-107 | MT-501 | MT-811 | MT-812 | MT-831 New |
| Characteritics | Symbol | | | | | | | |
| Dielectric constant (Relative permittivity) | $\epsilon_{33}^t/\epsilon_0$ | 1400 | 1450 | 1800 | 1800 | 1000 | 1100 | 1100 |
| | $\epsilon_{11}^t/\epsilon_0$ | 1250 | 1300 | 1630 | - | 1170 | 1220 | 1310 |
| Dielectric loss (Dissipation factor) | $\tan \delta (\%)$ | 0.40 | 0.35 | 2.00 | 1.80 | 0.18 | 0.18 | 0.15 |
| Coupling factors | k_p | 0.53 | 0.60 | 0.66 | 0.64 | 0.53 | 0.53 | 0.55 |
| | k_{31} | 0.30 | 0.34 | 0.34 | 0.38 | 0.31 | 0.30 | 0.33 |
| | k_{33} | 0.63 | 0.72 | 0.75 | 0.70 | 0.62 | 0.56 | 0.63 |
| | k_t | 0.34 | 0.41 | 0.49 | 0.55 | 0.49 | 0.48 | 0.48 |
| | k_{15} | 0.41 | 0.54 | 0.51 | - | 0.59 | 0.59 | 0.62 |
| Piezoelectric Constants ($\times 10^{-12} \text{C/N} = \times 10^{-12} \text{m/V}$) | d_{31} | -104 | -142 | -200 | -175 | -102 | -80 | -103 |
| | d_{33} | 270 | 340 | 450 | 400 | 225 | 230 | 260 |
| | d_{15} | 250 | 300 | 550 | - | 360 | 368 | 404 |
| Piezoelectric Constants ($\times 10^{-3} \text{V} \cdot \text{meter/N}$) | g_{31} | -9.2 | -10.5 | -11.5 | - | -10.4 | -11.5 | -10.6 |
| | g_{15} | 23.0 | 26.9 | 26.1 | - | 35.1 | 34.1 | 34.8 |
| Frequency Constants ($\text{Hz} \cdot \text{m}$) | N_{31} | 1650 | 1650 | 1370 | 1460 | 1720 | 1780 | 1740 |
| | N_{33} | 1500 | 1500 | 1300 | 1410 | 1610 | 1620 | 1610 |
| | N_t | 2200 | 2150 | 1900 | 1970 | 2090 | 2080 | 2220 |
| | N_{15} | 1000 | 1300 | 1050 | - | 1160 | 1170 | 1200 |
| Mechanical Q | Q_m | 1300 | 1800 | 70 | 75 | 1200 | 1350 | 1200 |
| Elastic Compliance ($\times 10^{-12} \text{m}^2/\text{N}$) | S_{11}^E | 12.3 | 12.5 | 17.3 | - | 11.0 | 10.4 | 10.8 |
| | S_{33}^E | 15.8 | 16.0 | 22.0 | - | 13.5 | 13.0 | 13.9 |
| Curie Temperature | T_c | 300 | 300 | 350 | 360 | 310 | 300 | 310 |



圧電素子標準リングサイズ(単位:mm)

Standard Size for Piezoelectric Ceramics. (Unit:mm)

| O. D.(mm) | I. D. (mm) | Thickness (mm) |
|-----------|------------|----------------|
| 8.1 | 4.2 | 1 - 3 |
| 9.8 | 4.9 | 1 - 5 |
| 10.9 | 6.3 | 1 - 5 |
| 12.8 | 6.0 | 2 - 5 |
| 14.4 | 6.9 | 3 - 5 |
| 19.2 | 8.6 | 3 - 5 |
| 24.0 | 10.1 | 3 - 5 |
| 28.8 | 11.9 | 3 - 5 |
| 34.0 | 15.0 | 3 - 6 |
| 38.0 | 15.4 | 3 - 6 |
| 38.3 | 19.9 | 3 - 6 |
| 48.5 | 27.7 | 3 - 10 |
| 50.0 | 20.1 | 3 - 10 |
| 50.6 | 18.7 | 3 - 10 |
| 58.3 | 33.7 | 5 - 10 |
| 60.5 | 15.1 | 5 - 10 |
| 65.7 | 20.3 | 5 - 10 |
| 67.9 | 34.5 | 5 - 10 |



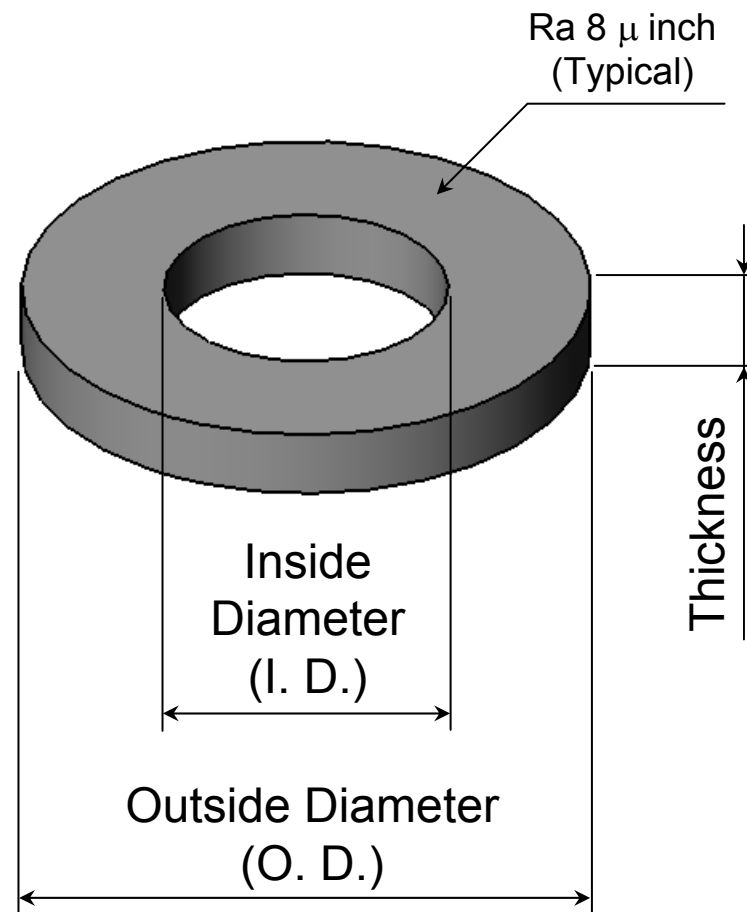
標準以外のサイズもご相談の上で製作可能です。
The other(not standard) sizes are also available.
Please inform us your requirements.



圧電素子標準リングサイズ(単位:inch)

Standard Size for Piezoelectric Ceramics. (Unit:inch)

| O. D.(in) | I. D. (in) | Thickness (in) |
|-----------|------------|----------------|
| 0.32 | 0.17 | 0.04 - 0.20 |
| 0.39 | 0.19 | 0.04 - 0.20 |
| 0.43 | 0.25 | 0.04 - 0.20 |
| 0.50 | 0.24 | 0.08 - 0.20 |
| 0.57 | 0.27 | 0.12 - 0.20 |
| 0.76 | 0.34 | 0.12 - 0.20 |
| 0.94 | 0.40 | 0.12 - 0.20 |
| 1.13 | 0.47 | 0.12 - 0.20 |
| 1.34 | 0.59 | 0.12 - 0.25 |
| 1.50 | 0.61 | 0.12 - 0.25 |
| 1.51 | 0.78 | 0.12 - 0.25 |
| 1.91 | 1.09 | 0.12 - 0.40 |
| 1.97 | 0.79 | 0.12 - 0.40 |
| 1.99 | 0.74 | 0.12 - 0.40 |
| 2.30 | 1.33 | 0.20 - 0.40 |
| 2.38 | 0.59 | 0.20 - 0.40 |
| 2.59 | 0.80 | 0.20 - 0.40 |
| 2.67 | 1.36 | 0.20 - 0.40 |



標準以外のサイズもご相談の上で製作可能です。
The other(not standard) sizes are also available.
Please inform us your requirements.

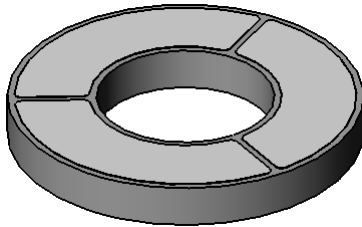


圧電素子電極

The Electrodes for the piezoelectric ceramics

(1) 標準仕様: 銀蒸着電極

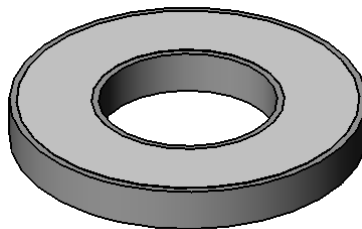
Standard electrode: Silver Vapored Electrode.



電極形成時の内孔マスキングのため、外観は分割タイプになります。
Appearance is segmented electrode, for the stencil covering the inner diameter hole during the electrode forming process.

(2) 印刷焼付銀電極

Screen Printed, Fired Silver Electrode.



スクリーン印刷による焼付銀電極もオプションとして可能です。
その他についても仕様ご相談の上で製作可能です。
Screen printed, fired silver electrode type is also available as the option.
Please inform us details of the electrode requirements.