

The values of Φ_{Bv} and Φ_{Bh} were calculated using floor vibration levels corresponding to line VC-B in Figure 15 (both for vertical and horizontal directions). Since plots in Figure 15 are given for vibratory velocity V_f , vibration displacement amplitudes X_f were calculated for each frequency of interest as $X_f = V_f/2\pi f$.

Values of Φ_A calculated per Specification A are interesting only for comparison, since high precision microelectronic production equipment is never used in conventional plant facilities, only in specially designed buildings complying with some of VC criteria.

It can be seen from Table 4A that the lowest value of Φ_{Av} (case A) for vertical direction is 4.51 Hz. If vibration isolators with medium damping $\delta_v = 0.6$ are used, then from Equation (12a) the required vertical natural frequency $f_v = 4.51 \sqrt{0.6} = 3.04$ Hz. However, if isolators made of rubber with high damping $\delta_v = 1.2$ are used, then $f_v = 4.51 \sqrt{1.2} = 5.0$ Hz, which can be realized by passive isolators with soft rubber flexible elements.

Much stiffer isolators ($f_{vz} > 14$ Hz) can be used to comply with values of Φ_{Bv} , per Specification B, which represent (according to not very stringent requirement VC-B) floor conditions at the microelectronics industry installations.

A similar situation is seen in Table 4B; however, realization of natural frequencies corresponding to Φ_{Bh} (4.7 Hz for $\delta_v = 0.6$, 6.63 Hz for $\delta_v = 1.2$) in horizontal directions with elastomeric isolators does not present any difficulty; even much lower values can be easily realized.

References

- [1] Rivin, E.I., *Passive Vibration Isolation*, ASME Press, N.Y., 2003
- [2] Crede Ch. E., *Vibration And Shock Isolation*, John Wiley and Sons, Inc., New York, Chapter Three, 1951
- [3] Mindlin, R.D., "Dynamics of Package Cushioning", *Bell System Technical Journal*, Vol. XXIV, Nos. 3-4, July-October, 1945
- [4] Hirschhorn, J., *Kinematics and Dynamics of Plane Mechanisms*, McGraw-Hill, 1962
- [5] C.M.T. Wells Kelo Ltd., *A Commercial Guide to Shock And Vibration Isolation*, Sept 1982, First Amendment, May 1983.