DETERMINING THE MODEL BEST FOR YOUR APPLICATION.

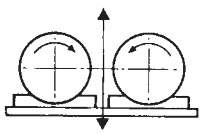
LINEAR MOTION FIG. 1 (CONTRA-ROTATING TWIN VIBRATORS)

Vibrators with their axes in the same plane and wired to contra-rotate will produce a linear motion at right angles to the vibrator axes. Amplitudes are as given by the formula below.

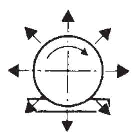
CIRCULAR MOTION FIG. 2 (SINGLE VIBRATOR)

True circular motion is only obtained when the center of the vibrator coincides with the center of gravity of the structure. When vibrators are fitted in noncenter of gravity positions the motion will be in the form of an ellipse which varies at different points on the structure. Amplitudes given by the formulas below are an average value suitable as an approximation.

1.



2.



AMPLITUDE FORMULA

a) For 864 CPM, App. $= \dfrac{0.0945 \text{ x CF}}{\text{LOAD}}$

b) For 1152 CPM, App. $= \dfrac{0.0530 \text{ x CF}}{\text{LOAD}}$

c) For 1728 CPM, App. $= \dfrac{0.0236 \text{ x CF}}{\text{LOAD}}$

d) For 3456 CPM, App. $= \dfrac{0.0059 \text{ x CF}}{\text{LOAD}}$

e) Any frequency, App. $= \dfrac{\text{CF*}}{14.2 \text{ x } \left(\dfrac{\text{CPM}}{1000}\right)^2 \text{ x LOAD}}$

*Use CF at required frequency i.e.

CF = CF at max. freq. x $\left(\dfrac{\text{Required freq.}}{\text{max. vibrator freq.}}\right)^2$

In no case should amplitudes exceed the following values:

SPEED	864 CPM	1152 CPM	1728 CPM	3456 CPM
App.	1.42"	0.795"	0.354"	0.088"

Any frequency = $1.06 \left(\dfrac{1000}{\text{CPM}}\right)^2$

CENTRIFUGAL FORCE REQUIRED

If the frequency of vibration, load, and amplitude required are known, the centrifugal force required can be calculated from the following:

a) For 864 CPM, CF $= \dfrac{\text{App. x LOAD}}{0.0945}$

b) For 1152 CPM, CF $= \dfrac{\text{App. x LOAD}}{0.0530}$

c) For 1728 CPM, CF $= \dfrac{\text{App. x LOAD}}{0.0236}$

d) For 3456 CPM, CF $= \dfrac{\text{App. x LOAD}}{0.0059}$

e) Any frequency, CF = App. x 14.2 x $\left(\dfrac{\text{CPM}}{1000}\right)^2$ x LOAD

VIBRATOR ISOLATION

When using vibrator(s) on vibratory equipment, it is necessary to allow freedom of movement and also to prevent unwanted damaging vibrations being transmitted to surrounding equipment and steelwork. Generally 95% isolation is satisfactory and will be obtained by using resilient mountings having the following static deflections under the weight of the structure, load, and vibrator(s):

a) For 864 CPM, d = 0.990"

b) For 1152 CPM, d = 0.557"

c) For 1728 CPM, d = 0.248"

d) For 3456 CPM, d = 0.062"

For other values of deflection and frequencies isolation % =

$$100 - \frac{100}{(d \text{ x } 25.4)\left(\dfrac{\text{CPM}}{950}\right)^2 - 1}$$

Total transmitted force is given by:

P Trans $= \dfrac{(100 - \text{isolation \%})}{100}$ x CF

WORKING MOMENT

The working moment values given in the tables are twice the working moment used to calculate the centrifugal force and are used as another method for calculating the amplitude peak to peak from:

$$\text{App.} = \frac{\text{Working moment}}{\text{LOAD}}$$

Also,

Working moment required = App. x LOAD

POWER REQUIREMENTS

The power required from a vibrator depends on the nature of the application and the degree of damping present. It can be shown that for any application there is a peak power requirement when damping is at an optimum level. The power required then is:

For Linear vibration,

Watts max. $= \dfrac{\text{App. x CF x CPM}}{676}$

For Circular vibration,

Watts max. $= \dfrac{\text{App. x CF x CPM}}{338}$

In most applications the power required can be taken as one-fifth of the above values since damping rarely reaches an excessive level. If the vibrator current is found to be too high, the out-of-balance weights should be set back until it reaches an acceptable figure.

NOTATION

App. = Amplitude peak to peak (inches)

CF = Total Centrifugal Force (pounds)

CPM = Frequency of Vibration (cycles per minute)

LOAD = Total weight of structure, vibrator(s), and any loading (pounds)

Designs and/or specifications are subject to change without notice.