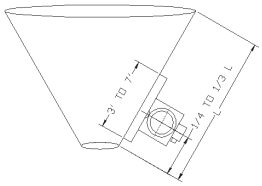
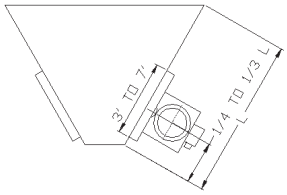
Engineering Data & Applications

TYPICAL VIBRATOR MOUNTING



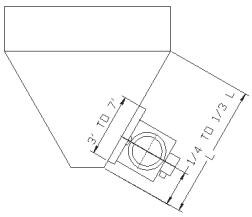
1. CONICAL HOPPERS:

Mount vibrator (by channel-iron stiffener 3'-7' long*) to hopper wall from 1/4 to 1/3 the distance from the discharge to the top. Should a second vibrator be necessary, it should be mounted diametrically opposite and approximately 1/2 up the wall.



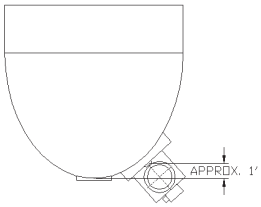
2. RECTANGULAR HOPPERS:

Mount as for conical hoppers on the centerline of one side. A second vibrator may be required if complete cleaning of all corners and sides is desired. Mount as per paragraph 1.



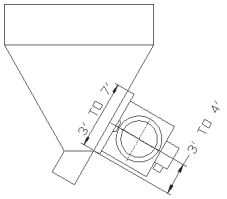
3. RECTANGULAR BINS WITH HOPPER BOTTOMS:

Usually requires larger force vibrators (than above) because of additional "head" load of material. Locate vibrator 1/4 to 1/3 distance up sloping section and mount as in paragraphs 1 & 2.



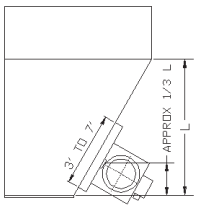
4. PARABOLIC BINS OR HOPPERS:

Mount vibrator within 1-foot of each discharge opening and in line with center of opening.



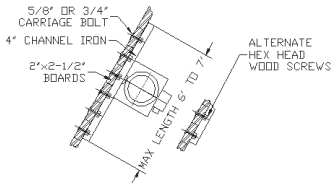
5. BINS WITH SLOPING CHUTE DISCHARGE:

Vibrator is mounted 1/8 to 1/6 distance up bin wall that is contiguous with under side of chute. This lower mounting position puts vibrator close to bin discharge throat and assures vibration transference into chute.



6. BIN OR HOPPER WITH VERTICAL SIDE:

Mount vibrator on wall with least slope in similar manner as in paragraph 3.



*For instruction on stiffening of bins and mounting procedures ask for Vibrator Mounting Instructions.

NOTE: for other applications not covered here please consult factory for recommendations. This is a free service and without obligation to you.

How to Select the Proper Vibrator in Three Easy Steps

1. **DETERMINE NEEDED VIBRATOR FORCE FOR YOUR APPLICATION**
2. **FIND AVAILABLE VIBRATOR MODELS**
3. **SELECT ELECTRIC, PNEUMATIC OR HYDRAULIC OPERATION.**

1. DETERMINE NEEDED VIBRATOR CENTRIFUGAL FORCE (IMPACT) FOR YOUR APPLICATION

A. BINS, HOPPERS

To move the material in a bin or hopper, the friction between the material and the bin skin has to be broken. Once this is done the material cannot cling to the bin sides and it will flow out through the discharge. The vibrator force needed to accomplish this, is for 80% of all applications, very simply calculated as follows:
Calculate the weight of the material in the transition or sloping part of the bin. Normally this is the only place where the friction between the material and the bin sides has to be broken. DO NOT CALCULATE THE TOTAL WEIGHT, ONLY WHAT IS IN THE TRANSITION PART.
For CONICAL BINS, calculate as follows: .261 x dia.^{2} x height x material density in lbs/cu. ft.
For RECTANGULAR BINS, length x width x height x 1/3 x material density.

When the weight has been calculated, divide by 10. The figure you get is the force or impact needed on your vibrator _____ lbs. Continue with paragraph B.
For example: The conical part of a 25 ton bin contains 7000 lbs. Divide 7000 by 10, you need a vibrator with 700 lbs. of centrifugal force or impact. Find suitable vibrator under Paragraph B.

NOTE: Additional considerations when sizing vibrator to bins.

1. If bin side angle is below 30º, select next larger vibrator.
2. If bin thickness is extra heavy (see table under section B), select next larger vibrator.
3. On real sticky and hard to move materials, it is better to use two (2) small vibrators instead of a large one (find the smaller one by figuring half the material weight.)

B. VIBRATING TABLES

1. PACKING MATERIAL

Dense materials respond best to high frequency vibration (3600 RPM or more) while light, fluffy or flaky materials respond best to low frequency vibration (1800 RPM or less).

For packing or settling materials, use a vibrator with an impact force of (1.5) to 2 times larger than the weight of the material plus container. Find suitable vibrator under Paragraph 2.

C. VIBRATING SCREENS

Rule of Thumb: for self-cleaning screen use a vibrator with a centrifugal force (impact) four (4) times the weight of the material plus the weight of the screen.

NOTE: Coarse and lumpy materials respond best to 3600 VPM (vibrations per minute), powdery and dry materials, 1800 VPM, sticky and wet materials, over 3600 VPM.

D. CONSOLIDATING CONCRETE

Rule of Thumb: For 3" "slump" concrete use a vibrator with the same force (impact) as the weight of concrete and form. For 1-2" slump concrete, an additional 30-50% impact is needed. For dry mixes (0-slump) add 100-200%.

NOTE: FOR ADDITIONAL SIZING INFORMATION, SEE PAGES 35 & 36 for suitable bracketry. Find suitable vibrator under paragraph B. Ask for Bulletin 0103 and 8401.

E. RAILROAD CARSHAKERS: SIZING, SEE PAGE 41 & 42.

F. MATCH PLATE - FOUNDRY: SIZING, SEE PAGE 11, 13 & 17.

G. FOR SPECIAL APPLICATIONS AND QUESTIONS CONTACT VIBCO FOR FREE RECOMMENDATION.

VIBRATOR SELECTION CONT.

2. FIND AVAILABLE VIBRATOR MODELS

From the table below, draw a line across from the force calculated in paragraph A. You will find you have a choice of several vibrators, both electric, pneumatic and hydraulic models. List them below and continue with Paragraph C.

MODEL:_____

To continue with the example - 700 lbs. of vibrator force is needed. Draw a line straight across from 700 lbs. The line will cross the force ranges of suitable vibrators: Electric Models 2P-450; 2P-800; 4P-700; 4P-1000; US-900; SCR-1000; and Pneumatic Models BVS & VS-380; BV & V-380; 50-2L; 50-2LS; PF-800. Now continue with Paragraph C to make final selection.

Vibrator Force or Impact Lbs.	ELECTRIC MODELS																						PNEUMATIC MODELS										HYDRAULIC MODELS				BIN SKIN Thickness Max.
	PAGE NO.																																				
	2P Page 24-28		4P Page 24-28		6P Page 24-28		8P Page 24-28		SPR Page 29-30		US Page 31-32		SFC Page 34		FC Page 34		SCR Page 23-24		TURBINE Page 3-12		BALL Page 13-14		PISTON Page 15-18		SVR Page 19-20		BIG BUSTER Pge 21-22		TURBINE Page 21-22		BIG BUSTER Page 21-22		
10									SPR 20 & 21								SCR-50/60	SCR-100	BVS-60 VS, BVS-100																20 Ga.
20																					BV-50 BB, V-100														20 Ga.
40		2P-75							SPR 40											BVS-130 VS, BBS-130			5/8, 3/4	1 & 1-1/4				B-130					1/16
60									SPR 60		US-100		SFC-100		FC-100						BV-130, BB, V-130		1-1/4 - 1-1/2S												1/8
80		2P-100							SPR 80							FC-200			BBS-160	BVS-190, VS-190	BB-160														3/16
100															FC-300						BV-190, V-190		1-1/2L or LS, 2S	1-1/2											1/4
150		2P-150				6P-500								SFC-300				SCR-200/300				BV-250, V-250														5/16
200				4P-350	6P-300			8P-500			US-300				FC-400				BVS-250, VS-250	BVS-320, VS-320	BV-320, V-320		2L, 3S	2, 2LS		PF-800										5/16
300		2P-200																SCR-400/500				BV-380, V-380														3/8
400																			BVS-380 VS-380	BVS-510 VS-510																3/8
500			4P-700				6P-1000					US-450																									7/16
600		2P-450																																			7/16
700				4P-1000																																	1/2
800																																					1/2
900			4P-1400								US-900																										1/2
1000																																					1/2
1200		2P-800		4P-2000																																	1/2
1400																																					3/4
1600			4P-3000									US-1600																									3/4
2000		2P-1700																																			3/4
2500				4P-5000																																	3/4
3000		2P-2500																																			1
3500																																					1
4000			4P-10000																																		1-1/4
4500																																					1-1/4
5000																																					1-1/4
6000																																					1-1/4
7000																																					1-1/4
8000																																					1-1/4

VIBRATOR SELECTION CONT.

3. SELECT ELECTRIC, PNEUMATIC or HYDRAULIC OPERATION

ELECTRIC VIBRATOR MODEL SELECTOR

ELECTRICAL DATA	MODEL 2P	4P	6P	8P	SPR	US	SFC	FC	SCR
115 volt 1 phase	x	x	x	x	x	x	x	x	x
230 volt 1 phase	x	x	x	x	x		x	x	x
Any voltage 3 phase	x	x	x	x			x	x	
50 cycles	x	x	x	x	x	x	x	x	x
Continuous duty	x	x	x	x	x		x	x	x
Intermittent duty						x			
More than 20 stops & starts per hr. 3 phase	x	x	x	x			x	x	
More than 20 stops & starts per hr. 1 phase	z	z	z	z	x	x	z	z	
Totally enclosed	x	x	x	x	z	z	x	x	x
Outside Fan Cooled							z	x	
Open construction					z	z			
Built in overload protection 1 phase	x	x	x	x	x	x	x	x	x
Adjustable speed					z	x			x
Adjustable eccentric	x	x	x	x	z	x	x	x	x
Decibel at 3' on A scale	60	60	60	60	48	90	62	62	65
APPLICATION									
Outside	x	x	x	x	x	x	x	x	x
Water splash	x	x	x	x	z	z	x	x	x
Powder in air dry	x	x	x	x	z	z	z	z	x
Powder in air sticky	x	x	x	x		z			z
Powder in air metallic	x	x	x	x		z			z
High temperature	z	z	z	z			z	x	
Bins with coarse mtr.	x				x	x	x	x	x
Bins with tine mtr.	x				x	x	x	x	x
Bins lumpy or sticky mtr.		x	x						
Bins with stringy mtr.		x	x	x					
Bins powdery & sticky mtr.						x			
Packing coarse mtr.	x						x	x	x
Packing fine mtr.		x	x	x					x
Stringy-fluffy mtr.			x	x					
Concrete	x					x			
Screens		x	x	x					x
Feeder - chutes	x	x	x	x			x	x	x

Z - SEE BULLETIN COVERING THE MODEL LINE (or consult VIBCO)

PNEUMATIC VIBRATOR MODEL SELECTION

	PNEUMATIC Turbine	Ball	Piston	SVR	SVRS	Big Buster
Decibel at 3' on A scale*	72.78	85-95	90-95	95-105	80-85	80-90
Air consumption**	2	3	1	6	5	4
Repair Cost**	1	3	2	4	5	6
Maintenance Cost*	1	3	2	4	5	6
Purchasing Cost	2	3	1	4	5	6
Patented Design	x			x	x	x
Lubrication Required		x	x	x	x	x
No lubrication required	x					
Requires clean air			x	x	x	x
Tapped exhaust for leading away exhaust air	x	x	x		z	x
High temp.		x				
Steam -pressure cleaning	x	x		x		
Concrete application	x			x	x	

*AVERAGE READING **LOWEST NUMBER BEST
Example: Piston lowest in air consumption, then Turbine, Ball, Big Buster, SCRS & SVR

GENERAL COMMENTS:

In general, electric vibrators are initially higher in cost than pneumatic vibrators; however, the operation cost is considerably less and the difference in price and installation cost is recaptured in a few months of operation. The electric units have the lowest noise readings, 60-70 dB, no more sound than an electric motor. The life expectancy is 2-3 times that of an air operated unit. The life of an air operated unit is, to a great extent, determined by the cleanness of the compressed air and the operating pressure. Maximum operating pressure is 80 PSI, above 80 PSI, the life of the pneumatic vibrator diminishes rapidly. The dBa reading on piston vibrators is 80-110, on ball vibrators, 80-115. The ONLY pneumatic units with a dBa reading of 60-80 are the TURBINE VIBRATORS. The least air consuming are the piston vibrators, then the turbine, ball and SVR high frequency vibrators. As a general rule: for standard applications, limit your selection of vibrators to the SCR Electric Vibrator Line and the Turbine Pneumatic Vibrators. They will give you the latest in vibration technology and design with the lowest noise, the best life, the least maintenance, and the lowest energy consumption.

The hydraulic vibrators are fast gaining acceptance but still primarily used on OEM equipment for food and related products.

For additional selection considerations, see table for electric vibrators and pneumatic vibrators located on this page. Also look up the pages for each specific vibrator for additional information.

To continue with our example: Choose electric model 2P-450 or 2P-800 if bin contains fine granular material (see also page 25-28): 4P-700 or 4P-1000 if bin contains lumpy or stringy material (page 25-28): US-900 if bin contains light powdery or real sticky material (cement, concrete, molasses, etc., page 31-32; SCR-1000 (page 23-24) when different materials are used in the bin and different frequencies or forces are needed. For additional considerations, also see "Electric Vibrator Model Selection" table on this page.

When choosing a pneumatic vibrator, see table on this page "Pneumatic Vibrator Model Selection". The turbine BVS and VS-380 (page 3-12) is noiseless, meets OSHA, has low maintenance cost, and needs no lubrication, (all other pneumatic vibrators need lubrication).

Difference between BVS and VS: In BVS, the air exhaust is threaded allowing connection of a hose or pipe; permitting the exhaust air to be exhausted outside work area; or used with different mufflers. The VS has a built-in muffler and exhausts the air into the atmosphere where the vibrator is mounted.

Ball vibrators BV-380 or V-380 (page 13-14): Noise level increases rapidly as ball and race wears. Use in high temperature applications. Difference between BV and V is the same as with BVS and VS.

Piston models 50-2L and 50-2LS are used for low cost and low air consumption, must be lubricated. Pistons are preferable on feeders and packing tables. Comes in silent and non-silent models, (page 15-18).

Big Buster, PF-800 is primarily used for railroad car shakers where a high intermittent force is needed (pages 21-22).

VIBCO OFFERS A WIDE SELECTION OF ELECTRIC,

VIBRATOR FORCE OR IMPACT IN LBS. SEE PAGE 47-50*

20 40 60 80 100 150 200 300 400 500

ELECTRIC SMALL IMPACT LINE PAGE 29-30

SPR, SPRT, SPRWT

20 | 40 | 60 | 80

CE-60

SPR SPRT SPWT

100

SCR ADJUSTABLE SPEED & FORCE PAGE 23-24

SCR-100 | SCR-200 | SCR-300 | 350 | 400 | SCR-500

2P, 4P HEAVY DUTY LINE PAGE 25-28

2P-75 | 2P-100 | 2P-150 | 2P-200 | 2P-450

4P-350 | 4P-600/700 | 4P-1000

SFC & FC PAGE 34

SFC-100 | SFC-300, FC-100 | FC-300

SFC-100

US-HIGH FREQUENCY LINE DC - 12 VOLT DC BATTERY OPERATED

PAGE 31-32

US-100 | US-450

DC-100 | DC-450, DC-200, DC-300 | DC-500

PNEUMATIC

SILENT TURBINE VIBRATORS PAGE 5-12

BBS-160

VS-320

BBS, FBS, VS-100, BVS-60 | BBS,FBS,VS, BVS-130 | VS-BVS-160 | VS-BVS-190 | VS-BVS-250 | VS-BVS-320

BBS-160 | BBS-190

BALL VIBRATORS PAGE 13-14

V-130

V-190

BV-320

BB-100, V-100 BV-60 | BB,V, BV-130 | BB-160 | BB, BV, V-190 | BV, V-250 | BV-320

10 & 20-1

PISTON VIBRATORS PAGE 15-18

10-5/8 | 10-3/4 | 10-1 | 50, 55-1,1-1/4S | 10-1-1/4 | 50, 55-1-1/4 50, 55-1-1/2S | 50, 55 - 1-1/2 | 50 - 1-1/2L, LS | 50, 55 - 2S | 50, 55 - 2

HIGH FREQUENCY PAGE 19-20

BIG BUSTER PNEUMATIC PAGE 21-22

HYDRAULIC

PAGE 22

B-190 | B-250

***Follow selected vibrator force line vertically to find vibrators to select from with same force output.**

FOR EXAMPLE: I need 560 lbs. of force – draw a vertical line from the 560 Force Output Value. Your choice of vibrators are: Electric Model SCR-1000 with adjustable speed & force; Model 2P-450 heavy duty; Model 4P-1000 - 1800 RPM heavy duty; Model US-700 high frequency; DC-700 12 Volt DC;

PNEUMATIC, HYDRAULIC VIBRATORS*

560 600 700 800 900 1000 2000 3000 4000 5000

NOTE: For additional information on vibrator selection see page 48.

SCR-1000

SCR-1000

2P-100

2P-450

2P-800 | 1700 | 2P-2500 | 2P-4500 | 2P-5500

4P-1400 | 4P-3000 | 4P-5000

US-450

US-1600

US-700 | US-900 | US-1600

DC-700 | DC-900 | DC-1600 | DC-3500

BVS-570

CCF-5000

VS-BVS-380 | VS-BVS-510 | BVS-570 | CC 2000 | CCF, CCL, CCW-5000

V-320 | BV, V-380

55-2

50-3

50-2L | 50,55-3S | 50-3L, 50-4

50,55-3 | 50-3LS

SVRLS-5500

SVRFS-5500

SVR, SVRS 4000 | SVR,S-5500 | SVR,S-6500

PC-3500

PF-800 | PF-1200 | PF-1500 | PF, PC-3500

LH-1000 | LH-1800 | HL-3000

B-320 | HLF-1300 | HF-1500

HLF-700 | HF-800 | HF-1200 | HC,HF-3500

LH-3500

LF-700

Pneumatic VS or BVS-320 Silent Turbine; V-320 Ball Vibrator; Model 55-2 or 50-2 Piston Vibrator; Model HLF-700 Hydraulic. Which vibrator to choose: First select Electric, Pneumatic or Hydraulic; then see page 50 for further selection data or call an application engineer at VIBCO for advice.