General Rules for Selecting, Sizing and Placing External Vibrators

For the successful use of external vibrators you must determine:

1. VIBRATION PENETRATION

2. EFFECTIVE VIBRATION AREA

3. SIZING AND PLACING OF VIBRATORS

4. VIBRATION PROCEDURE & VIBRATION TIME

1. **VIBRATION PENETRATION:** As a general rule, when the thickness of the concrete in the form exceeds 6 inches, use vibrators (staggered) on both sides of the form. In columns the reinforcement steel will aid in vibration transfer to the center of the column.

2. **EFFECTIVE VIBRATION AREA:** Vibration waves are strongest at the vibrator and diminish as they move away in a circular pattern (like the waves when a stone is thrown into water) Reaching a 3-5 foot radius. Generally figure a 3 foot radius from the vibrator as an effective vibration area. Some of the vibration will travel to a 5 foot radius. At the 5 foot radius the vibration from the next vibrator should overlap the first.

3. SIZING AND PLACING OF VIBRATORS

(A) SIZING: There are many ways to select and size vibrators. We list the most commonly used ones below. (For other selections consult a VIBCO applications engineer.)

ELECTRIC VIBRATORS:

Model US-900:	115 volt single phase - 4.5 amps 10,000 vibrations per minute
Model US-1600:	115 volt single phase - 5 amps 9,000 vibrations per minute

(Both can be run off field generators.)

PNEUMATIC VIBRATORS:

Model CCF, CCW or CCL-2000:	80-100 PSI - 40 CFM 6,000 vibrations per minute
Model CCF, CCW or CCL-4000:	80-100 PSI - 45 CFM 7,000 vibrations per minute

5. HELPFUL HINTS AND CORRECTIONS AFTER THE FORM IS STRIPPED

(A) For bleeding of cement and water: tighten seals in form or use less water or lower slump concrete.

(B) For honeycombing: often from bleeding, but if not, increase vibration time. If honeycombing on lower surface, move vibrators close to bottom of form.

(C) For small pin holes in finish: usually from too wet mix; additives or form oil; air entering when form wall flexes too much during vibration, sucking in air. Large pin holes: if all over, try to reduce water content, vibrate longer after pour, add additional vibrators or re-vibrate before initial set.

(D) Separation of aggregates: vibration time too long or too much water in mix.

IF YOU HAVE ANY QUESTIONS

CALL AND ASK FOR ASSISTANCE

FROM A VIBCO

APPLICATIONS ENGINEER

24/7 at:

800-633-0032

www.vibco.com

vibrators@ vibco.com

3. SIZING AND PLACING OF VIBRATORS (cont'd.)

(C) BRACKETS: The bracket to be selected can be one of the standard models shown on the preceding applications or you can design your own in conjunction with VIBCO's application engineers.

4. VIBRATION PROCEDURE AND VIBRATION TIME

(A) VIBRATION PROCEDURE: Place vibrators to be used in their lowest position. It's a good idea to pre-mark the vibrator positions. Do not start vibrators until the concrete reaches them or is about 6"above them.

TIP: If internal vibrators are used, do not start the external ones until the internals have stopped or moved to a higher position. Internal vibrators throw air bubbles away from the vibrator head against form side leaving air holes and pockets on surface. External vibrators throw air bubbles into the mix, up and out, leaving surface against form smooth and blemish free.

(B) HOW LONG TO VIBRATE: The time you need to vibrate varies depending on concrete slump, additives, stiffness of form, vibrator force, etc.

To determine the vibration time needed, it is advisable to make a test run. For example: On a column, take the time from the start of the vibrators to when the concrete reaches the 1/2 way mark to the next higher row, look at the concrete surface. When no more air bubbles are breaking on the surface, and a glistening surface appears on top of the concrete, you have vibrated enough. The time this took is your vibration time for the vibrators in each position for all the columns of that size.

If you do not want to measure the time, you will have to watch the concrete surface for bubbles breaking and the glistening slick surface each time, before moving the vibrators.

NOTE: If the walls or columns are too high to determine the vibration time by observing air bubbles breaking on the surface you can elect to run the vibrators until the concrete reaches the next higher row (like the contractors on page 8 and 13). The lower vibrators are stopped, moved up and restarted. Caution should be taken if the concrete mix has a high slump with large aggregates.

TIP: "Over-vibration" is something every contractor is afraid of (when the aggregate and sand separate and all the aggregate ends up in lumps or at the bottom of the form). The concern is well founded, but it takes a long vibration time and a lot of vibration force to reach this point. Our experience has been to see "under-vibration" rather than "over-vibration," too little vibration time or force to get a homogenous mix free of air bubbles.

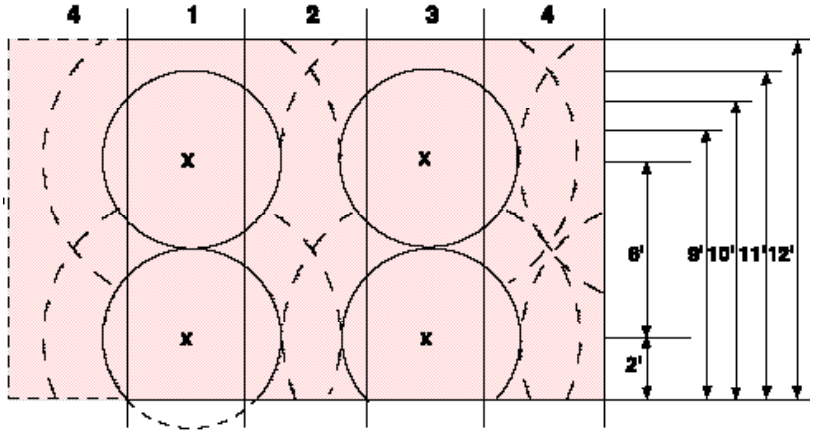


Figure I

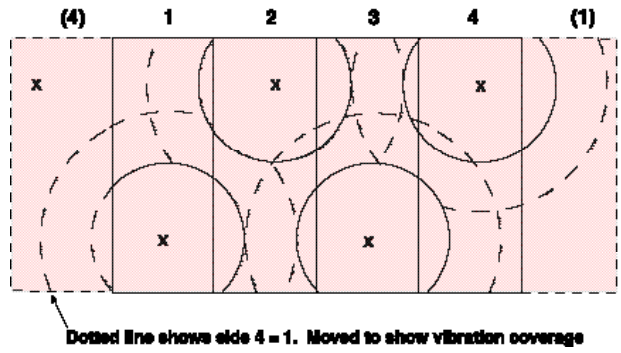


Figure II

FIGURE 2A

4' x 4' COLUMN

Figure I: 3' radius circles "Primary Vibration" cover two sides; with the "Secondary 5'R-Vibration" all sides are covered. The X indicates vibrator position. 4 vibrators will cover A 9', 10', 11' or 12' high columns.

Figure II: Show an alternative staggered vibrator mounting

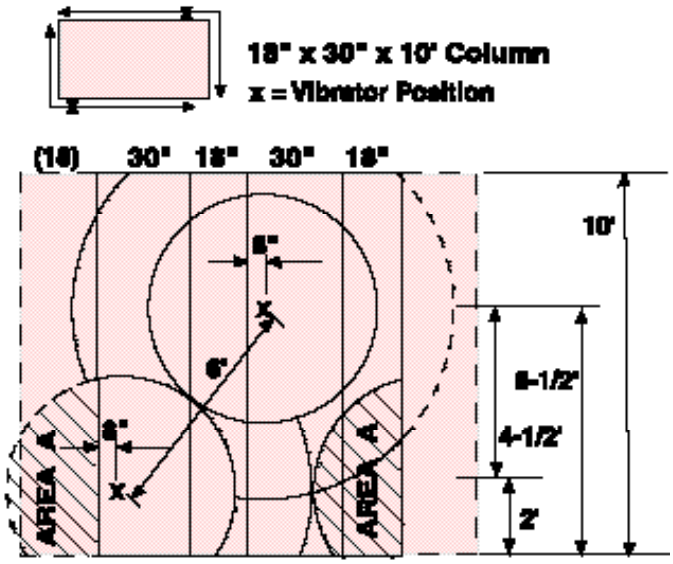


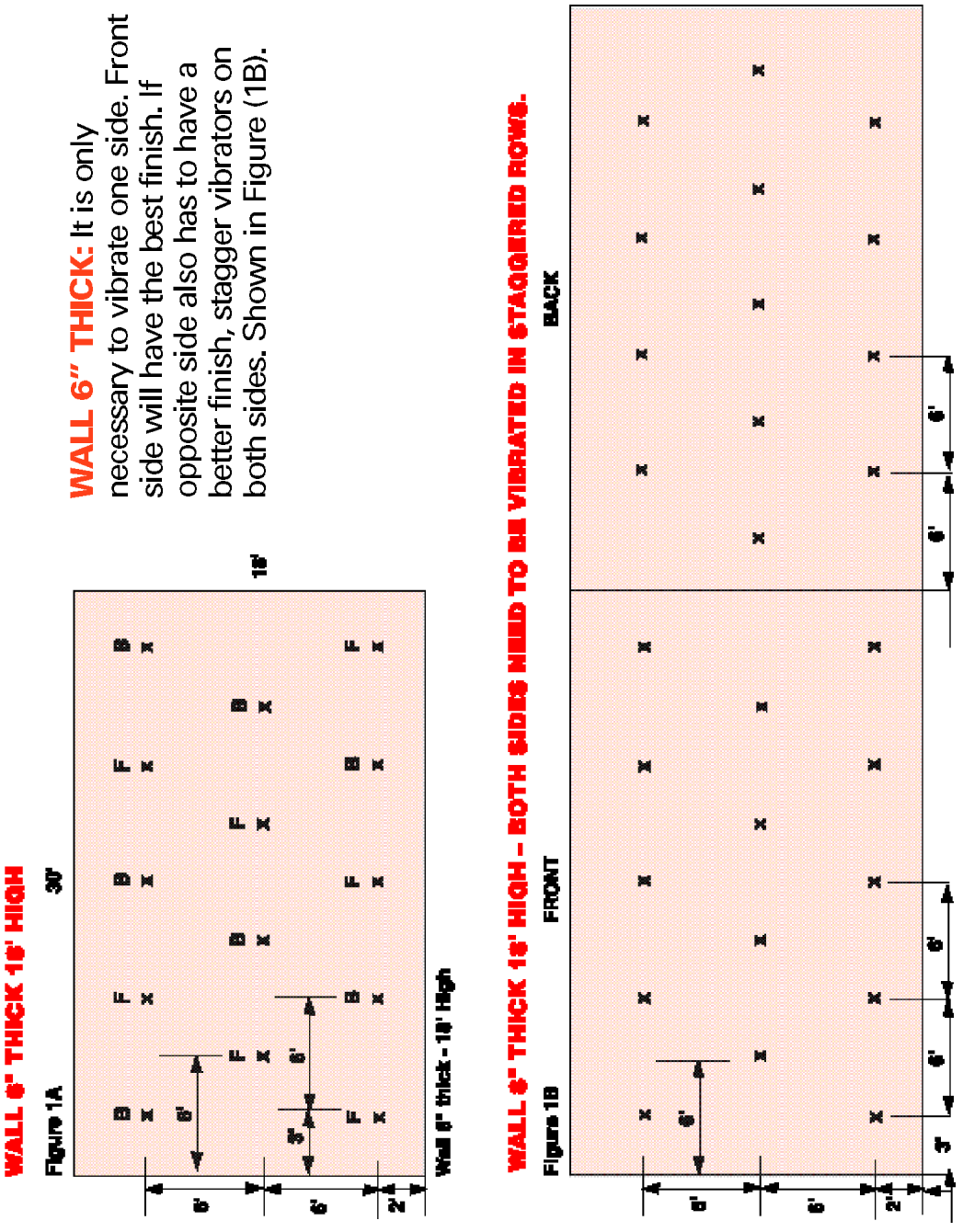
FIGURE 2B

When sides are small 15", 18", 20", put the vibrator close to a corner. The other vibrator close to opposite corner of the 30" side (a corner will always resist vibration more than a flat wall).

When placing the vibrators as shown the primary and secondary vibration will cover the form sides.

The top vibrator can be moved so that the vertical distance between the vibrators is 6' and then a taller column can be vibrated.

WALL 6" THICK: It is only necessary to vibrate one side. Front side will have the best finish. If opposite side also has to have a better finish, stagger vibrators on both sides. Shown in Figure (1B).



3. SIZING AND PLACING OF VIBRATORS (cont'd.)

PNEUMATIC VIBRATORS cont'd:

Model SVRLS,	80-100 PSI - 40-50 CFM
SVRFS-4000,	11,500 to 15,000 vibrations per minute
SVRWS-4000	(For architectural finish)
CCF, CCL-5000 & 7000:	

COMPARABLE VIBRATORS:

US-900 & CCF, CCL, CCW-2000's: Used on smaller forms for low production with effective vibration area of 2.5 to 3' radius

US 1600 & CCF, CCL, CCW-4000's & SVRL, SVRF, SVRW-4000: Used on high production, larger forms with an effective vibration area of 3' plus.

(B) PLACING OF VIBRATORS:

STEP 1. For walls, make a dimensional drawing of the form, if 6 inch thick concrete, draw up front only. If over 6 inches, make a drawing of both sides *(see Figure 1 A & B)*. For columns, make a drawing of all 4 sides *see Figure 2 A & B).*

STEP 2. Draw in circles of 3' radius and 5' radius.The 5' radius should overlap, one circle for each vibrator position. (*see Figure 2 A & B)*

TIP: A good idea is to start first row of vibrators 2' up from the bottom of the form. Since all the form weight rests here, some of the vibration will also travel under the form.

You can make your own decisions as to where to place the vibrators on the form – just remember the simple rule that the effective vibration area has a 3' radius (5' max.) and the adjacent vibrator area should overlap.

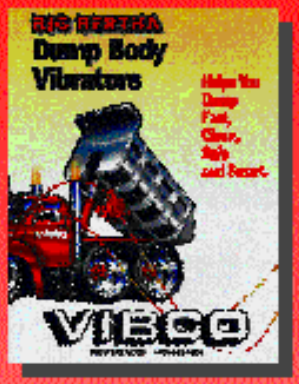
When you have drawn up your form and placed the vibrators, you will know how many vibration positions you have. Now you will have to decide how many vibrators you need. A good rule of thumb is to have enough for the first row of vibrators. Remember the bottom row of vibrators must be moved to the next row up and started when the concrete reaches that row. If this is too much climbing and rushing while the pour is going on , you might want to get additional vibrators.

When using electric vibrators, keep in mind that the US-900 and US-1600 high frequency vibrators have a 50% duty cycle – in an hour you can only use them for 30 minutes. These 30 minutes can be 30 minutes continuous running or 1, 2, 3, etc. minimum minutes "on" with the same or longer "off" time. But never exceeding a total running time of 30 minutes in one hour. The pneumatic units have a 100% duty cycle and can be operated continuously.

Let us send you free copies of our catalogs and discover all the VIBCO products designed to help you work smart.

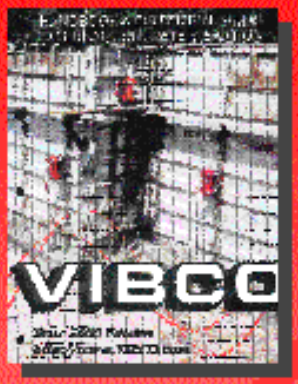
GENERAL CATALOG

- Pneumatic Vibrators
- Electric Vibrators
- Hydraulic Vibrators
- Catalog #9001



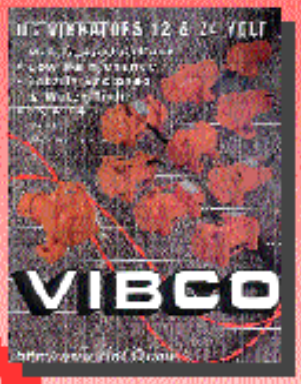
BIG BERTHA DUMP BODY VIBRATOR

- Dump body vibrators
- How To Select Guide
- Drawings & Dimensions
- Catalog #0101



HANDBOOK & EQUIPMENT GUIDE EXTERNAL CONCRETE VIBRATION

- How-To-Booklet
- 71 Application Photos
- Selection & Locating Guide
- Catalog #8401



12 VOLT DC VIBRATORS

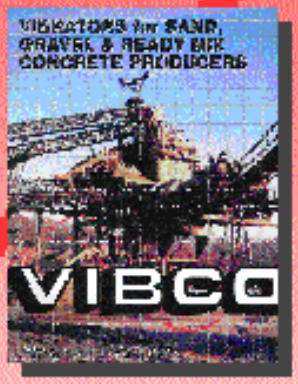
- Dump body vibrators
- Salt & sand spreaders, etc.
- 20 to 3500 lbs. force
- Catalog #9112

PLATE COMPACTORS & ROLLERS

- 12" to 24" plates
- Reversible and single directional plates
- Rollers 12" and 36" sizes available
- Catalog #9808

INTERNAL CONCRETE VIBRATORS

- Electric 1-3/8" to 2-1/2" Head Size
- Pneumatic 1-3/8" to 3"
- Interchangeable head and shaft
- Catalog #9606



SAND & GRAVEL VIBRATORS

- 60 Application Photos
- Selection & Sizing Guide
- Pneumatic Electric & Hydraulic
- Catalog #9803

ALL VIBCO VIBRATORS ARE MADE IN THE U.S.A.

VIBCO

We're The CONCRETE Vibrator Guys.™

Corporate HQ & Factory:
75 Stilson Road, P.O. Box B
Wyoming, RI 02898
E-Mail: vibrators@vibco.com
Phone: (401) 539-2332
(800) 633-0032
FAX: (401) 539-2584

Western US:
Phoenix, AZ 85254
Phone: (480) 596-1809
(800) 633-0032
FAX: (480) 596-1614

Canada:
2215 Dunwin Drive
Mississauga, ONT L5L 1X1
Phone: (905) 828-4191
(800) 465-9709
FAX: (905) 828-5015

www.vibco.com

PRINTED IN USA