ON-LINE MANUAL
General Information

1. General information on pneumatic external vibrators

1.1. Introduction
This manual contains information on the two main types of vibrators:

- **Rotary vibratord** (ball, roller and turbine vibrators)
- **Linear piston vibrators**

Historical Background...
Even today in some areas of the globe, just as it was centuries ago, the hand driven stamper still is very common as a tool to compact concrete in molds. Similarly, the sledge hammer is the tool used to support the material flow.

Screens to separate chaff from corn are known to be the first vibrating application "industrialized", i.e. the first vibrating element driven by non-human energies such as water and wind.

Pneumatic driven vibrators were introduced early this century as linear piston vibrators or pneumatic hammers. Only years later was the simpler rotary vibrator with a ball or a roller running circle born. For decades this design has not been changed. The body was and still is made by many manufacturers of cast iron and the outside surface is not machined.

At the end of the sixties, the first experiments with aluminum bodies were conducted. Aluminum is very simple and clean to machine, with no black casting dust that covers machines and the hands of the end users. Aluminum has the strength required but is not too stiff to allow cracks to form. It can be coated with paint so that modern industrial designs can be created. For applications in special environments such as pharmaceutical installations bodies are machined from stainless steel.

Today, a vast amount of work is done by vibrators. The main applications are emptying bins and hoppers, screening materials, and compacting concrete as well as feeding sand, clay, or any kind of powder or small parts such as screws. Vibration is also used in the electronics industry to detect cold joints on printed circuit boards.

In silo and bin applications air blasters are used to loosen bulky materials. Most of our agents and representatives sell air blasters as well as vibrators since the products complement each other.

1.1.1. Classification of vibrators
Vibrators can be classified in general according to the type of energy they use and the vibration technology :

Energy Type	Technology
Electricity	Rotary / Linear / Magnetic
Pneumatic	Rotary / Linear
Hydraulic	Rotary

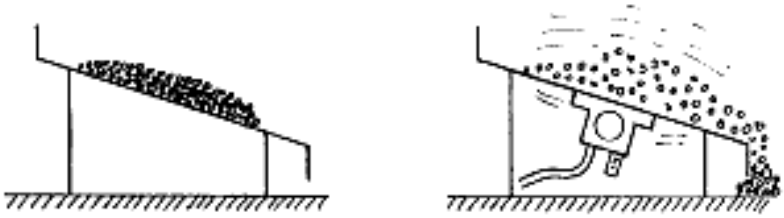
1.2. Basic Information On Pneumatically Driven Vibrators

1.2.1. What is a vibrator good for?

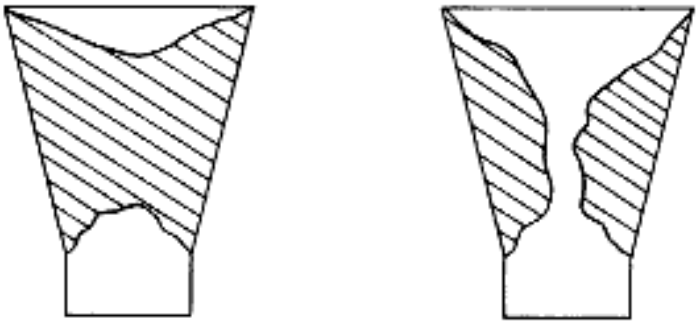
As previously stated, with the help of vibration any kind of bulky material can be fed, compacted or separated. In most cases vibration supports the force of gravity. For instance, bulky material may "hang" and clog in a hopper because of moisture. Vibration can loosen the material so the force of gravity can continue to move material through the hopper.

Another application for vibrators is their use with concrete. Vibrating concrete means to shake the sand and gravel particles so that they find the most compact volume possible, with no space available for air. Gravity is responsible for the first line in compacting but the vibration supports and improves it very much.

In both the cases vibration will reduce friction of the material.



Vibrating and gravity



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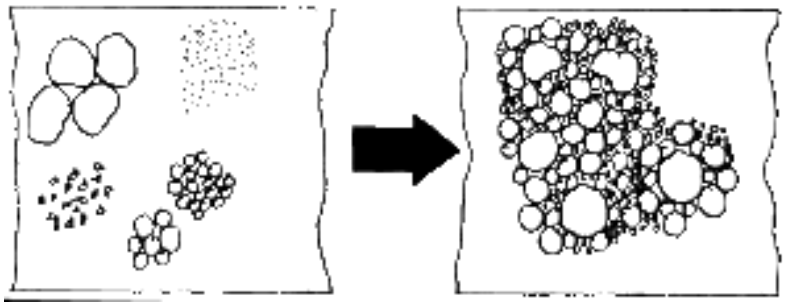
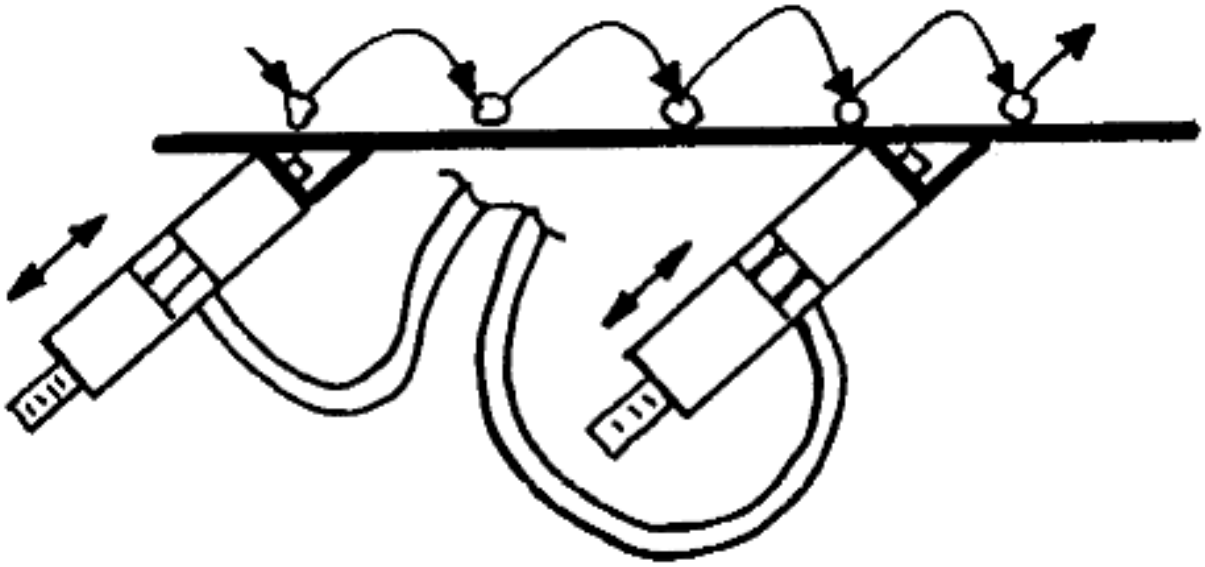


Compacting of concrete

Vibration does not necessarily suppor the force of gravity. Vibration makes material "jump" and gravity brings it back to the channel or chute. With the help of linear vibrators the direction of the material jump can be defined, and by adjusting the amplitude the length of the jump can be varied. When the chute slopes downward, rotary vibrators can be used as well.



Feeding of materials

1.2.2. Basic information

One thing is most important to know when dealing with any kind of vibrators: You can certainly calculate natural frequencies of materials, silos, chutes, etc., but in reality your results will never be exactly as calculated.

There are tables and even calculation schemes available to correctly select and position vibrators with respect to a wide range of force and frequency. However, the "fine tuning", that is, the optimal adjustment of the vibrator, is a matter of practical trials and tests. Field engineers with some experience may immediately select the best type of vibrator as well as the optimal mounting site.

There are some rules of thumb and tables given under "Selection of the Optimal Vibrator Type".

To be able to perform optimal tuning of the vibrator, it is recommended that you put an air line regulator or a needle valve in the air pressure line so the air flow and the air pressure can be controlled.

Finding the natural frequency of the material that is to be fed, compacted or separated is the best way to

tune or adjust the vibrator.

The operational frequency range of pneumatic external vibrators is from 2,000 r.p.m. up to about 20,000 r.p.m. or about 35 to 350 Hz. The values given in the technical data sheet were obtained when the vibrator is mounted to a heavy lab test block, when the vibrator is not actually working, that is, the amplitude is zero, but the frequeny speeds 2 to 3 times higher than when mounted to an object.

Often the natural frequency of the material is out of the operational frequency range of a vibrator. Thus, a more powerful vibrator has to be used to do the job.

It is not necessary for the vibrator to run at full power to perform at its best. It is recommended that you operate a new vibrator at ¾ of its maximum power so that if power is lost over time due to abrasion, aging, etc., the frequency can be increased to compensate properly.

NOTE:

The pneumatic rotary and linear vibrator must not be operated with more than 7 bar (100 PSI) operating pressure.

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