

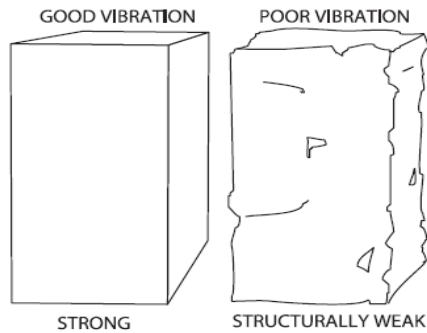
Title of Training	Electric Flex Shaft Concrete Vibrator	
Equipment Info.	Make/Type/Size/Model	
Material Needed	Operators Manual	PPE: Hard Hat-Safety Glasses-Work Gloves-Work Boots-Hearing Protection

Electric Flex Shaft Concrete Vibrator Safety

Right after placement, concrete contains up to 20% entrapped air. The amount varies according to the type of mix and its slump, the placement method, form size, and the amount of reinforcing steel used. Concrete vibration can improve the compressive strength of the concrete by about 3% to 5% for each percent of air removed.

Vibration consolidates concrete in two stages:

First by moving the concrete particles, then by removing entrapped air. Vibration settles the concrete by subjecting the individual particles to a rapid succession of impulses, causing differential motion (each particle moving independently of the other). The particles consolidate as trapped air are forced to the surface, allowing the concrete to flow into corners, around rebar and flush against the form face.



This eliminates voids (honeycombing) and brings paste to the surface to assist in finishing. Since concrete flows better with vibration, the mix can contain less water, thereby providing greater strength for the finished product. Until both vibration stages are complete, the concrete isn't fully consolidated. If the vibrator is removed too soon, some of the smaller bubbles don't have enough time to move to the surface.

Concrete Vibrators

Concrete vibrators are divided into two major categories: *external* and *internal*. EXTERNAL VIBRATORS are attached directly to the concrete form, thereby vibrating the concrete through the form.

INTERNAL VIBRATORS utilize a vibrating head that is placed directly into the concrete mix. Internal vibrators fall into two major categories: *flex-shaft* and *high-cycle*. Today, we will only be dealing with flex-shaft internal vibrators.

FLEX-SHAFT VIBRATORS consist of a universal motor connected to a flexible shaft casing with a wire core and a head on the other end of the shaft. The motor turns the shaft, which turns the head. Flex-shaft vibrators have specific applications, such as small pours that require a minimal amount of vibration (i.e. thin slabs, narrow walls, bases and small footings). In these cases, flex-shaft vibrators are usually sufficient. In pours with heavy rebar concentration, flex shafts can be used since small diameter heads (&8" to 2") can avoid hang-ups in the rebar. Stiff concrete cannot be used in this situation; concrete slumps of 3" or more are commonly vibrated with the flex shaft.



FLEX-SHAFT
VIBRATOR

Trainee Name (print)		Signature of Trainee	
Instructor Name		Date of Training	
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WHEN THE CONCRETE IS PLACED, IT IS IMPORTANT TO CONSOLIDATE THE CONCRETE. THIS IS DONE BY AN INTERNAL VIBRATOR. THE INTERNAL VIBRATOR SHOULD BE LOWERED INTO THE CONCRETE VERTICALLY AND SHOULD REMAIN UNTIL THE CONCRETE TAKES ON SHEEN AND THEN LIFTED SLOWLY FROM THE CONCRETE.

INTERNAL VIBRATORS ARE EXCELLENT FOR CONSOLIDATING CONCRETE, BUT THERE ARE SEVERAL DON'T'S:

- **DON'T** USE A VIBRATOR TO MOVE CONCRETE HORIZONTALLY BECAUSE THE AGGREGATES WILL SEPARATE FROM THE MORTAR.
- **DON'T** LEAVE A VIBRATOR IN CONCRETE, WHICH HAS A SLUMP OF MORE THAN 3 INCHES, FOR TOO LONG. THAT WILL CAUSE SEGREGATION. IT IS GENERALLY DIFFICULT TO OVERVIBRATE STIFF CONCRETE, BUT LEAVING THE VIBRATOR IN THE CONCRETE TOO LONG IS A WASTE OF TIME AND ENERGY.
- **DON'T** LET A VIBRATOR RUN VERY LONG WHEN IT IS NOT IN CONCRETE. IT MAY BURN OUT. CONCRETE ACTS AS A COOLANT FOR THE VIBRATOR.
- **DON'T** USE AN ELECTRIC VIBRATOR WITHOUT WEARING GOOD RUBBER GLOVES AND RUBBER BOOTS; OTHERWISE YOU ARE LIABLE TO GET A SHOCK OR BURN.

DEATH OR SEVERE INJURY COULD RESULT FROM FAILURE TO FOLLOW THE SAFETY RULES LISTED BELOW

1. KEEP WORK AREA CLEAN, CLUTTERED AREAS INVITE INJURIES.
2. CONSIDER WORK AREA ENVIRONMENT: DON'T EXPOSE TOOLS TO RAIN. DO NOT USE TOOL IN PRESENCE OF FLAMMABLE LIQUIDS OR GASES.
3. GUARD AGAINST ELECTRIC SHOCK: PREVENT BODY CONTACT WITH GROUNDED SURFACES. USE A GROUND FAULT CIRCUIT INTERRUPTER TO REDUCE THE RISK OF ELECTRIC SHOCK.
4. STORE IDLE TOOLS: WHEN NOT IN USE, TOOL SHOULD BE STORED IN A DRY AND HIGH LOCATION.
5. DON'T FORCE TOOL: IT WILL DO THE JOB BETTER AND SAFER AT THE RATE WHICH IT WAS INTENDED.
6. USE THE RIGHT TOOL: DON'T FORCE SMALL TOOL OR ATTACHMENT TO DO THE JOB OF A HEAVY-DUTY TOOL. DO NOT USE TOOL FOR PURPOSE NOT INTENDED.
7. DRESS PROPERLY: DO NOT WEAR LOOSE CLOTHING OR JEWELRY. THEY CAN BE CAUGHT IN MOVING PARTS. RUBBER GLOVES AND NON-SKID FOOTWEAR ARE RECOMMENDED WHEN WORKING OUTDOORS.
8. USE SAFETY GLASSES: ALSO WEAR A FACE SHIELD WHEN NEEDED.
9. DON'T ABUSE CORD: NEVER CARRY TOOL BY THE CORD OR YANK IT TO DISCONNECT FROM THE RECEPTACLE. KEEP CORD FROM HEAT, OIL AND SHARP EDGES.
10. DON'T OVERREACH: KEEP PROPER FOOTING AND BALANCE AT ALL TIMES. **THIS TOOL SHOULD BE USED AS A TWO-MAN OPERATION, ONE MAN ON THE SWITCH END AND ONE MAN ON THE HEAD END.**
11. MAINTAIN TOOLS WITH CARE: KEEP TOOLS CLEAN FOR BETTER AND SAFER PERFORMANCE. INSPECT TOOL AND CORDS PRIOR TO EACH USE. KEEP HANDLES DRY, CLEAN AND FREE FROM OIL AND GREASE.
12. DISCONNECT TOOL: WHEN NOT IN USE TO AVOID UNINTENTIONAL STARTING. BE SURE SWITCH IS OFF WHEN PLUGGING IN.
13. STAY ALERT: WATCH WHAT YOU ARE DOING AND STAY FOCUSED ON THE JOB TASK.



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EMPLOYEE NAME (Print or Type)	EMPLOYEE SIGNATURE	TRADE	JOB TITLE
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