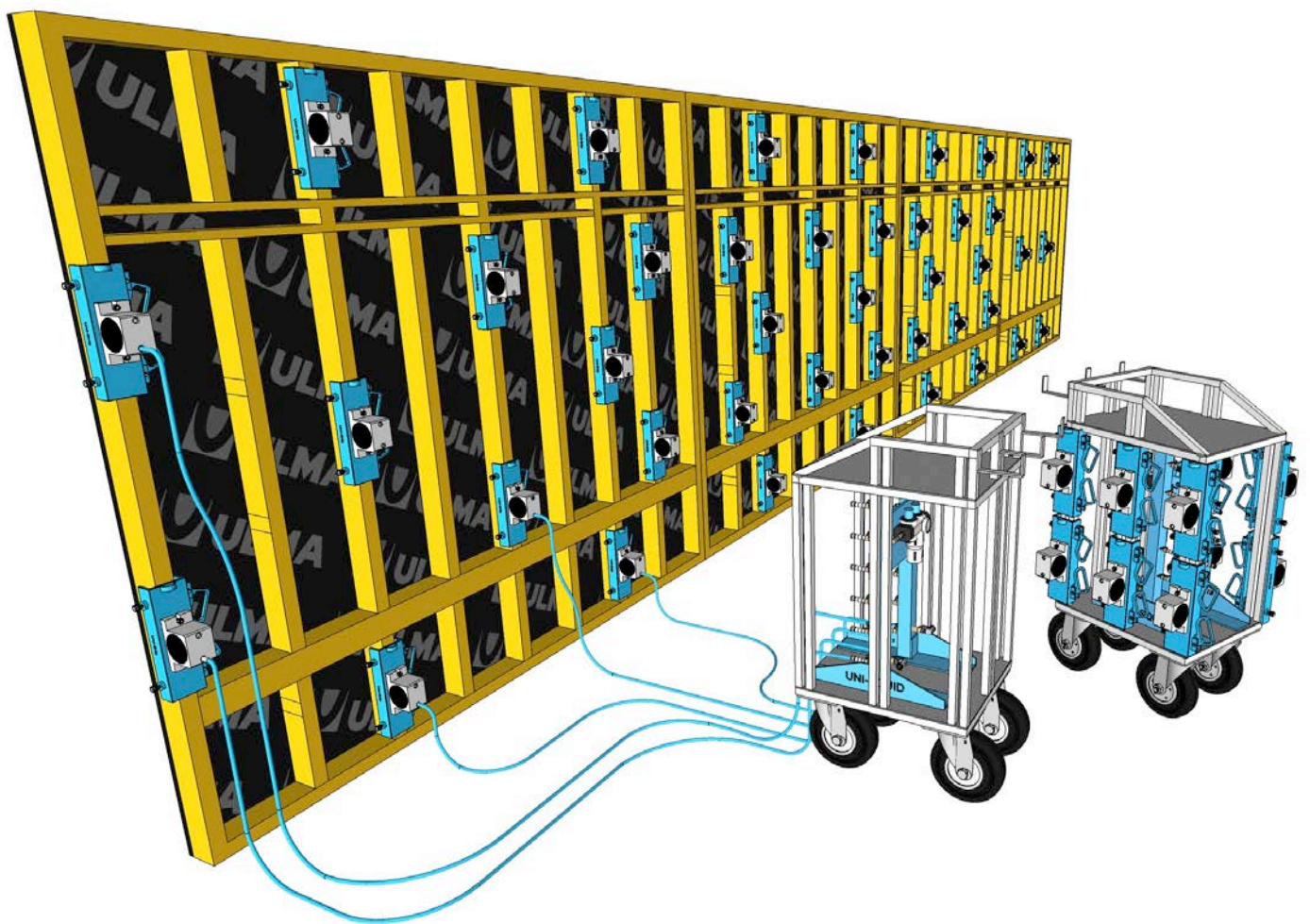




TECHNICAL GUIDE
UNI-GRIP™
CONCRETE VIBRATION



We help build Australia **smarter.**

Any safety provisions as directed by the appropriate governing agencies must be observed when using our products. The pictures in this document are snapshots of situations at different stages of assembly, and therefore are not complete images. For the purpose of safety, they should not be deemed as definitive.

The loads featured in this document, related to the parts of the product, are approximate.

Our equipment is designed to work with accessories and parts produced by our company only. Combining such equipment with other brands is not only dangerous without having made all corresponding verifications, it also voids any or all of our warranties.

The company reserves the right to introduce any modifications deemed necessary for the technical development of the product.

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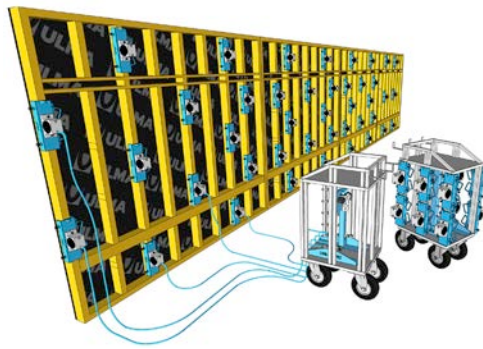
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SECTION ONE

SYSTEM COMPONENTS



INTRODUCTION

EXPLANATION

It is becoming increasingly popular to attach external form vibrators to formwork shutters. The benefit of these is to improve the concrete finish or to vibrate the concrete in areas a traditional pencil vibrator cannot reach. Generally, external vibrators are only used on thin or heavily reinforced walls.

The issue with external form vibrators is that they re-liquify the concrete thus removing any setting affects you have allowed for in the pressure calculation.

To reduce concrete pressure the calculation assumes that after a set period, the concrete reaches initial set and the pressure in the lower part of the form does not increase. As shown in Figure 1 for this 5m wall we can assume the bottom 2733mm of pressure will not increase once we pour the last 2267mm of the wall.

If external form vibrators were to be installed on the full height of the wall, the whole wall would effectively be “shaken” and remove this initial set in the concrete and make the pressure fully hydrostatic (no setting) as can be seen in Figure 2, where the pressure is now 120KPa compared to 54.4KPa above. Full hydrostatic means the pressure is simply the density multiplied by the height and the pressure will be the greatest at the bottom then taper linearly to the top where it will be zero pressure. Concrete weighs 24kn per cube so $24 \times 5\text{m} = 120\text{kPa}$.

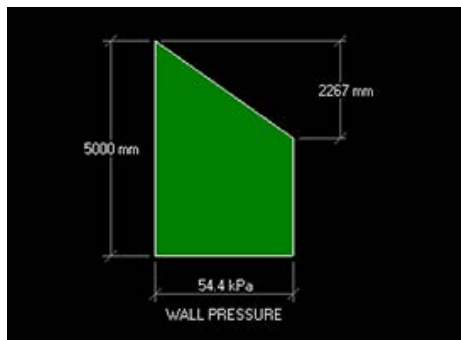


FIGURE 1

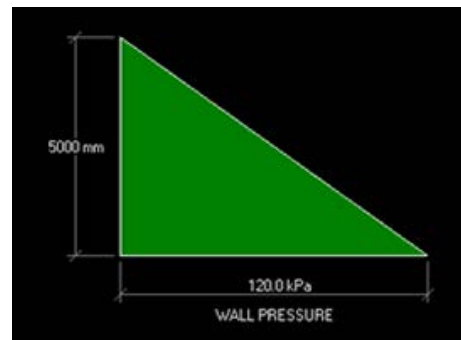
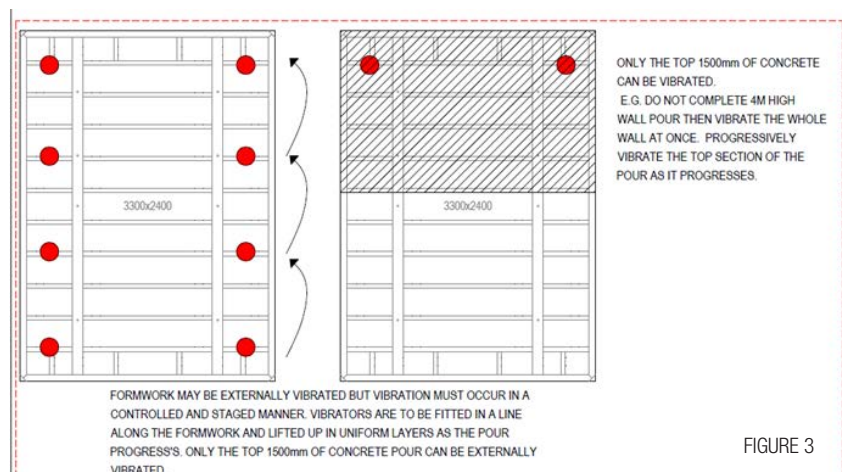


FIGURE 2

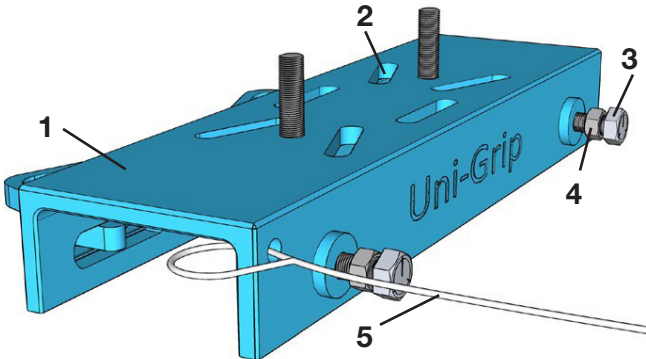
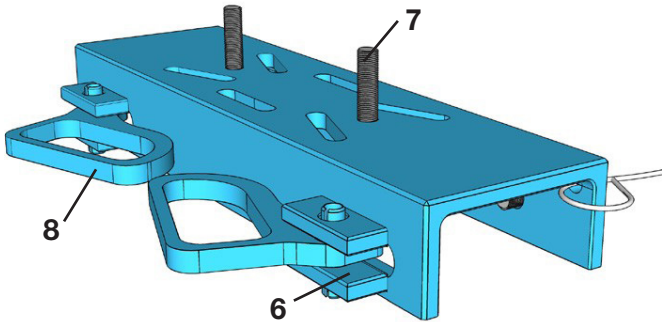
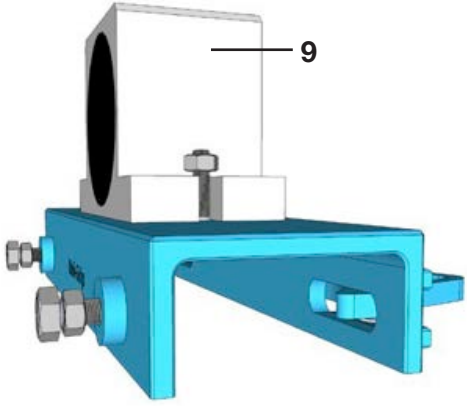
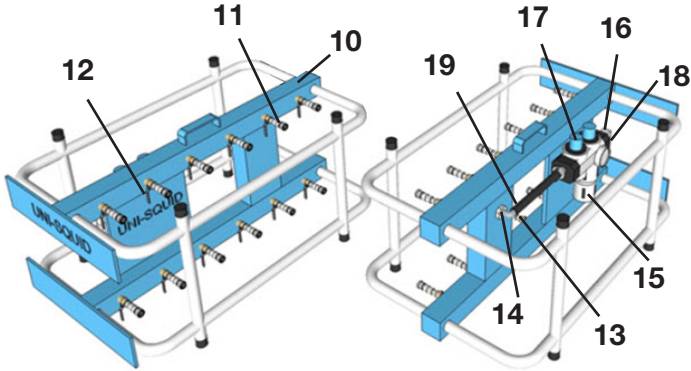
WHAT TO DO?

External form vibrators cannot be used without first consulting an engineer. There is significant risk that if used incorrectly you could overpressurise a wall and cause overloading.

Ultimately, we are relying on site personnel to use them correctly. If used, we will supply the below information which basically indicates that the vibrator must only be used on the top 1500mm of wall. This part of the wall, regardless of height, will always be liquid until after the pour is completed.

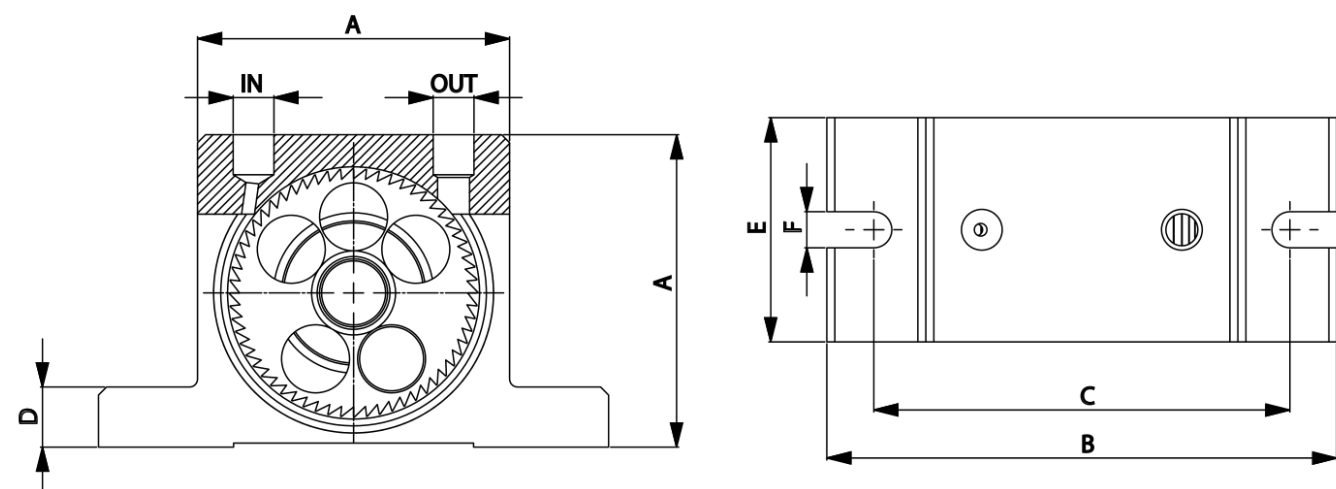


SYSTEM COMPONENTS

PRODUCT	DESCRIPTION
	<ol style="list-style-type: none"> 1. Main steel C channel Uni-grip™ body 2. Slots to suit OT36 high frequency vibrator 3. High tensile threaded cup set screw 4. Lock nut for set screw 5. Safety tether cable
	<ol style="list-style-type: none"> 6. Handle supports 7. Hardened roll pins 8. High tensile ergo handles
	<ol style="list-style-type: none"> 9. Uni-grip™ vibrator
	<ol style="list-style-type: none"> 10. Aluminium box channel accumulator 11. 12 x 3/8 BSP ports 12. 12 x shut off valves & quick release couplings 13. Manifold in feed port 1" BSP 14. 1" Coupling nipple 15. 1" Pressure regulator 0-10 bar with water trap 16. 1" Inlet port with 1" claw inlet fitting 17. Safety shut off & exhaust valve 18. 1" Outlet port elbow 19. 1" High pressure rubber hose

THE PRINCIPAL COMPONENT

UNI-GRIP™ OT36 EXTERNAL HIGH FREQUENCY PNEUMATIC VIBRATOR



OVERALL DIMENSIONS

TYPE	A		B		C		D		E		F		IN-OUT	WEIGHT	
	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch		kg	lbs
OT36	100	3.94	160	6.30	130	5.12	20	0.79	73	2.87	11	0.43	3/8" GAS	2.30	5.06

FEATURES

TYPE	VIBRATION			F.C.MAX						AIR CONSUMPTION					
	VPM			2bar = 29psi		4bar = 58psi		6bar = 87psi		2bar = 29psi		4bar = 58psi		6bar = 87psi	
	2bar = 29psi	4bar = 58 psi	6bar = 97psi	kg	lbs	kg	lbs	kg	lbs	l/min	CF/min	l/min	CF/min	l/min	CF/min
OT36	8500	11500	12000	341	751	698	1536	749	1648	322	11.4	542	19.1	749	26.5

ADDITIONAL FEATURES

APPLICATION

Hopper and silo - screen - vibrating table - chute - concrete consolidation

POWDER

Dry and granular (food) - concrete

PROBLEM SOLVING

Friction reduction - separation - consolidation

DUTY CYCLE

Continuous

WORKING PRESSURE

From 2 bar to 6 bar (from 29 psi to 87 psi)

PNEUMATIC CIRCUIT

Filter + flow control valve + lubrication + 3/2 ways valve

AIR SUPPLY QUALITY

Class 5.4.1

WORKING TEMPERATURE

From -20 oC to 120oC (from -4 OF to 248 oF)

MAX. NOISE LEVEL

<90 dB(a)

TECHNOLOGY

Turbine vibration - high frequency and centrifugal force

ATEX

II 2D CT(X) / II 2G CTI(X)

MATERIAL

Aluminium body



APPLICATIONS & FEATURES

APPLICATIONS

IN-SITU CONCRETE

- Columns
- Walls
- Slabs
- Curved structures
- Confined structures

PRECAST CONCRETE

- Planks
- Tanks
- Culverts
- Bridge beams

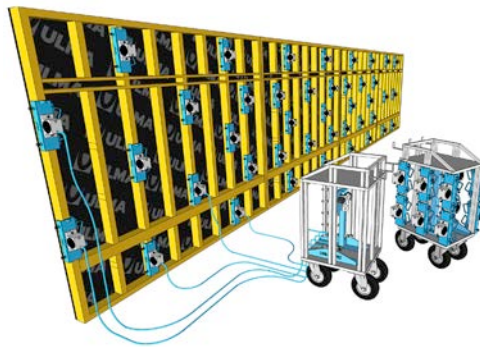
FEATURES - BRACKET & VIBRATOR UNIT

TOTAL WEIGHT	5.8kg
APPROX. AREA OF INFLUENCE	1000mm - 1200mm DIA up to 400mm thickness
OPERATING PRESSURE	Max. 6 bar (87 psi)
AIR CONSUMPTION	0.75m ³ /min
CENTRIFUGAL FORCE	200 Hz @ 6 bar (87 psi)
VIBRATIONS (VPM)	Rpm 6000 - 12000
PRINCIPAL	Inner weight turbine

EQUIPPING A CONCRETE FORM

- Fix vibrator to formwork in horizontal rows.
- For best results, only activate the row closest to the concrete layer being poured.
- Formwork can be fully equipped with external vibrators or the external vibrators can be easily relocated step by step from bottom to top, in accordance to the progress of the concrete pour.





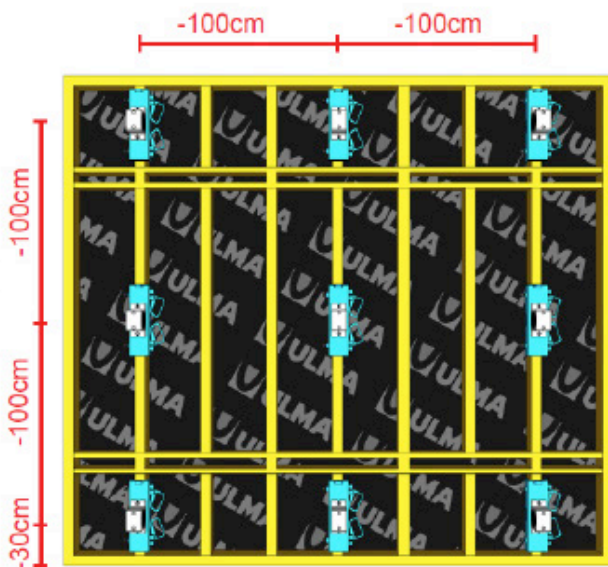
SECTION TWO

GUIDELINES & CHECKS

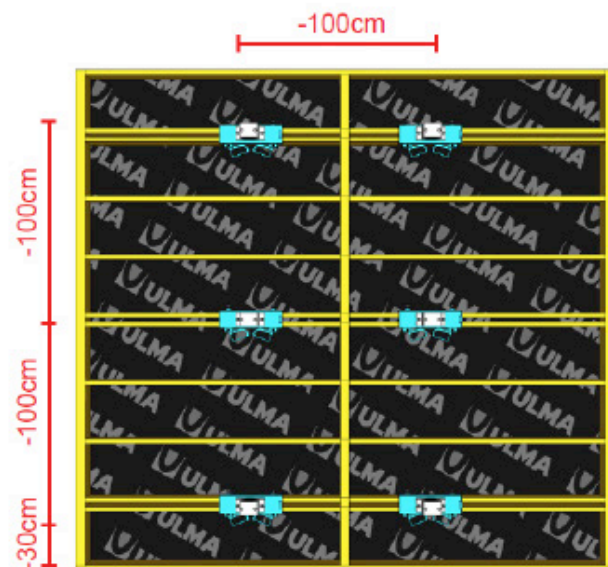
OPERATING GUIDELINES

GUIDELINES

1. Working conditions to be safe & free from obstructions.
2. Understand concrete to be used.
3. Formwork should be clean, free from debris, treated with appropriate release agent & leak proof.
4. Placement of vibrators to be 1.0 – 1.2m apart in both horizontal & vertical positions.
5. Vibrators to be placed approx. 300mm - 400mm from edge of form.
6. Mount Uni-grip to fixing point to allow good transmission of vibrators amplitude.
7. Vibrators should only be attached directly to stiffening profiles (never directly to FW skin).
8. Area to be poured will determine QTY of vibrators required (i.e. 3m x 3m wall = 9 units).
9. Maximum wall thickness for vibration is up to 400mm, two vibrators (either side of wall) are required if >400mm.



SYSTEMATIC EQUIPPING OF CONCRETE FORMS WITH BEAMS



SYSTEMATIC EQUIPPING OF CONCRETE FORMS WITH FRAMES

OPERATING

RUNNING TIME

- Compaction time 1-5 min per layer
- Start vibrators once concrete fill commenced
- Concrete layer height: max. 50cm
- Heavy reinforcing used – additional minute vibration time
- Wooden formwork used – add 1-2 min
- Vibrators must be moved up the form in line with pour process

ADVICE FOR FASTENING

- Tighten fastening system firmly
- Always fasten safety tether
- Check rotation is in upwards motion

EQUIPMENT CHECKS AFTER USE

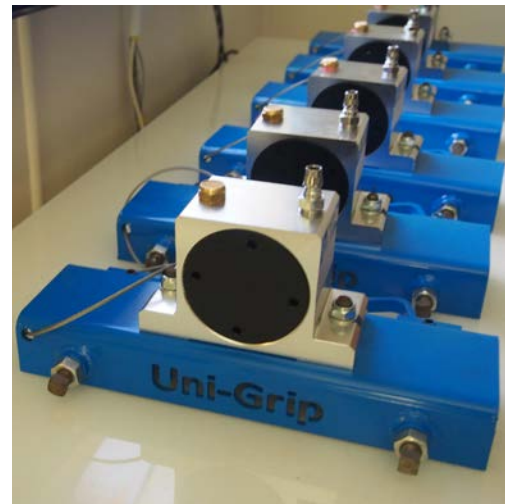
UNI-GRIP™ BRACKET

1. Check that split pins are tight and secure with no movement. Check that spacers are not showing signs of excessive wear.
2. Check that handles are secure and locked firmly into position after the set screws and lock nuts are pre-set to correct width for next job.
3. Check that nyloc nuts are firm and vibrator is secured into position.
4. Check that safety tether is attached and no wear points showing.
5. Check that setscrew and hex lock nuts are pre-set to correct width of formwork and firmly locked into place.
6. Connect to manifold, turn air on and run vibrators. Check that all is operating ok.



UNI-GRIP™ VIBRATOR

1. Ensure that exhaust is clean and free from any build up.
2. Attach bracket and vibrator to formwork.
3. Connect to manifold, turn air on and run vibrators. Check that everything is operational.
4. If vibrator doesn't activate, spray WD40 into inlet. Wait for 10 minutes, re-attach hose and then turn air on again.
5. Check that inlet nipple is free from any grit or product build up.
6. Check that inlet nipple is secured into vibrator inlet port.
7. Check that nyloc nuts are firm and secured into position.

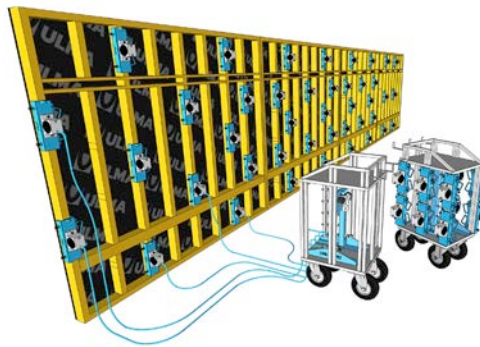


EQUIPMENT CHECKS AFTER USE

UNI-GRIP™ MANIFOLD

1. Check that all valves open and close easily.
2. Check that all fittings are secure.
3. Check for any leaks.
4. Check to make sure that there is no sand or grit in valves.
5. Check that footings are secure and level.
6. NB: Check that regulator is clean and free from any product build up and water.
7. Check that filter gauge is working and set on 6 bar (87 psi).
8. Check that the safety exhaust is not blocked.
9. Check that inlet and outlet on filter regulator is secure.
10. Check that rubber hose is secure with no leaks.





SECTION THREE

MAINTENANCE, FACTS & BENEFITS



NATFORM



GENERAL MAINTENANCE GUIDE



MAINTENANCE

1. Air supply to the Uni-grip™ air manifold and Uni-grip™ vibrators must be clean, dry filtered air only.
2. Air regulator is to be set between 4-6 bar maximum.
3. Quick release brackets must be firm and secured into position onto your formwork.
4. Check all M10 bolts are torque to 53 Nm.
5. Check all M12 bolts are torque to 105 Nm.
6. Vibrator must be kept clean from any contaminants and product build up at all times.
7. Turn valves on manifold to ON (full) position to deliver a full blast of air to start vibrators.
8. Keep exhaust on vibrators clean at all times. If exhausts are blocked, they will not operate.
9. Do not leave the Uni-grip™ system (including vibrators) outside and unprotected from weather if not in use.
10. Store in clean, dry and undercover area when not in use.
11. Each vibrator uses 749 litres of air per minute. In order to effectively utilise 12 vibrators, you will require a compressor to deliver a minimum of 320 CFM.



FACTS & BENEFITS

FACTS ON USE OF HIGH FREQUENCY VIBRATORS

1. Improves the density of freshly poured concrete.
2. Ensures even amalgamation of layers during multiple pours.
3. Improves the finish, eliminating “bug holes”.
4. Releases trapped air and water from the wet concrete thus reducing the chance of defects.
5. Assists in optimising the concrete’s strength.
6. Allows the flow of concrete in and around reinforced steel.
7. Assists in the elimination of lamination defects.
8. Prevents optical layering.
9. Improves productivity.



BENEFITS

1. Low noise level.
2. Safe to use, no electricity required and therefore no risk of shock.
3. Lightweight and portable.
4. Easy snap-on bracket for quick relocation to steel and timber formwork.
5. Uni-grip™ system is made up of 4 components only.
6. Even density and superior lamination of concrete.



FACTORS TO CONSIDER

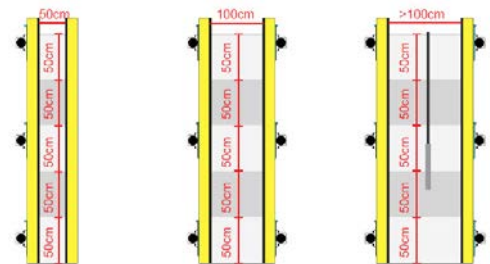
WHY VIBRATE CONCRETE?

1. To ensure consistency of concrete density
2. To prevent optical layering
3. To ensure even amalgamation of layers
4. To remove excessive air from fresh concrete & improve surface finish.
5. If wall thickness > 400mm – important to place vibrators on both sides of formwork.



VIBRATION TIME CONSIDERATIONS

1. Slump & MPA of concrete.
2. Type of formwork – steel, ply (> time required due to absorption of vibration).
3. Aggregate size (smaller aggregate = finer vibration required).
4. Time between pours – check setting times.



VIBRATION FACTORS

- | | |
|--|------------------------------------|
| 1. Segregation | 2. Cracking of formwork |
| 3. Bubbling of the surface | 4. Pin holing |
| 5. Excessive water buildup inside the form | 6. Cracking of formwork |
| 7. Poor flow of concrete = defects | 8. Honey combing |
| 9. Optical layering | 10. Inhomogeneous multi layer pour |
| 11. Poor concrete compaction | 12. Poor finish |

CONCLUSION

CONCLUSION

Always speak to an engineer, to understand the requirements and suitability of using an external vibrator suitable for your project, prior to commencing the use of this. Site personnel play a significant role in the safe use of external vibrators and lifting them up the formwork. If misused, the result can be catastrophic.

Note - It is likely that the new formwork standard in 2022 may require us to assume full hydrostatic concrete loads when using external vibrators in the next revision. This will be confirmed and advised if this comes into effect. This would mean panel type formwork would be limited to approximately 3m high and external vibrators would only be suitable for custom steel formwork, designed to full hydrostatic pressure.



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