

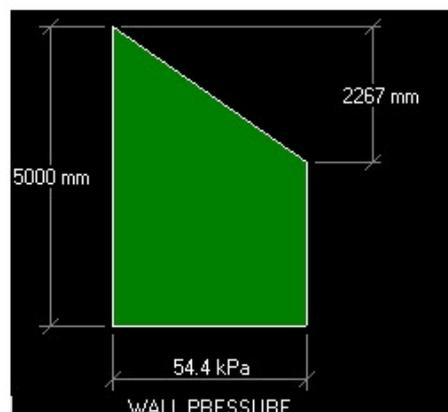
EXTERNAL FORM VIBRATORS

EXPLANATION

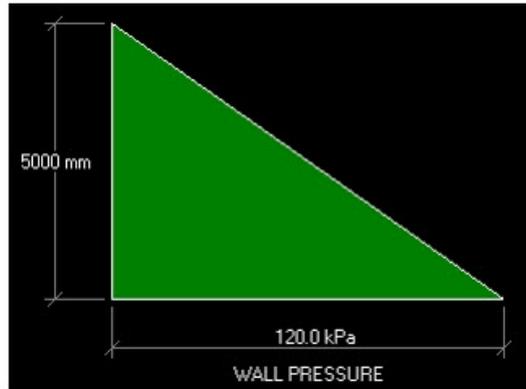
It is becoming increasingly popular to attach external form vibrators to formwork shutters.

The benefit of these is to improve the concrete finish or to vibrate the concrete in area's 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 below 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 hydro-static (no setting) as can be seen below where the pressure is now 120kPa compared to 50kPa above. Full hydro-static 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 $24 \times 5\text{m} = 120\text{kPa}$.



WHAT TO DO

External form vibrators cannot be used without first consulting an engineer. There is significant risk that if used incorrectly you could over pressurise 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.

ISSUES WHEN USING EXTERNAL VIBRATORS

- Nuts and bolts becoming loose.
- Insufficient air supply.
- Wrong vibrator type used.
- Damage to formwork.

WHAT TO CONSIDER?

- You will need to install double wingnuts.
- Must regularly inspect bolted connections.
- Generally, not suitable for walls greater than 500mm thick.
- External vibrators do not eliminate the need to use internal vibration in most cases.
- Timber formwork is ineffective as it absorbs the vibration.
- Do not use large vibrating units designed for the likes of silo's etc. as they can be too powerful and could rip the formwork apart.

UNI-GRIP VIBRATORS

Acrow can supply the Uni-grip vibrators (shown below) for both hire or sale and are based on the OLI OT36 Pneumatic unit. They come as a set of 12 with an air manifold.



CONCLUSION

Always speak to an engineer first, to understand the requirements and suitability of using an external vibrator applicable to your project's situation. There is a great deal of trust placed on the site personnel using the vibrators correctly 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 hydro-static concrete loads when using external vibrators in the next revision. This will be communicated if it comes into effect. This would mean panel type formwork would be limited to approx. 3m high and external vibrators would mostly be only suitable for custom steel formwork, designed to full hydro-static pressure.

If in doubt, ask! This information is general in nature and may change at any time.

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