

SUPPLY OF READY MIXED CONCRETE

PREPARING TO ORDER

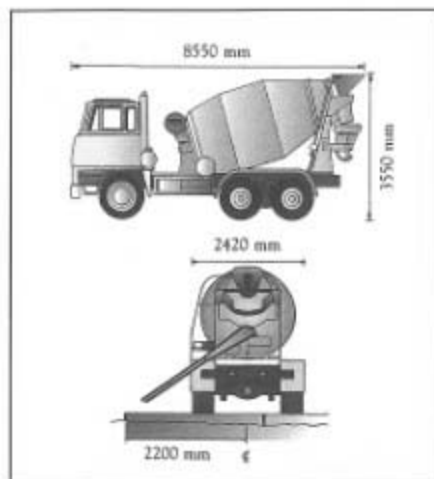
Checklist for ordering a supply of concrete from a ready mixed producer:

You should get confirmation on the following points.

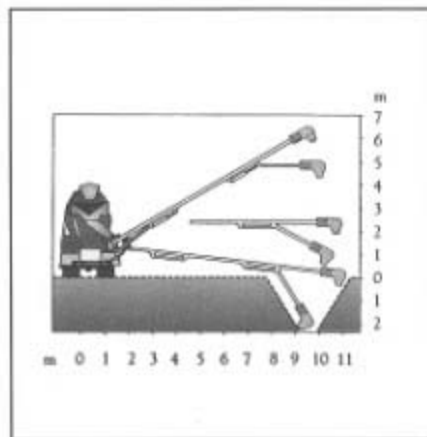
- The production plant holds a Audit Certificate in accordance with NZS 3104 as issued by the New Zealand Ready Mixed Concrete Association Inc.
- The mixes and materials comply with the contract specifications.
- Any procedures required by the contract for approving mixes, materials and plant certification have been completed, or, at any rate, are in hand.
- The concrete mixes are clearly described, and the mix descriptions are properly understood by the site staff.
- The mixes and their workabilities, suit the handling, placing, compacting and finishing methods to be used on site.
- The programme of deliveries to the site has been given to the ready mixed producer.
- The arrangements for ordering from the site have all been agreed.
- The site procedure for approving the start of a pour has been arranged and is available.
- Details of any proposed back-up supply that might be needed have been approved.
- Site roads and turning space have been provided for truck access to and from the delivery point.
- Arrangements have been made for washing out the truck mixer before it leaves the site.



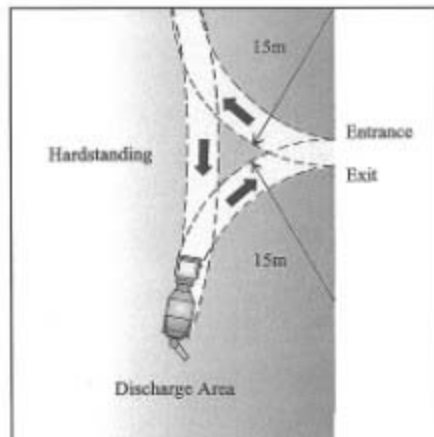
READY MIXED PLANT AUDIT CERTIFICATE



TYPICAL READY MIXED TRUCK DIMENSIONS



REACHING DISTANCES OF TRUCK MOUNTED CONVEYOR



TYPICAL TURNING REQUIREMENTS OF A READY MIXED TRUCK

ORDERING

Checklist for ordering ready mixed concrete:

- Is the nominated person doing the ordering?
- Have the requirements been entered into a concrete order book?
- Is the mix you are requesting included in the official purchase order?

Be ready to give the following information:

- Your name.
- The name of the company that you work for.
- The site address, street name and number.
- Any site peculiarities that may affect the delivery.
- The volume of concrete required and the delivery time.
- The required concrete properties.
 - The 28 day strength in MPa.
 - The maximum aggregate size.
 - The slump required.
 - Any special admixtures required.
 - Any other special requirements.
- Whether the concrete is to be moved by pump, truck mounted conveyor, skip/crane, or wheelbarrow.
- The order number.
- If the order is to be confirmed.
- A contact phone number.
- All necessary documentation.



SAFETY ON SITE:

Suitable protective clothing should be worn when handling wet concrete

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MOVING CONCRETE ON SITE: A job that must be done with care

HAVE YOU THOUGHT ABOUT:

- how much concrete is to be poured, where it is to go, and which is the most appropriate moving method?
- site access and site ground conditions?
- the distances, height and clearances for the moving equipment?
- whether the workability and maximum aggregate size specified is compatible with the concrete moving equipment?
- making sure the compacting equipment will be able to cope with the rate of concrete supply?

Horizontal Movement



BARROW
Capacity: ~0.03m³



TRUCK MIXER
Capacity: ~2 to 10m³
5m³ common



DUMPER
Capacity: ~0.3 to 0.75m³

Vertical Movement



CONSTANT ATTITUDE SKIP
capacity: ~0.2 to 1.0m³



BELT CONVEYOR
TRUCK MOUNTED

VERTICAL	0m	4.5m
HORIZONTAL	10.5m	9.5m



ROLLOVER SKIP
Capacity: ~0.2 to 1.0m³

Pumping Concrete

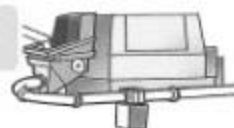


BOOM PUMP

TYPICAL PUMPING DISTANCES

BOOM PUMP	DIRECTION	STATIC PUMP
16 - 42M	HORIZONTAL	50-300m
	VERTICAL	5-90m

Capacity: ~30m³/hour



STATIC PUMP & PIPELINE

REMEMBER TO:

- inform the supplier of the rate at which concrete is required on site.
- protect concrete from drying out in hot weather and strong winds during transport.
- cover open containers during heavy rain.
- prevent contamination of concrete from oil or dirt from the equipment.
- maintain equipment, repair leaking containers immediately to avoid mortar loss from the concrete and repair dents in equipment that can restrict the flow of concrete on discharge.
- provide a wash down area for trucks and equipment.

PLACING AND COMPACTING

PLACING

- Make sure you can see what you are doing
 - Lights may be needed for thin and/or deep formwork
- Concrete mixers, skips and pumps can easily place the concrete exactly where it is needed
- Make sure that you order the right type of concrete with the correct slump for your placing method because you should not add water to a mix on site
 - A different type of concrete is used for pumping than is used for placing with a skip for example
 - Only small amounts of water may be added to a mix on site to make up for loss of water during travel, and may only be authorised by the Ready Mix supplier
- Placing must be done at the correct speed
 - Too fast and the compacting gang will not be able to keep up
 - Too slow and the mix will stiffen making compaction very difficult
- Concrete should be placed in layers to make sure that it is compacted properly
 - With poker vibrators the layers shouldn't be deeper than the length of the head
 - With vibrating beams layers shouldn't be deeper than 150 mm
- When dropping concrete from a height use tubes and/or baffle boards to prevent damage to the formwork

1 CONCRETE MIXERS CAN PLACE THE CONCRETE EXACTLY WHERE IT IS NEEDED.



2 TUBES ATTACHED TO SKIPS CAN AIM THE CONCRETE IN THE RIGHT DIRECTION.



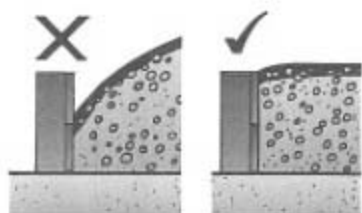
3 CONCRETE PUMPS CAN MOVE THE CONCRETE LONG DISTANCES TO WHERE IT IS NEEDED.



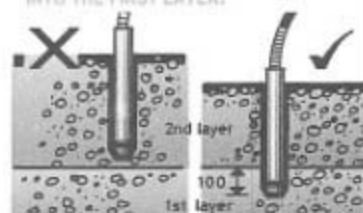
4

SLUMP	ON SITE	
 Check the slump is right for the job	Site workers must NOT add water to the concrete	Ready Mix suppliers may add up to 10 litres/m ³ to adjust the slump

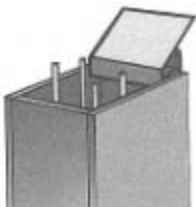
5 DON'T PLACE CONCRETE IN PILES BUT IN FLAT, EVEN LAYERS.



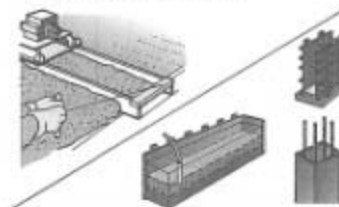
6 DON'T MAKE THE SECOND LAYER TOO THICK. THE POKER MUST GO 100mm INTO THE FIRST LAYER.



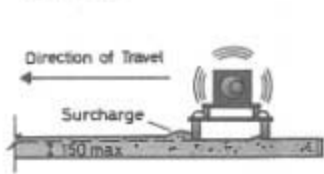
7 BAFFLE BOARDS PROTECT THE FORMWORK FROM BEING DAMAGED BY DROPPED CONCRETE.



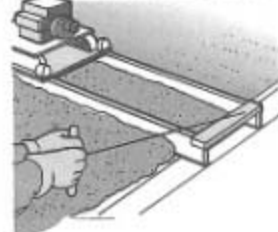
8 FOR THIN SLABS USE A BEAM VIBRATOR. FOR COLUMNS, WALLS AND THICK SLABS USE POKER VIBRATORS.



9 ALWAYS HAVE A SURCHARGE OF CONCRETE IN FRONT OF ANY BEAM VIBRATOR.



10 DOUBLE BEAM VIBRATORS REQUIRE NO FINISHING ON SOME JOBS.



11 FOR SMALL JOB SLABS UP TO 100mm THICK A HAND TAMPER MAY BE USED.



12 POKER VIBRATORS SHOULD BE USED ALONG THE EDGES OF SLABS WHEN COMPACTING WITH A BEAM



COMPACTING

- Air is always trapped in concrete when it is being mixed.
- The aim of compaction is to remove as much of this air as possible.
- Why does getting rid of the air matter?
 - Air holes reduce the strength of concrete.
 - If you don't compact concrete, it may only be half as strong as it should be.
 - Air holes in the concrete stop a good bond forming between the concrete and the reinforcing steel making the structure weaker.
 - Large air holes can cause ugly marks on the surface.
- Use the right compaction equipment for each job.
 - Poker vibrators for beams, columns, walls and deep slabs.
 - Beam vibrators for thin layered slabs.
 - Clamp-on vibrators can be used on special formwork, especially in the precast industry.
- Always have spare compacting equipment in case of a breakdown.
- For more information on the use of poker vibrators see Poster No 4 "Using a Poker Vibrator".

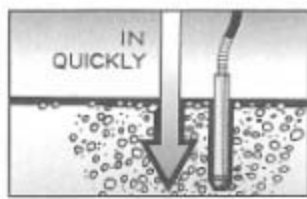
USING A POKER VIBRATOR

1 MAKE SURE YOU CAN SEE THE CONCRETE SURFACE



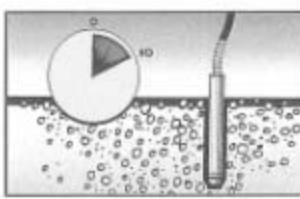
Lights may be required in thin, deep sections.

2 PUT THE POKER IN QUICKLY



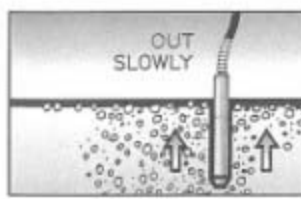
This ensures that entrapped air at the bottom of the layer can escape (before the top is compacted).

3 LEAVE IT IN THE CONCRETE FOR ABOUT 10 SECONDS



This does not include the time taken to insert and withdraw the poker from the concrete

4 WITHDRAW THE POKER SLOWLY



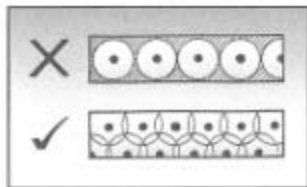
The main thing is to see that the hole made by the poker is closed up.

5 PUT THE POKER BACK IN NOT MORE THAN ABOUT 500mm FROM ITS LAST POSITION



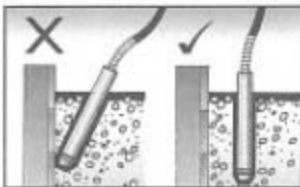
With smaller diameter pokers, closer insertions will be needed. eg. 20mm - 200mm 50mm - 500mm

6 MAKE SURE THAT ALL THE CONCRETE IS COMPACTED BY THE VIBRATOR



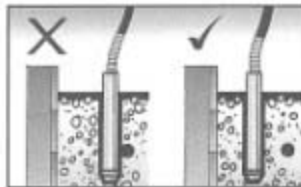
If care is not taken in poker placement then uncompacted areas will occur.

7 AVOID TOUCHING THE FORMWORK WITH THE POKER



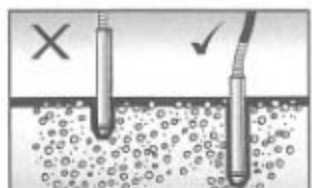
Not only will the form face be damaged - "poker burn" - but a mark will be left on the finished concrete surface.

8 AVOID TOUCHING THE REINFORCEMENT WITH THE POKER



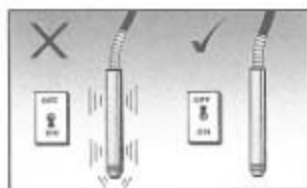
Vibrations in the reinforcement can be transmitted into parts of the section where the concrete may have stiffened, affecting the bond between the two.

9 PUT THE WHOLE LENGTH OF THE POKER HEAD INTO THE CONCRETE



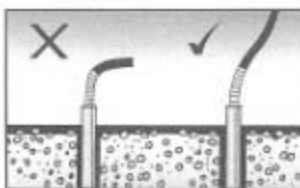
This is essential to keep the bearings cool.

10 AVOID LEAVING THE POKER RUNNING WHEN IT IS NOT IN THE CONCRETE



Otherwise there is a risk of bearings overheating.

11 AVOID SHARP BENDS IN FLEXIBLE DRIVES



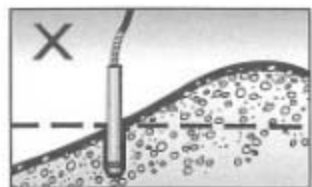
This can damage the drive mechanism

12 MAKE SURE THE DRIVE MOTOR WILL NOT VIBRATE ITSELF OFF THE STAGING



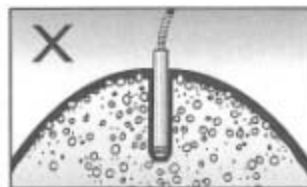
DO NOT move by pulling the flexible drive.

13 AVOID USING THE POKER TO MAKE THE CONCRETE FLOW



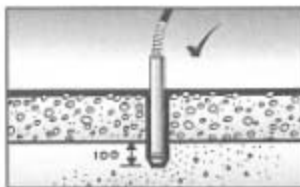
This type of action can cause segregation of the concrete.

14 AVOID STICKING THE POKER INTO THE TOP OF A HEAP



To flatten a heap, insert the poker around the perimeter. Do this carefully to avoid segregation

15 MAKE SURE THE POKER EXTENDS ABOUT 100mm INTO ANY PREVIOUS LAYER



This will knit the layers together and disperse any laitance from the top of the previous layer.

16 EXTRA VIBRATION CAN REDUCE THE NUMBER OF BLOWHOLES



May be important where a good finish is required.

PLANNING

Labour Resources

Make sure you have enough labour for the job size. Typical finishes have the following labour output production.

Floating

- Wood float - 3 to 4 m²/hour
- Hand steel float 3 to 4m²/hour
- Power float - 6 to 8m²/hour

Power Trowelling

- 1 pass - 6 to 8m²/hour
- 2 passes - 10 to 12 m²/hour

Equipment

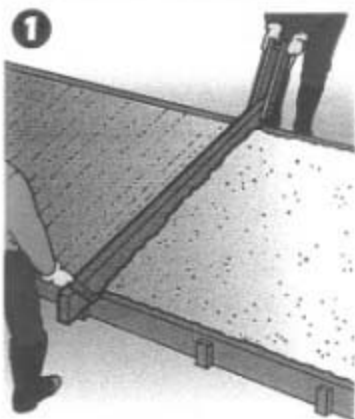
Make sure you have enough equipment for the job. Make sure you know where to get replacement gear for power equipment.

Typical gear list:

- Square Mouthed shovels.
- Concrete Rakes
- Straightedge
- Edging trowels
- Power Finishing
 - Float
 - Trowel
- Hand finishing
 - Bull float
 - Wood float
 - Steel Trowels
- Special broom to suit a textured finish.
- Special finishes: you will need to check you have all the special gear, such as imprinting stamps, etc.

WEATHER

- Do not concrete slabs that are exposed to the weather if rain is forecast. It is virtually impossible to repair a rain-damaged surface.
- Have some sheets of polythene available to cover the slab if you do get caught by a shower of rain.



SCREEDED FINISH (U1): This is the simplest finish to produce - the surface is formed with a hand tamping beam during the placement and compaction of the concrete.



FLOATED FINISH (U2): Concrete surface being levelled with a "bull float". On the forward stroke the float is pushed with handle lowered, on the returns stroke the float is pulled with the handle raised.

BLEED WATER: Water known as bleed water will come onto the surface of concrete within 15 minutes of compacting the concrete. No finishing work can start until this water has evaporated.



WAITING TIME

Winter

- In cold weather the waiting period could be up to 5 hours.
- The wetter the concrete, you use the longer the wait.

Summer

- In hot weather, the waiting time could be two hours.
- If it is drying faster than two hours, then plastic surface cracking is likely to occur.
- To stop the rapid drying, mist spray with water or an aliphatic alcohol special plastic surface of the concrete. This drying time to 2 hours time for excess water layers to escape plastic upper surface.



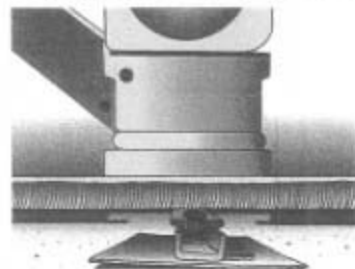
FOOTPRINT Concrete is ready for power floating when standing on the concrete creates an imprint not deeper than 2-3mm.



POWER FLOATING a slab surface.



HAND TROWELLING: The finish near edge is improved with steel hand trowel.



POWER TROWELLING can start when the surface has dried and is not sticky to the palm of the hand. The close-up view is of the trowel blade tilted during final stages.

THE PROCESS

- The basic steps are shown in the numbered sequence 1 to 8.
- There must be a waiting period for bleed water to evaporate from the slab surface.
- Be warned that in the summer, evaporation can be too rapid leading to plastic cracking.
- In the summer, surface stiffening may still leave the lower parts of the slab in a plastic state. This can lead to problems of a rolling surface while trying to finish.
- As soon as the concrete has hardened enough to avoid surface marking, usually after 2 passes of steel trowelling, start the curing process, using for example a membrane spray. See Curing Poster No 6

TYPES OF FINISHES

Make sure you understand the specification requirements in NZS 3114 before you start.

The finish designations in NZS 3114 are:

- U1 Screeded Finish - see Step 1
- U2 Floated Finish - typically bull floating after the U1 finish.
- U3 Trowelled Finish - developed from a U2 finish after bleed water on the surface has evaporated.
- U4 Vibrating steel beam - surface left untouched from beam.
- U5/6 Broom finishes - different textures.
- U11 Early Age Grinding - usually applied to a U2 finish 36-48 hours after completing.

Note: there are other special finishes in NZS 3114; those using the letter E are Exposed Aggregate finishes.

SLAB PROTECTION

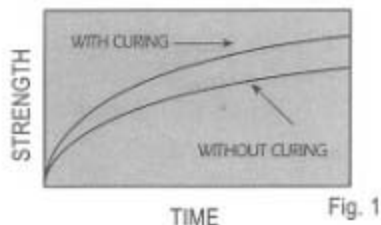
- Have the curing process decided before you start the job - See Curing Poster No 6
- In summer, make sure you can apply a mist spray of water or a special aliphatic alcohol to slow down the surface evaporation of water. This is very important with special concretes often used on commercial/industrial floors.
- In winter or in summer where there can be a big change in temperature between day and night, make sure you cover the slab.

METHODS OF CURING CONCRETE

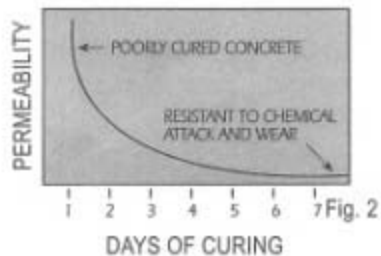
WHY CURE

The New Zealand Building Code requires all concrete to be cured.

Curing allows concrete to gain its full potential strength, and is therefore one of the most important stages of concrete construction (see Fig 1).



Concrete that is cured properly, can be 15 times more resistant to chemical attack and wear, and is more watertight (see Fig 2).



Formed surfaces, such as columns should be cured as soon as formwork is removed.

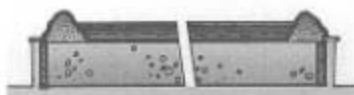
Unformed surfaces should be cured as soon as the surface has hardened and been finished.

WATER CURING METHODS

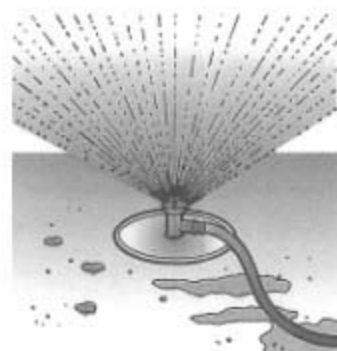
Ponding: On flat surfaces such as pavements, footpaths, and floors, concrete can be cured by ponding (see picture, left)

Sprinkling: A fine spray of water applied continuously through a system of nozzles provides a constant supply of water (see picture, right)

Wet Coverings: Wet hessian, other moisture-retaining fabrics, or sand can be laid onto the concrete as soon as it has hardened enough to prevent surface damage (see picture, far right).



PONDING



SPRINKLING



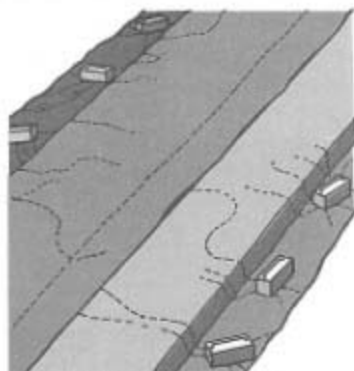
WET COVERINGS

SHEET CURING METHODS

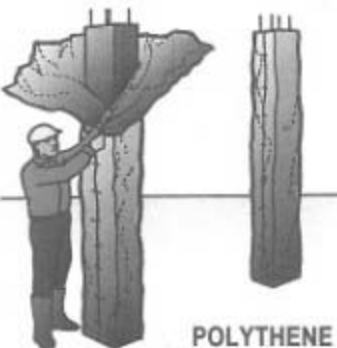
Watertight sheets are placed over and around concrete to prevent water from escaping. Polythene and/or formwork are often used for this task.

Polythene: This should be put in position as soon as possible after finishing (see pictures left and right).

Formwork: When left in place, formwork gives a barrier which stops water evaporating in the same way that polythene does. Polythene may be needed over the ends of some members (see picture, far right).



POLYTHENE ON SLAB



POLYTHENE AROUND COLUMNS



FORMWORK

MEMBRANE CURING METHODS

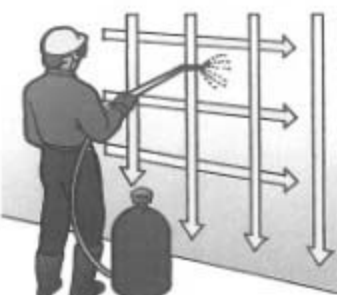
Curing compounds are either sprayed or rolled onto the concrete and are suitable for vertical and horizontal surfaces.

Spraying in a set pattern: This will help to make sure that the whole surface is covered evenly (see picture, right). Some compounds contain a dye that quickly lets you see if an all-over layer has been applied.

Roller application: In windy conditions it may be better to apply the compound with a roller than a sprayer (see picture, far right).



SPRAYING



EVEN COVERAGE



ROLLER APPLICATION