

Compacting concrete:

Concrete is compacted to expel entrapped air, resulting in the achievement of maximum density, strength and impermeability. Compaction can be done with or without mechanical vibration.

Hand compaction:

Methods of hand compaction include rodding, tamping or spading. To complete the compaction, use a wooden beam. First use a chopping action to remove entrapped air, then a sawing action to achieve the desired level.

Mechanical compaction:

Mechanical vibration is the most effective way of compacting concrete. The most common mechanical compaction equipment includes the vibrating beams and poker vibrators. With all methods of vibration the following precautions should be observed:

- Forms should be tight-fitting to avoid loss of grout.
- Depths in vertical sections should be shallow enough to allow complete compaction of each layer.
- All areas should be thoroughly vibrated but not over vibrated. A vibration time of 10 to 15 seconds in each area should normally be sufficient. The vibrator should be inserted at about 400mm intervals.

Finishing concrete:

Three types of finishes are described below, the choice being made according to circumstances. At no stage should neat cement or mixtures of cement and sand be applied to the surface to soak up bleed water.

Ordinary non-slip:

The surface is left as finished with wooden floats. Over-working should be avoided.

Steel trowelled:

If a hard, smooth finish is required, the surface should be steel trowelled. Steel trowelling must not start until:

- Bleeding of the mix has stopped.
- All bleed water on the surface has evaporated or been removed.
- The surface has started to stiffen.

Only then should steel trowels be applied using considerable pressure on the tools.

Note:

- Several trowellings spread over a period of up to two hours may be required.
- For large areas, power-operated tools are used.
- Trowelling should continue until the surface has attained an even, fine matt finish. Only if a polished finish is specifically required should trowelling continue.
- Small amounts of water flicked on with a brush may be applied to the surface to aid finishing. However, this should be done as little as possible and only when trowelling on its own is not producing the desired results as this tends to weaken the surface.
- Planning of the work should take into account that the delay period before steel trowelling can start is likely to be two to three hours, and even longer in cold weather. During the delay, drying of the mix, as opposed to evaporation of bleed water, must be avoided, as it may cause cracking.

Hard non-slip:

The surface should be steel trowelled as above and, subsequently, lightly textured with carpet-faced floats or soft brushes.

Curing concrete:

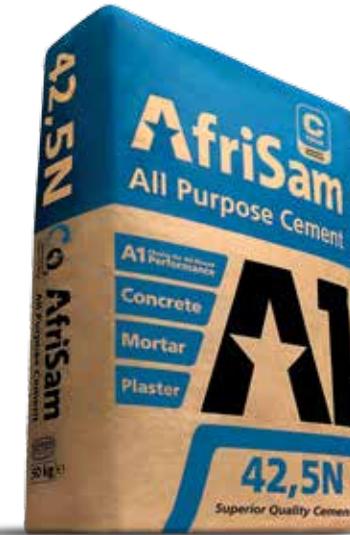
- Cover the work with plastic for at least seven days immediately after completion of the surface finishing.
- To avoid temporary variations in colour, the sheeting may be supported clear of the surface by timber battens for the first 24 hours of curing (this tends to occur when plastic sheeting is laid directly on to a wet concrete surface).
- Do not allow wind to blow under the sheeting.
- Inadequate curing will result in weak concrete.
- Light foot traffic may be allowed over the new work 24 hours after finishing, provided that the plastic sheeting is not damaged or displaced.

Conclusion:

Provided sufficient attention is paid to the selection of materials, mix proportions, placing, compaction, finishing and curing of the concrete, the results should be strong, durable, look good and last a lifetime.

For further assistance, please contact our customer service.

A detailed Safety Data Sheet and a guide to the use of cement are available on request.



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Your guide to
CONCRETING



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Concrete is one of the most versatile and easy to use building materials available. By following a few simple guidelines, builders and DIY enthusiasts can mix their own concrete and make a success of their building project.

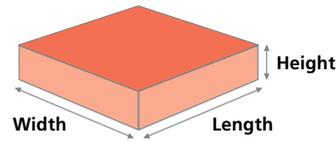
The right materials for concrete:

The following materials are required to make high quality concrete. They are available from leading builders' merchants stocking AfriSam cement.

- High quality cement that complies with SANS 50197-1. Clean coarse sand free of leaves, grass, twigs or other foreign matter. Sand should be fairly coarse with particle sizes ranging from fine dust up to about 5mm.
- Clean stone sizes of 26,5mm, 19mm, 13,2mm or 9,5mm. Stone sizes of 26,5mm can be used for thick sections such as foundations, deep suspended slabs and industrial floors thicker than 120mm. 19mm stone can be used for floors, paths, patios and driveways. Stone sizes of 13,2mm or 9,5mm can be used for thin concrete sections such as thin suspended slabs, precast items such as lintels, flagstones and other items with section thickness ranging from 40mm to 50mm.
- Clean drinkable water.

Determining the right quantity of concrete:

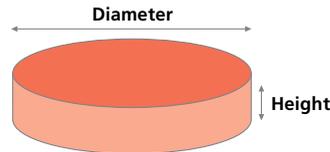
Concrete is either poured into formwork or ground excavations. The calculation for the volume of concrete required for square or rectangular sections is carried out as follows:



Volume of concrete = Width x Length x Height

Estimate the amount of concrete you need for foundations by measuring the length, width and height of the excavated trenches and not off plan.

The calculation for the volumes of circular sections is carried out as follows:



Volume of concrete = (Diameter)² x 0,8 x Height or Depth

Suggested thickness of concrete:

Structural concrete members are designed for specific thicknesses. Typical thicknesses for unreinforced concrete elements are given in table below.

Element	Thickness (mm)
Precast flagstones	40
Paths, patios, floors, driveways	80
Footings for garden walls	200
House foundations	200

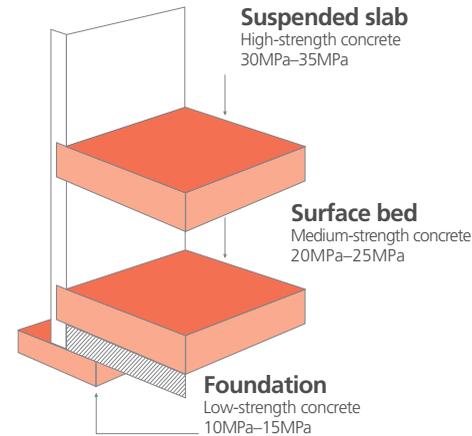
Concrete strength:

The strength of the concrete depends on the mix proportions and should suit the work being done. It should be noted that concrete strength depends on the following factors:

- Type and amount of cement added to the mix.
- The amount of water added to the mix.
- The type of sand.
- The type of aggregate.
- Effective curing.

Note: Only enough water should be added to ensure adequate workability. Adding too much water reduces concrete strength.

Different applications require different strengths of concrete. Three different strength categories with typical applications are outlined below.



Preparing areas before pouring concrete:

Foundations:

Prior to pouring foundations, make sure that the trenches are damp, but with no standing water. This will place the concrete in a self-curing environment with three sides prevented from drying out by the soil. The sub-base for foundations, surface beds and ground slabs should be well compacted.

Formwork:

Ensure that the formwork is clean and adequately supported to retain the mass of the concrete.

Reinforcing:

Make sure that the steel reinforcing is adequately secured to ensure that it does not move while placing concrete.

Mixing concrete:

Concrete can be mixed by hand or by using a concrete mixer. Make sure that the quantities of each ingredient are accurately measured. This can be done by simply using a clean bucket or tin and filling it to the same level each time. This ensures that the concrete mix remains consistent throughout. It is preferable to batch cement in whole bags.

Mixing by hand:

Concrete should be mixed on a flat, clean, hard surface (concrete slab or steel sheet).

- Spread the sand in a layer about 100mm thick and then spread the cement on top, mixing the two thoroughly together until they form an even colour.
- Pile the mixture into a heap and make a hollow in the middle.
- Pour in water slowly in small quantities and mix until a smooth paste is formed. Too much water will produce a weak concrete. Too little will make the mix difficult to place.
- Add the correct amount of stone and mix until every stone particle is coated. If the mix becomes too stiff to place easily, add a little more water and mix it thoroughly.

Mixing with a concrete mixer:

The size of the concrete batch should suit the size of the mixer being used. If too little is mixed, time will be wasted while mixing too much could cause spilling and poor mixing results.

- Measure quantities of each ingredient.
- First add the stone and some water, then cement, then sand
- Mix and add more water until the right consistency is reached.
- Mix until concrete becomes a uniform colour and texture.
- Empty the mixer completely when you discharge each batch.
- Clean mixer thoroughly on completion.

Selecting the type of cement:

The difference between AfriSam All Purpose Cement and High Strength Cement is the rate of strength development and ultimate strength.

High Strength Cements should be used in applications where high early strength is required, e.g. early removal of formwork and precast applications. For normal concrete applications, there is a slight difference in mix proportions as shown on the right and the selection of cement will depend on economics.

Low-strength concrete: 15MPa

Low-strength concrete is suitable for unreinforced foundations for houses and free-standing walls.

Batching by wheelbarrow

All Purpose Cement	Coarse sand	Stone	Approximate yield
2 Bags (1=50 kg)	4 wheelbarrows	4 wheelbarrows	0,39m ³

Medium-strength concrete: 25MPa

Medium-strength concrete is suitable for reinforced foundations and slabs, light-duty house floors, paths, patios, steps, driveways and garage floors.

Batching by wheelbarrow

All Purpose Cement	Coarse sand	Stone	Approximate yield
2 Bags (1=50 kg)	3 wheelbarrows	3 wheelbarrows	0,3m ³

High-strength concrete: 25MPa

High-strength concrete should be used for suspended structural beams and slabs, and pre-cast items such as flagstones and heavy-duty floors such as workshop floors.

Batching by wheelbarrow

All Purpose Cement	Coarse sand	Stone	Approximate yield
2 Bags (1=50 kg)	2 ½ wheelbarrows	2 ½ wheelbarrows	0,26m ³

Ultra high-strength concrete: 25MPa

Suitable for suspended structural beams and slabs, columns and water-retaining structures.

Batching by wheelbarrow

All Purpose Cement	Coarse sand	Stone	Approximate yield
2 Bags (1=50 kg)	2 wheelbarrows	2 wheelbarrows	0,22m ³

Moving and placing the concrete:

Time limits:

The time that elapses between the start of mixing a batch and when the batch is placed and compacted should ideally not exceed 45 minutes. Should concrete not be placed immediately after batching, cover it with plastic sheets or wet sacking to prevent drying out in the sun or wind.

Concrete not placed and compacted within this time, or which has stiffened to a degree that its workability (consistency) cannot be restored fully by turning it over a couple of times with spades should be discarded. This is because the hydration process would be in an advanced stage and retempering of the concrete would weaken it.

Moving the concrete:

The concrete can be moved in buckets or wheelbarrows. If it is jolted too much, the stone will settle at the bottom. If this happens, remix the concrete before placing it. Do not let the concrete stand so long that it stiffens before it is placed.

Retempering:

The concrete mix should be used within a maximum of two hours of being mixed and must never be retempered by mixing in additional water, as this reduces the resultant strength of the mix.

Placing the concrete:

Place the concrete as close to its final position as possible. If concrete is placed on the ground, the soil should be thoroughly damp but without any standing water. Work the concrete right into the corners and along the edges of the form or hole with a spade or trowel.