

TECHNICAL INFORMATION

TOPFLOW HORIZONTAL

Topflow Horizontal's finishing characteristics and high quality surface finish can eliminate the need to power float concrete on site dependant on project specification.

APPLICATIONS

- Slabs
- Residential dwelling oversite/slabs
- Structural toppings
- Domestic floors
- Commercial slabs such as composite deck construction (rib metal decking)
- Low traffic industrial floor slabs
- Mezzanine and office areas within industrial units

CHARACTERISTICS

- Topflow Horizontal enables the rapid and effortless fabrication of slabs and floors
- Tarmac technology means that surface finish is of a high quality
- This can eliminate power floating on site
- Floor finish tolerance to BS 8204 - 1 SR2

SPECIFICATION

- Maintenance of fluidity - two hours
- Minimum thickness - 75mm
- Compressive strength at 28 days - 35N/mm²
- If a greater early age or 28 day strength is required Tarmac will work to customer specification

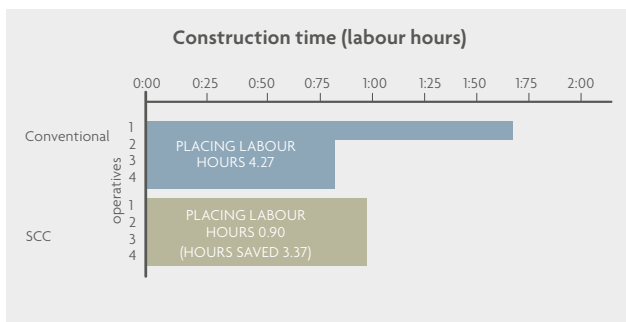
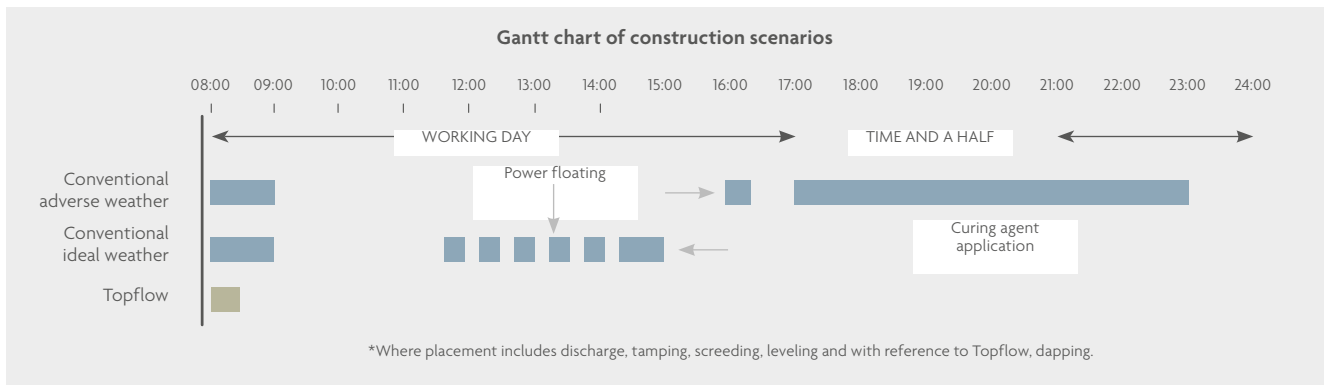
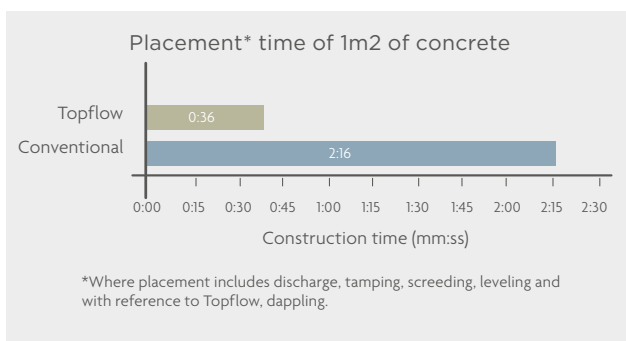
After extensive research with Loughborough University¹, Topflow Horizontal was proven to improve construction processes. The research² focused on determining and clarifying the exact benefits that Topflow Horizontal can bring to the construction process.

The research made it clear that Topflow Horizontal is not just a material for construction but it is in fact a method of construction. By adhering to the Topflow Horizontal method significant savings were shown to be achievable.

- Placement with Topflow Horizontal can reduce slab construction time by nearly 75%
- Reduces the gang size from four operatives to two

TOPFLOW HORIZONTAL CONSTRUCTION METHOD

- Removal of the power floating operation reduces an aspect of the variability and unpredictability with concrete slab construction
- Topflow Horizontal increases the predictability of construction projects with respect to project time and costs, reducing the risk of unforeseen expenses and delays
- Topflow Horizontal removes issues observed with conventional concrete practice of water addition, insufficient compaction and curing. Complying with requirements of NHBC standard 2.1 – S10 parts c, f and g



INSTALLATION

Topflow Horizontal can be laid over any stable substrate.

UNDERFLOOR HEATING

Topflow Horizontal is suitable for laying over underfloor heating; however the following precautions need to be made.

1. Reinforcement mesh (typically A142 or A193) should be used. Ideally this should be tied to the heating pipes prior to installation
2. Minimum depth of concrete cover to the top of the heating pipe should be 50mm
3. Careful consideration should be given to bay sizes and the location of construction joints

BOND TO SUBSTRATE

- When the concrete is laid unbonded to the substrate, a polythene membrane of suitable thickness will be required
- When the concrete is to be laid bonded, steel reinforcement mesh will be required. Bonding compound (such as an SBR type product) to be applied

PERIMETER ISOLATION

- A compressible strip with a minimum thickness of 8mm and maximum of 15mm should be fixed around the walls
- The isolation strip is also required to be fixed around vertical features such as columns and pipe ducts
- Particular attention must be taken at re-entrant angles such as doorways, bays and alcoves
- Ensure the perimeter isolation is placed at right angles into all corners of the room
- On exterior angles it may be necessary to double up the isolation to ensure that the minimum thickness is maintained around the angle
- The most suitable material for this is a self-adhesive ethafoam strip; a small amount of steel mesh should also be placed around any internal corner or extrusion through the slab

SUBSTRATE PREPARATION

- In all cases, a polythene membrane of 120 micron minimum thickness and 250 micron maximum thickness must be laid on the substrate
- Topflow Horizontal is highly fluid and this requires the membrane to be substantially watertight to prevent loss of material
- The sheet should be laid with a 300mm overlap, adhesive tape at least 50mm wide should be applied along overlapping joints of the sheets to seal them
- Care should be taken to ensure the membrane is folded, or cut and sealed, into a corner
- Around the perimeter of the room, the edges of the polythene membrane should extend well above the intended level of topping or should be taped to the ethafoam strip
- Care should be taken to ensure no ridges or folds are left on the surface of the polythene

CONDITIONS

- Topflow Horizontal can only be laid when the air temperature is between 5°C and 30°C
- The substrate must not be frozen and ideally should be within the above temperature range

SETTING OUT LEVELS

- The thickness of the concrete from the highest point of the prepared substrate should not be less than 50mm and should incorporate measures to counter plastic shrinkage
- To adequately set out the levels before placing the concrete, the highest point should first be found
- To easily identify the thickness to be laid a series of tripods with a height adjustable indicator should be used. A tripod should be placed at the highest point to denote the top of the finished floor and a nominal minimum thickness of 75mm
- Other tripods should be placed at two to three metre intervals across the floor and the indicators set using a laser-levelling device with the first tripod as the datum

SLUMP-FLOW MEASUREMENT

When Topflow Horizontal arrives on site, the slump-flow of the material should be 650mm - 750mm when measured using the appropriate equipment. If the mix is outside of the target range, then advice should be sought from your Tarmac Readymix representative as to the appropriate course of action.

PUMP PRIMING

If the concrete is to be pumped, prior to pumping it is essential that the pump is primed. The pipes must be systematically 'lubricated' with a slurry made up of approximately 10kg of pure cement mixed with 10l of water. The slurry should be fed through the pipes and fully recovered at the other end before any of the concrete is discharged.

PUMPING

When placing the product, the hose should be held approximately 500mm from the substrate. The pipe should be moved in a sweeping motion and should not be held stationary above any fixed point. Topflow Horizontal should be poured until the pre-set levels, as denoted by the tripods, have been reached.

DAPPLING

- When the material has been placed to the desired levels within a room/area, it should be dappled immediately to obtain the best surface finish. The T-bar should be moved across the surface of the concrete with a dappling motion to generate a wave-like ripple across the surface
- The dappling should occur in two directions, the second being perpendicular to the first. The first pass should be a deep pass to approximately two-thirds of the depth of the concrete; the second a light pass over the surface

CURING

- Following placement, a curing membrane should be sprayed over the surface using a mist sprayer. Care should be taken to follow all relevant health and safety procedures when using the curing membrane, including goggles and respiratory equipment where required
- It is essential to ensure complete coverage of the surface as per manufacturer's guidelines

FOLLOWING PLACING

- The surface will be suitable for light foot traffic after 24 hours and can be worked on after a period of 72 hours from placing
- The slab should not be loaded with palletised materials until at least seven days
- Partitions can be erected after a minimum of seven days from the time of placing. Floor finishes should ideally be applied within a 60-day period after placing
- The slab should be protected from excessive winds or drying for 48 hours after placing

BAY SIZES (WHEN INSTALLED WITHOUT CRACK CONTROL MESH REINFORCEMENT)

Saw cut joints should be detailed at 40 times the depth of the slab (in mm) e.g. a slab that is 75mm deep = $40 \times 75 = 3,000\text{mm}$, therefore joints must be at 3m x 3m.

Please note that bay sizes can be increased by utilisation of fibre reinforcement technologies and/or including Shrinkage Reducing Admixtures (SRAs) within the mix.

CHECK LIST BEFORE POURING

In order to achieve the full potential of Topflow Horizontal it is necessary to follow established best practices. Please review and initial the guidelines below before pouring.

TOPFLOW HORIZONTAL	Customer Initial
Substrate temperature must be within 5-30°C with no risk of freezing for at least 48 hours after placement.	
Minimum slab thickness is 75mm.	
Check that the correct Topflow mix has been specified for the application.	
Ensure there is no standing water on the substrate prior to placement. Check that perimeter isolation strip has been installed correctly.	
Do not apply vibration to Topflow, as this will cause segregation. Using secondary transportation such as dumpers on site can also cause segregation.	
If using pumps, ensure pump lines are primed prior to start. Do not allow priming water/grout to be placed in forms. Pump off concrete until a consistent product is coming out of the line otherwise segregation may occur. Inform the pump company to make them aware that they are placing Topflow concrete. 75mm diameter lines provide the most controlled placement.	
If using a machine bucket, avoid saturating the bucket with release agent as this can cause segregation or discolouration of the concrete. Ensure there is no water in the bucket prior to filling. Discharge with steady flow.	
Curing agents should be applied immediately after the dappling process. Application rates as per manufacturer's recommendations (e.g. Chrysocure HPE from Chryso). Use a high pressure spray can that will provide an even application at the recommended dosage.	
Do not use plugged nozzles, or disturb concrete sprayer.	

FREQUENTLY ASKED QUESTIONS

1. IS IT APPROVED BY THE NHBC?

Yes, Topflow Horizontal is fully approved for use by the NHBC.

2. HOW FAR WILL IT FLOW?

Depending on the method used for the placing, the concrete will flow between 3 to 10m from the point of placing. How far the concrete actually flows is dependant on the energy you put into it i.e. how fast or hard you 'push' when you start placing.

For example, if you pour it directly from the truck into the slab, it will go further than if you pumped it because the initial motion 'energy' was higher.

3. DO I HAVE TO POWER FLOAT IT?

No, the main reason for using Topflow Horizontal is to avoid the need for this activity. By applying the appropriate method of placing, there is no need for power floating.

4. DO I HAVE TO VIBRATE IT?

No, the concrete is self-compacting, which means you don't have to vibrate it to compact it. In fact, if you vibrate any Topflow product you will cause the product to segregate and bleed.

5. HOW DO I FINISH IT?

When the concrete has been placed to the desired levels, it should be dapped (or tamped) using the T-bar. You should make two passes of the bar the second pass being at right angle to the first. On the first pass the bar must be used vigorously to create 'big' waves to level the surface. The second pass must be done more gently, i.e. a light tamping, as this will create the best surface finish. During this pass the bar should remain in contact with the surface of the concrete. The curing agent must be applied without delay after the second pass.

6. CAN YOU PUMP IT?

Yes, Topflow Horizontal is ideal for placing by pump, a normal concrete piston pump will have no problems with Topflow providing the pump and pipeline have been properly primed using a cement slurry. A big advantage when using Topflow products is that the size of the last two or three sections of flexible pipe may be reduced to 75 mm diameter, making it easier to handle and move around.

7. WHY DO YOU HAVE TO SPRAY A CURING AGENT ON THE FINISHED CONCRETE?

The curing agent has three purposes. Firstly, it is used to prevent plastic shrinkage cracking by preventing the evaporation of the water from the surface of the concrete. Secondly, by stopping the evaporation of water from the surface you prevent 'dusting' of the finished slab. Thirdly, good curing always allows the concrete in the slab to develop its full potential strength.

8. WHAT HAPPENS IF YOU DO NOT CURE IT?

The concrete will crack. Depending on the site conditions, the cracking can be from very light (two or three cracks per m²) to 'crazy paving'. As with any concrete you may expect the strength to be significantly reduced and the risk of 'dusting' to increase.

9. WHEN CAN I WALK ON OR LOAD THE SLAB?

The surface of the slab will be suitable for light foot traffic after a maximum of 24 hours. In terms of the initial loading of the slab the rate of strength gain is similar to conventional concrete. Where there are restrictions on loading, the designer or specifier's instructions must be followed. Tarmac staff will be happy to advise you on the rate of gain that may be expected for your project.

10. HOW DO I PLACE IT?

The three main placing methods are:

- Using a piston type concrete pump
- Straight from the mixer truck via chutes
- Using a crane and skip

Whichever method is used it is important that the finished level of the slab is clearly identifiable to the operatives before starting the pour. This can be done using adjustable tripod indicators, by using a laser level to adjust the level of the concrete at the same time as you place it, a tensioned string line between markers, or a combination of methods.

11. HOW MANY PEOPLE WILL I NEED TO LAY IT?

Depending on the volume of concrete, the surface area and the method of placing or setting the level, you will need between one and five people. Tarmac staff will be happy to advise you.

12. WHAT PREPARATION IS REQUIRED BEFORE POURING?

Topflow Horizontal is to be laid on top of a watertight membrane when unbonded and a compressive strip with a minimum thickness of 8mm is required, to be fixed around vertical features such as columns, pipes and walls. When the slab is intended to be bonded, a primer - SBR laytex or similar - must be applied to the substrate and a reinforcement mesh or fibre is required for crack control.

13. IS THE FINISHED CONCRETE SUITABLE TO RECEIVE CARPET OR CARPET TILES?

Yes, the quality of surface finish should be acceptable to receive carpet tiles without the need for priming or using a self-levelling compound. It is our recommendation that if there is any doubt regarding adhesion of floor finishes, any residue of curing agent should be removed prior to adhesion.

14. WILL THE FINISHED SURFACE BE DUSTY WHEN IT DRIES?

No, providing the specified curing membrane has been correctly applied the surface of the concrete will be dust-free.

15. CAN I LAY IT TO FALLS?

No, Topflow Horizontal cannot be laid to falls because of its high fluidity.

16. WHAT IS THE SETTING TIME?

Depending on the temperature, the concrete will start to set 3-6 hours after placing. After 24 hours the strength will be sufficient for light foot traffic. Apart from the first few hours when Topflow is still fluid, the setting time is comparable to one of a 'traditional' concrete.

17. DO I NEED TO PUT STEEL IN THE CONCRETE?

It is recommended that either a reinforcement mesh or fibre is used in any horizontal application to control the stresses induced by the shrinkage of the concrete. When Topflow Horizontal is laid in certain unbonded situations, the use of mesh may be avoided by good site preparation as described in our guidance. All bonded applications will need at least reinforcement mesh or fibre reinforcement.

18. CAN I LAY IT BONDED?

Yes, but it is not our normal recommendation. The site preparation necessary to lay bonded Topflow Horizontal is more complicated than for unbonded. When bonded the contractor must use an adequate reinforcing mesh, must put a soft isolating joint around every vertical feature, must use a suitable primer before laying the concrete and must saw cut crack control joints within 24 hours. Please ask us for advice if you intend to use Topflow Horizontal in a bonded application. The concrete must also receive its intended floor finishings within 56 days of placing, otherwise there is risk of long-term drying shrinkage.

19. CAN I PLACE TOPFLOW HORIZONTAL DIRECTLY ONTO INSULATION BOARD?

No, because Topflow Horizontal is so fluid care is required to avoid floatation of the insulation boards, as such a layer of Visqueen is required to isolate the insulation from the concrete. Avoid the use of aluminium foil faced board as the aluminium will react with any cement based product, and this reaction can cause surface defects.

20. WHY IS THE PREPARATION SO CRITICAL?

Good preparation is critical because it is the only way to reduce the risk of problems like cracking, poor surface finish, or a disaster like having a few cubic metres of concrete flowing through a gap in the formwork onto the level below.

21. IF THERE ARE GAPS IN THE FORMWORK OR PRECAST SYSTEM, HOW MUCH PRODUCT WILL I LOSE?

That will depend on the size of the gaps, typically a gap of 2-8mm will result in the loss of some product, however this will block within a few minutes and the loss will stop. Where gaps are greater than 15mm the concrete will continue to flow until the gap is blocked by an operative.

22. CAN YOU PUT FIBRES IN IT?

Yes, Topflow Horizontal can either be supplied with macro-synthetic (plastic) fibres or steel fibres. The application and mesh type to be replaced will determine the fibre type and dosage. Each Topflow mix is adjusted accordingly to take into account the fibre type and dosage.

23. IF IT RAINS WHEN THE CONCRETE IS STILL WET, WILL IT RUIN THE SURFACE?

As with all other forms of concrete heavy rain will damage the surface, once the curing membrane has been applied the surface will be partially protected and is unlikely to be damaged by light rain.

24. CAN I REWORK THE SURFACE IF I NEED TO?

Yes, but only if essential and it must take place before setting begins. The surface can be reworked using the bar before the curing agent is applied. If the curing agent has been applied it may be possible to refinish the surface, however, it will be very difficult to mix the curing film into the surface layer and may detract from the normal finish.

25. DO I HAVE TO PUT CONSTRUCTION JOINTS IN AND IF SO AT WHAT SECTIONS?

Yes, it is our recommendation to use construction joints. Normal concrete practice suggests inducing joints at intervals equivalent to 40 times the depth of the concrete. For example a slab 100mm thick should have joints every 4m. The length to width ratio shall not exceed 2:1. Note that the use of fibre reinforcement can potentially increase the spacing of joints. If in doubt, please consult with your Tarmac representative.

26. WHAT AMBIENT CONDITIONS CAN I POUR IN?

You can place Topflow Horizontal at any time providing the temperature is between 5 and 30°C. At low temperatures, 5-10°C the setting time will be slightly longer.

27. DOES FROST AFFECT THE CONCRETE?

As for any concrete, Topflow Horizontal should not be placed in freezing conditions, or where the temperature is 5°C or less on a falling thermometer.

28. HOW LONG DOES THE CONCRETE STAY FLUID?

Topflow Horizontal is normally designed to retain its workability in excess of two hours. For special situations this may be extended.

29. ONCE FINISHED CAN I LEAVE IT AS A FINISHED PRODUCT?

Yes, however it is our recommendation to cover the concrete within 56 days of placing to minimise the potential risk of longer-term shrinkage cracking. This can be minimised by specifying the right type of reinforcement within the concrete, either mesh or fibre.

30. WHAT TYPE OF SURFACE FINISH CAN I OBTAIN?

The quality of surface finish is defined by two characteristics: its flatness and its smoothness. Topflow Horizontal is normally sold as 'equivalent to a power-float finish' but it is not identical. It will normally be flatter than a power float finish but not as smooth. Depending on a number of factors such as mix design and geographic area, it may be possible to use plain Topflow Concrete in Horizontal applications. Please note, when considering this mix, the surface finish achieved will not be as good and the risk of cracking will be higher.

As a rule, Topflow Horizontal will meet the requirements of BS8204-1 SR2