



INSTALLATION HANDBOOK



Synthetex[®]

Guidelines for a successful HYDROTEX[®] port /underwater installation



KEYS TO SUCCESS

INSTALLATION OVERVIEW

After preparing the site, HYDROTEX[®] fabric formwork panels are carefully rolled out, placed along the project site area, zipped together, and filled with fine aggregate concrete in situ. This handbook offers step-by-step instruction for a successful installation.



ON-SITE, ABOVE WATER CREW MEMBERS SHOULD WEAR:

SAFETY HATS

GLASSES OR GOGGLES

RUBBER GLOVES

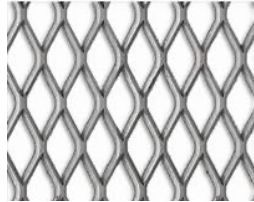
BOOTS

**HYDROTEX®
INSTALLATION**

PPE for a Successful Installation



CONCRETE PUMP WITH HOPPER



WIRE MESH FOR TOP OF HOPPER



READY-MIX TRUCK



FLEXIBLE CONCRETE PUMP HOSE



FLOTATION UNIT



UTILITY BOAT



LAYFLAT FILLING HOSE (IF NECESSARY)



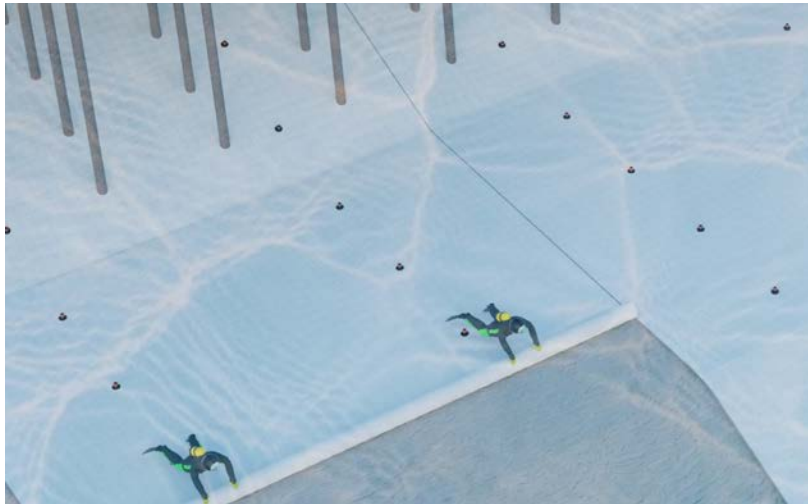
INSTALLATION HANDBOOK



FLOW CONE TO TEST GROUT

HYDROTEX® INSTALLATION

Tools for a Successful Installation



HYDROTEX® **PORT** **INSTALLATION**

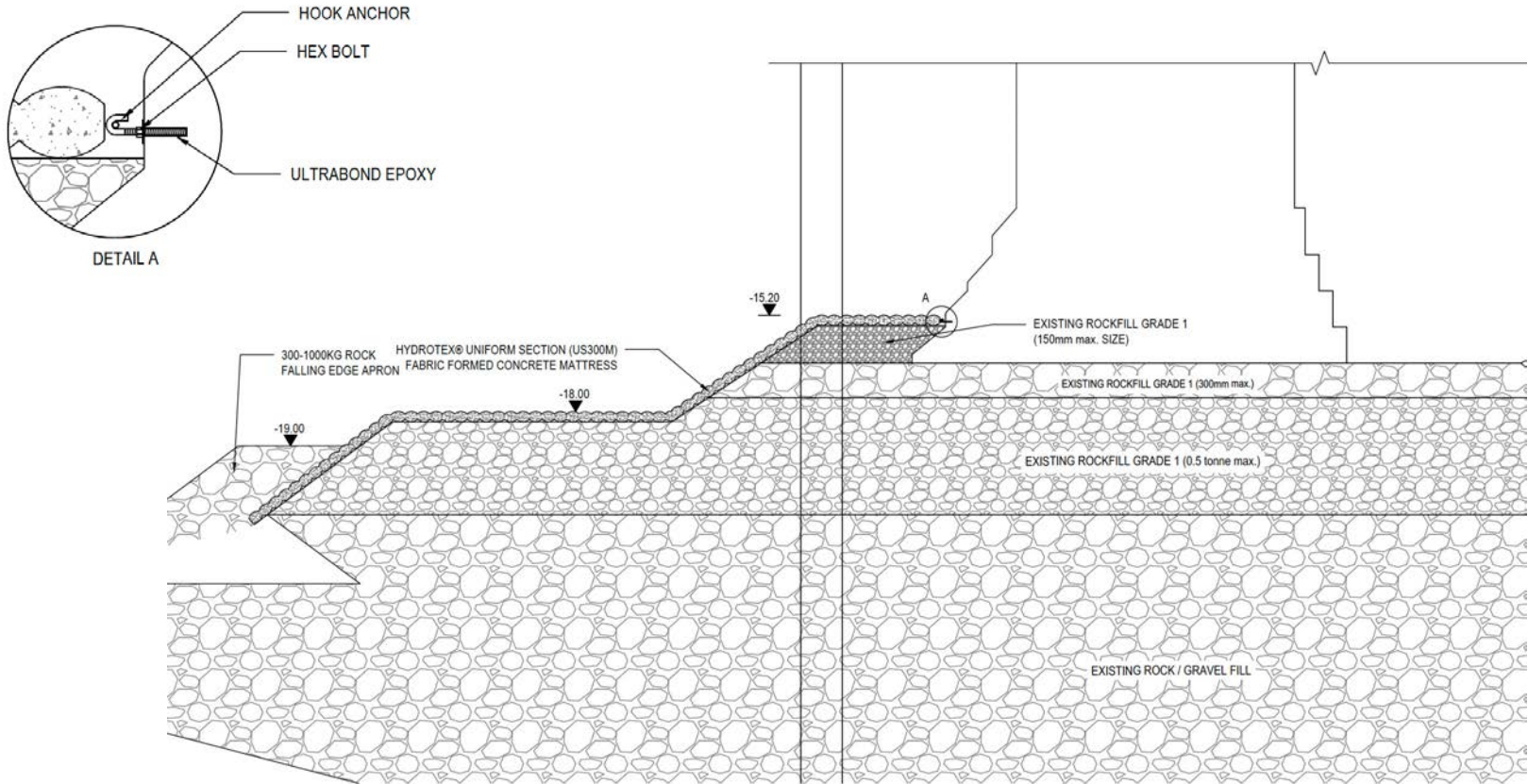
Once the fabric panels have been rolled up in the dry, lifted and lowered into the water by a crane, the dive team will attach the panels to the bottom of the quay wall, roll out the panels, place around piles and zip them together.

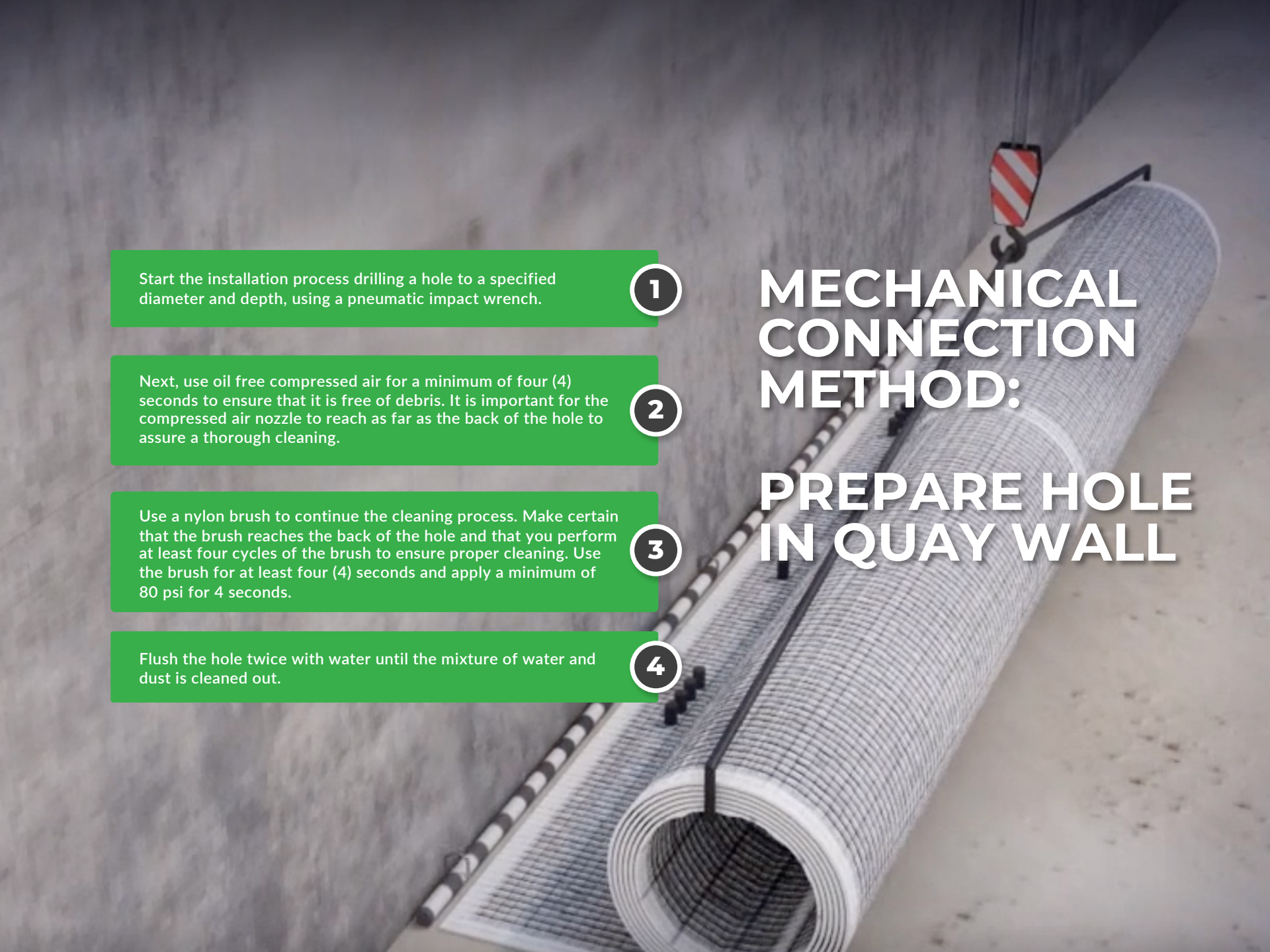


QUAY WALL ATTACHMENT

How to fix HYDROTEX[®] fabric formwork mattress to
the bottom of the quay wall

MECHANICAL CONNECTION METHOD





Start the installation process drilling a hole to a specified diameter and depth, using a pneumatic impact wrench.

1

Next, use oil free compressed air for a minimum of four (4) seconds to ensure that it is free of debris. It is important for the compressed air nozzle to reach as far as the back of the hole to assure a thorough cleaning.

2

Use a nylon brush to continue the cleaning process. Make certain that the brush reaches the back of the hole and that you perform at least four cycles of the brush to ensure proper cleaning. Use the brush for at least four (4) seconds and apply a minimum of 80 psi for 4 seconds.

3

Flush the hole twice with water until the mixture of water and dust is cleaned out.

4

MECHANICAL CONNECTION METHOD:

PREPARE HOLE IN QUAY WALL

Open the package and remove the cartridge.

1

Attach the proper nozzle and extension. Do not modify the nozzle.

2

Insert the cartridges into the dispersing tool. Dispense adhesive to the side to assure that it has been properly mixed and that the color is uniform.

3

For water filled holes, insert the disperser with the cartridge and completely fill the hole starting from the back to prevent water pockets from forming. Withdraw the nozzle as the hole fills.

4

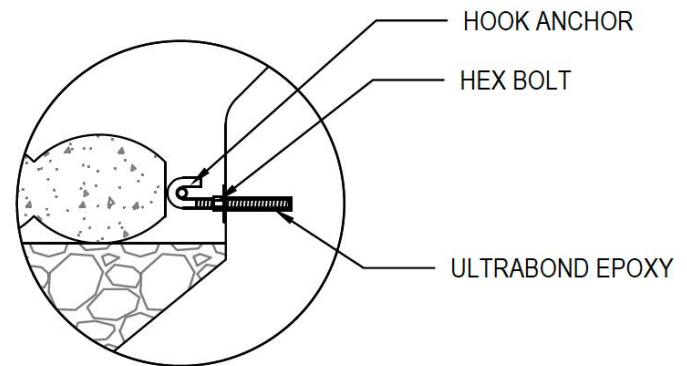
Insert clean, oil-free anchor and turn it slowly until it contacts the bottom of the hole.

5

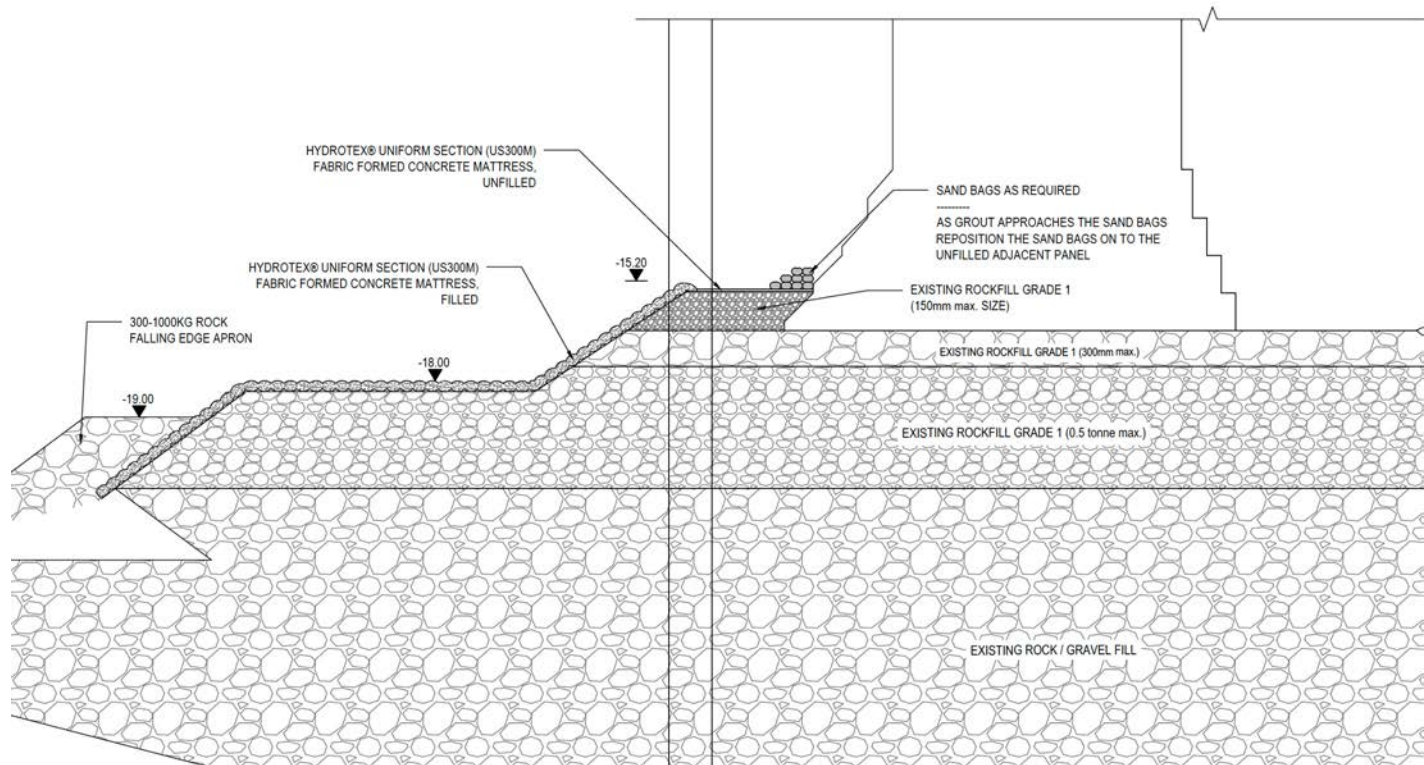
Do not disturb the anchor until the adhesive has fully cured.

6

MECHANICAL CONNECTION METHOD: SECURE TO QUAY WALL



OPTIONAL CONNECTION METHOD*



**Must be approved by EOR (Engineer of Record).*

FIXING OF THE CONCRETE MATTRESS FORMWORK AT THE QUAY WALL

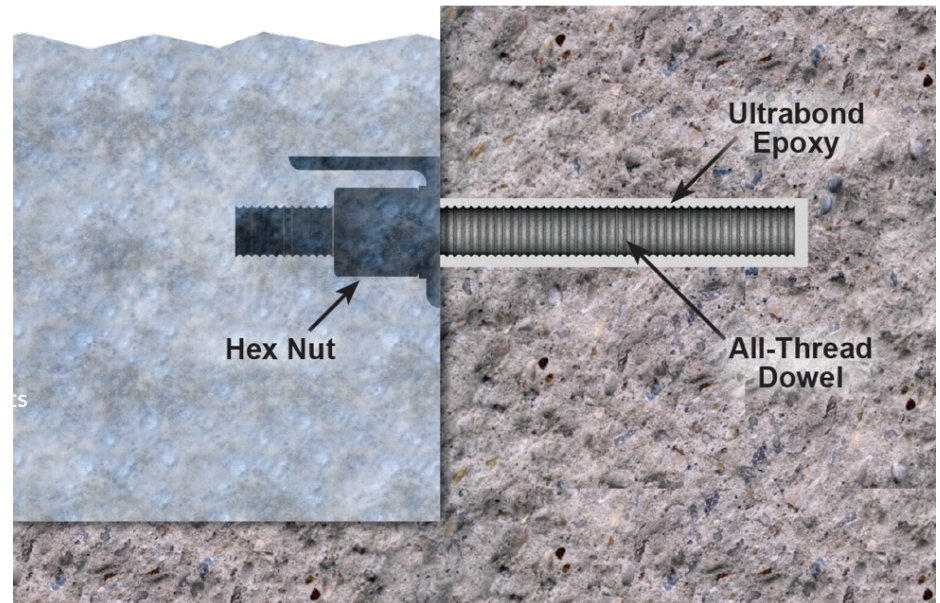
Install a steel bar through the PVC Cuff to use as an installation tool to hang onto hooks on quay wall (see previous illustration).



OPTIONAL CONNECTION METHOD*

1
Install the concrete mattress formwork as to abut the caisson and place sandbags, as illustrated, for the securing of the formwork to the caisson.

2
Attach the proper nozzle and extension. Do not modify the nozzle.



**Must be approved by EOR (Engineer of Record).*

ROLL OUT HYDROTEX FABRIC FORMWORK

1 Once fabric panels are lowered into water, two divers will roll it out (and around piles, if present).


2 The second panel will be rolled out in the same manner and then zipped to the first panel.

3 The bottom layer of each panel should be zipped together first.

4 If cables are present they should now be connected between the two panels.

5 The top layer of each panel should be zipped together next, while ensuring all internal components are in between the two layers and clear of the zippers.

6 When both panels have been completely zipped together. Any point there is a zipper break (noncontinuous segment) then the zippers both top and bottom layers should be secured together using tie wire or zip ties.



CONCRETE MIX IS KEY TO SUCCESS!

1

Fine aggregate concrete is a mixture of Portland cement, fine aggregate (sand) and water, that when properly proportioned and mixed will produce a pumpable grout.

2

Fine aggregate concrete should be pre-mixed, following our mix requirements at a concrete batch plant and delivered by ready-mix trucks to the site.



If a continuous supply of concrete cannot be assured a reserve of concrete should be maintained in a holding hopper equipped with an agitator.



RECIPE FOR SUCCESS!

| Material | Mixing Ratios (lb/yd ³) | Mixing Ratios After Filling (lb/yd ³) |
|----------|--|---|
| Cement | 750 - 850 | 805 - 915 |
| Sand | 2053 | 2290 - 2190 |
| Water | 500 | 460 - 470 |
| Air | 4 oz | N/A |



CONCRETE MIX REQUIREMENTS:

WATER ADDITIONS


No additional water should be added to prepared concrete batch until upon arrival to the project site IF NEEDED for flow rate.

The desired flow rate is within 9 to 15 seconds. If flow is higher than 15 seconds upon arrival to the job site, then add more water.

All water additions should be completed within 15 minutes from the start of the first water addition. Water additions should be injected into the mixer under such pressure and direction of flow to allow for proper distribution within the mixer.

Turn the drum an additional 40 revolutions, or more, if necessary, at mixing speed, to ensure a homogenous mixture.

Water should not be added to the batch at any time after this.

A photograph of a construction site where workers are sampling concrete. In the foreground, a worker in a blue hard hat and yellow safety vest is using a funnel to transfer concrete into a wheelbarrow. Another worker in a white hard hat and yellow safety vest is assisting. In the background, a worker in a grey hard hat and safety vest is visible. The site is cluttered with construction equipment, including a concrete mixer truck and various containers. A sign in the background reads "HARD HATS AND SAFETY VESTS REQUIRED".

For testing, the fine aggregate concrete should be discharged at the normal operating rate, with care being exercised not to obstruct or retard the discharge by an incompletely opened gate or seal.

As the mixer is being emptied, individual samples should be taken after discharge of approximately 15% and 85% of the load.

No samples should be taken before 10% or after 90% of the batch has been discharged.

Due to the difficulties of determining the actual quantity of fine aggregate discharged, the intent is to provide samples that are representative of widely separated portions, but not the beginning and end of the load.

SAMPLING FOR UNIFORMITY

The consistency of the fine aggregate concrete delivered to the job site should be maintained in the 9-15 second range when passed through the 0.75-inch (19 mm) orifice of the standard flow cone that is described in ASTM D 6449



MAINTAINING PROPER FLOW:

The consistency of the fine aggregate concrete delivered to the job site should be maintained in the 9-15 second range when passed through the 0.75-inch (19 mm) orifice of the standard flow cone that is described in ASTM D 6449.

Faster or slower flow cone times may be appropriate depending on the site conditions and materials availability (i.e., steep slopes, coarse or irregular material in the fine aggregate grout mix.)

Discharge of fine aggregate concrete should be completed within 1.5 hours after the introduction of mixing water to mix.

This limitation may be waived by the contractor if concrete is still at proper flow of 9 to 15 seconds after 1.5 hours' time, without adding water to the batch.

In hot weather, or under conditions contributing to rapid stiffening of the fine aggregate concrete, a time less than 1.5 hours is permitted to be specified by the contractor.

Depending on the project requirements the technology is available to the manufacturer to alter fresh fine aggregate properties (such as setting time or flow.)

On some projects the manufacturer may request changes to certain fresh fine aggregate concrete properties due to the distance or projected transportation time between the batch plant and the point of delivery.

BATCH TICKET INFORMATION

Require the following info for each concrete batch:

- Ready-mix company name, batch plant or batch plant number.
- Serial number of ticket
- Date
- Truck number
- Specific designation of job (name and location)
- Specific call for designation of the concrete
- Amount of fine aggregate concrete in cubic meters
- Time loaded or of first mixing of cement and fine aggregate
- Amount of water added to the fine aggregate concrete at site
- Type, brand, and amount of cement
- Class, brand, and amount of coal fly ash or pozzolans
- Type, brand, and amount of admixtures
- Source and amount of each metered or weighted water
- Information necessary to calculate the total mixing water
- Amount of fine aggregate
- Ingredients certified as being previously approved
- Signature or initials of manufacturer's representative



SETTING UP FOR MATTRESS CONCRETE FILLING

1 Concrete pump is positioned at the top of the quay wall and wire mesh is placed over hopper to separate any clumps of cement or sand in the fine aggregate concrete mix.

2 Flexible concrete pump hose is connected to the hose flotation system.

3 If necessary, lay-flat filling hose is connected to the end of the concrete hose with a hose clamp. Otherwise, use flexible concrete hose only.

4 A utility boat with a two topside crew members is launched.

5 The concrete pump hose and lay-flat hose (if required) assembly is lowered into the water by the topside crew and positioned in place above the first filling port, by the top side utility boat crew.

6 Concrete hose is lowered into the water to a level above the concrete mattress formwork.

7 Under the instruction of the divers, the filling hose is lowered by the top side team and attached to the first filling port.



FILLING MATTRESS WITH CONCRETE

Diver is positioned at the designated filling port and start the concrete pump slowly to avoid damaging the pumping system.

1

Complete the filling of the fabric formed concrete mattress to the thickness specified.

2

Concrete is filled from the lower edge of the fabric formwork, working back up the slope.

3

Topside crew will record the volume of concrete pumped and stop the pump when the correct volume has been pumped

4



FILLING MATTRESS WITH CONCRETE

Dive crew will position the lay-flat filling hose above the next filling port and connect the hose and to formwork with a camlock.

5

Once the concrete pump has stopped, the divers will inspect the mattress section, by inserting a length of stiff wire through the concrete mattress at several locations along the slope.

6

On completion of the filling the first mattress formwork, Steps 1 through 6 will be repeated for the remaining formwork sections.

7