

# Prefilled Lined Underwater Hand-Placed Bagwork

## Underwater Bagwork Product Datasheet

UK Patent No. GB2464669

UK Patent Application No.1905855.1



### Identification

#### Introduction

Prefilled SoluForm Underwater Bagwork is designed for the hand placement of concrete in watercourses. Uses include the creation below water of scour protection, void filling, underpinning to a structure subject to scour, the formation to underwater parts of headwalls to culverts and bridges, or the creation and protection of riverbanks and walls below water. The concrete contained within the bagwork, remains inside the bagwork product during its use, with the outer bag acting as the external formwork and the inner liner as the means of concrete containment. Both the inner liner and outer bag are fully biodegradable, safely biodegrading insitu within 6-12 months. The concrete mix within the bags typically hydrates within several hours (refer to instructions below), hardens fully within 12 hours, and achieves full design strength within 28 days.

Each prefilled SoluForm Underwater Bag is supplied filled with 20kg of dry mix high strength structural concrete, 50no. prefilled bags per pallet, with each pallet shrink wrapped for storage and protection. Prefilled U/W bagwork can be placed underwater with the use of galvanised steel rebar pins, the pins being used short term to pierce the liner and allow water to hydrate the concrete, and long term as a means of linking blockwork together into a singular massive block of concrete blockwork.

#### Authority

The individual components of the concrete comply with the requirements of BS/IS EN 206-1:2002 and is manufactured under a BSI registered ISO 9001:2015 Quality System.

Materials used comply with the following standards:

Cement	BS EN 197-1:2011 (UK)
	IS EN 197-1: 2011 (Ireland)
Aggregate	BS EN 12620:2002

#### General Advantages

Prefilled SoluForm Underwater Bagwork allows the hand placement of concrete in water, without the need for pumps, plant or other forms of concrete formwork. The lined product also creates a clean method of placement, to greatly minimise any effect upon the environment arising from the placement of concrete in the river. Provided prefilled, primarily this removes the need for the contractor to fill bagwork themselves. As a means of concrete placement, it is highly adaptable on site during construction, and requires very little in the way of design.

#### Description

#### Manufacture

Concrete raw materials and end products are subject to regular quality control procedures and testing. Materials are factory blended, weighed and bagwork filled to ensure consistency and quality of the end bagwork product.

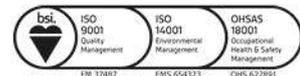
#### Compressive Strength

SoluForm prefilled bagwork is supplied to achieve an in-situ strength of at least 25N/mm<sup>2</sup>, complying with BS EN 206-1

Characteristic Strength N/mm<sup>2</sup> (typical)

#### High Strength Concrete Blend

Strength Test- Cube	7 Days	28 Days
Laboratory Tested	<b>25</b>	<b>32</b>
Representative (in situ)	18	25



## Performance

Prefilled SoluForm Underwater Bagwork contains a premixed, dry mix cementitious concrete product, formulated for underwater non flow applications. It is designed to allow placement of a dry mix concrete in watercourses, with the associated bagwork providing both a means of cement containment and a means of concrete formwork. The concrete has been specifically blended to provide a durable, long term concrete formation, with a structural grade strength of at least 25N/mm<sup>2</sup> and offer good adhesive properties for any associated steelwork. As such, it is ideal for a range of underwater repairs and similar underwater uses of hand placed concrete bagwork.

## Instructions for Use

All prefilled bagwork should remain palletised and wrapped until ready to use. Palletised bagwork should be stored in the dry, or suitably covered and protected if stored outside.

Care should be taken in removing protective wrapping, so as not to cut or damage the bagwork. When ready to use, bagwork should be removed individually from the pallet wrapping, and individual bags gently shaken, rolled or squeezed to loosen any compacted dry mix concrete contained within each bag. Should there be any small amounts of cement powder on the outside of the bag, resulting from the filling process, this can be gently brushed off with a soft brush, prior to approaching the watercourse. Where bags are more heavily dusty, it is likely that the liner has ruptured during transit and the bags should not be used. Only intact, undamaged bags should be carried into or used in the watercourse. Where damage has occurred during transit, these damaged bags should not generally be used, although often the dry mix can be reused to refill empty bagwork or reutilised for other purposes.

## For Placement below Water Level

Prefilled Underwater Bagwork relies upon the surrounding water to hydrate the concrete. For this to occur, steelwork is needed; the steelwork piercing each and every bag creating a pathway for the surrounding water to enter the bag and disperse around the concrete. When submerged underwater, and with a single standard pin through each bag, hydration and hardening typically takes around 6-12 hours, such that bagwork will have fully hardened by the next working day. Full strength is achieved within 28 days.

The procedure for placement below water level is:

- Unopened, loosened pre-filled underwater bagwork should be carefully carried, individually and by hand, through the watercourse to the location where they are needed. Each bag should be carefully placed horizontally, taking care not to drop, snag or tear the bags on sharp objects. Bagwork is to be placed flat and built up in rows, typically alternating or cross bonding bagwork to improve the strength of the finished blockwork. Bagwork can be patted flat or shaped once placed, to improve the appearance of the bagwork and reduce the amount of voids within the finished blockwork. Patting or shaping must be completed before the bagwork is pierced with steelwork.
- Underwater bagwork placed by divers can also be lowered into the river in 1T bulk bags. The divers can then remove individual prefilled bags from the bulk bag, by hand, to be carried and placed by the divers.
- After the second or third row of bags, steel rebar pins should be used to provide a pathway for water to enter the bag and hydrate the concrete, and to tie all the finished blockwork together. Steelwork pins should be pushed down vertically through the bags, with steelwork passing through each and every bag. Pins can be inserted by hand, or if a hammer is used, this should be a rubber mallet. Once placed and stacked, the tight seal between the steelwork and the liners, the tight packing between the individual bags and the fact that the steelwork is inserted vertically through the bags, ensures there is no loss of cement fines from the bags during placement or from piercing the bags.
- Further rows of bagwork and steelwork can be added, to take the wall or bagwork up to the required height. Typically standard 300mm long steelwork pins are inserted every two rows of bagwork, piercing 3 rows of bagwork with a single 300mm long pin. Ensure all the bagwork is pierced with at least one rebar pin, creating up to four entry points for each bag.
- Once pierced, air bubbles will typically escape from each bag, as water enters the bagwork and displaces any trapped air.

For placement of prefilled bagwork above water level we recommend the use of our water soluble Above Water Lined Bagwork products. Pre-soaked water soluble bagwork can often be used, subject to Regulatory Authority Approval and satisfactory method statement, to ensure hydration of the bagwork that otherwise cannot rely upon the surrounding river water as a means to harden the concrete.

In situations where water levels can be manipulated or is expected to rise and submerge the bagwork for a 12hr period following placement of the bagwork, it can also be possible to utilise Underwater Bagwork for higher level works. In all instances however, dry bagwork should not be left on site without either being wetted or anticipated to be fully hydrated within the following 24hr period.

**We recommend you pre-test the bags and proposed methodology beforehand, prior to using them on site, to ensure the product is suitable for the application.**

**Biodegradation:** The polymer film will biodegrade by the action of micro-organisms, at a similar rate as the outer hessian bag. General factors that affect the rate of biodegradation include, water temperature, light intensity, pH, whether the bag is subject to constant or intermittent wet/dry conditions and biological activity. Physical degradation is also subject to flow rates and turbulence. The outer hessian bagwork intentionally does not contain any fungicides and will safely biodegrade, typically within 6-12 months. The outer hessian bag, like the liner, is purely temporary and needed to contain and shape the concrete within, although the consequence of this is that it deviates from the requirements of the Specification for Highways Works and specifically BS1214.