

# ELCOROCK<sup>®</sup>

## Installation Guidelines

### 2.5m<sup>3</sup> Sand Containers



Quality - Support - Expertise



# ELCOROCK® Installation Guidelines

Please read the important notice at the end of this brochure

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These guidelines are general in nature. Site or project specific conditions may require them to be altered or amended to ensure effective installation. Please follow the guidance of the consulting or site engineer.

## 1.0 INTRODUCTION

ELCOROCK® engineered sand containers offer excellent performance in durability, robustness and usability. ELCOROCK® sand containers offer the designer, contractor and end user a range of benefits over traditional rock or hessian bag type structures, including more consistent physical properties, a well structured installation process and an amenable, user-friendly end product.

ELCOROCK® 2.5m<sup>3</sup> sand containers are designed with the harsh conditions of the open shoreline in mind. Constructed from heavy duty staple-fibre polyester and polyester/polypropylene blends, the ELCOROCK® product is capable of withstanding some of the harshest conditions on the planet, ranging from prolonged exposure to extreme ultra-violet radiation to withstanding the devastating effects of a category five cyclone.

The installation of the ELCOROCK® 2.5m<sup>3</sup> sand containers is a structured process that has been developed to ensure it is capable of delivering rapid construction times. This document provides a detailed outline of the procedures that should be followed in order to correctly store, fill and install ELCOROCK® 2.5m<sup>3</sup> sand containers.

Standard Occupational, Health and Safety guidelines should be followed as per normal site operations. Site safety and safe work practices are the responsibility of the consultant and/or contractor.

## 2.0 PACKAGING, TRANSPORT AND UNLOADING ON SITE

ELCOROCK® 2.5m<sup>3</sup> sand containers are supplied wrapped in waterproof, UV resistant, opaque plastic stretch-wrap on a pallet. For quantities of sand containers per pallet refer to Table 1. Transportation of sand containers is usually by flat-bed truck or similar and unloading should be conducted on the pallet as a whole, leaving the protective wrap in place until such time as the sand containers are required for filling. Unloading from the pallet should take place as required and remaining sand containers should be covered with the plastic wrap to prevent water ingress or exposure. Failure to do this may lead to saturation of the bags, making them heavy and difficult to handle.

**Table 1: Packaging**

Geotextile	Number of containers per pallet
Standard	30
Vandal deterrent one side	25
Vandal deterrent	20

## 3.0 ON SITE STORAGE

All deliveries of ELCOROCK® sand containers should remain in as-delivered protective wrapping until filling and placement commences. Ideally, sand containers should be stored in a location that offers protection from the elements, particularly for longer storage periods.

## 4.0 INSTALLATION REQUIREMENTS

The following are the minimum requirements to ensure a good filling and placement rate of 2.5m<sup>3</sup> ELCOROCK® sand containers;

- Filling apparatus, including J-Bins (supplied). Ensure compatibility of excavator quick hitches (refer to Table 2 and Figure 1),
- 2 Shock absorbing retracting lanyards and safety harnesses (supplied),
- 50mm lay flat high pressure hose with quick lock fittings (supplied),
- Container lifting device, consisting of clamp, pulleys and rope,
- Silicon adhesive (supplied),
- Cable ties (supplied),
- 2" high pressure water pump/supply,
- 13 tonne or similar excavator for filling sand containers,
- 35 tonne or similar suitable (refer to Figure 2) excavator for placement of sand containers,
- 3 labourers plus excavator operators,
- Personal protection: hats, steel cap boots, sunglasses, sun screen, long sleeve shirts and safety harnesses.

Before installing ELCOROCK® sand containers this guideline should be read thoroughly by all installation personnel. The installation team should be aware of their individual roles in ensuring a quality installation. Any questions raised by the installation team which cannot be answered by this document should be referred to the supplier.

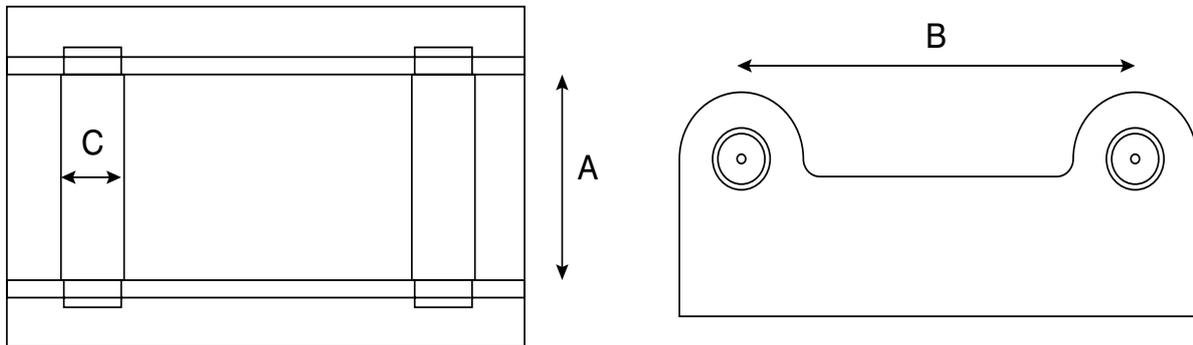
## 5.0 EQUIPMENT COMPATIBILITY

The J-Bins have been designed to accept a wide range of different excavators by means of an interchangeable quick hitch attachment. If the equipment available does not match the standard quick hitches available (refer to Table 2), project specific hitches can be manufactured to suit. The contractor should allow at least one month for the manufacture of new quick hitch attachments.

**Table 2: Standard Quick Hitch Dimensions**

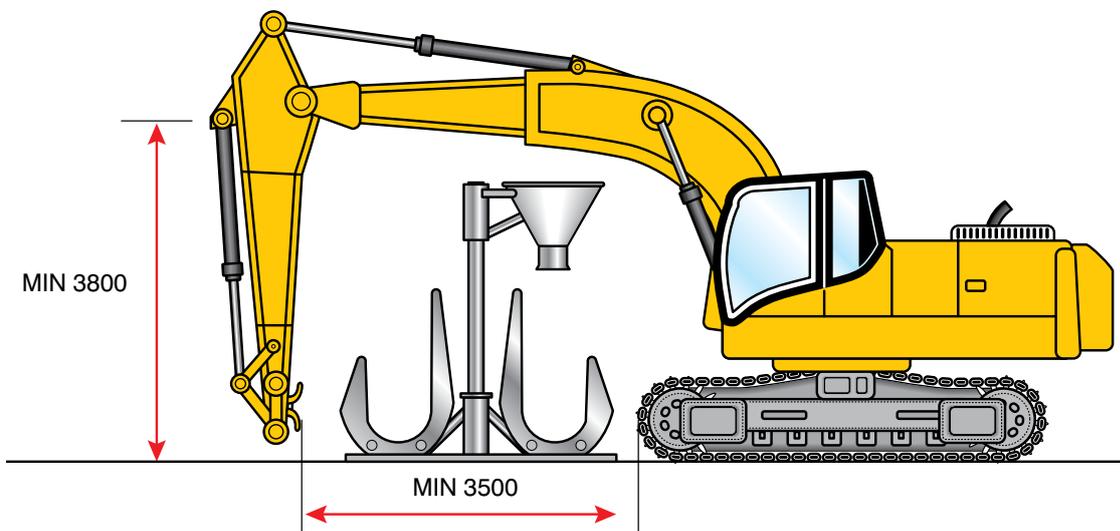
Code	A Spread	B Pin Centres	C Pin Diameter
QH 141	221mm	407mm	65mm
QH 201	320mm	440mm	80mm
QH 301	350mm	515mm	90mm
QH 351	420mm	585mm	100mm

**Figure 1: Quick Hitch Dimensions**



For removal of the J-Bins from the filling apparatus, a 35 tonne excavator is recommended. This size machine allows removal on J-Bins from one side of the apparatus only, which simplifies the removal and placement operation and ensures enough clearance around the apparatus (refer to Figure 2).

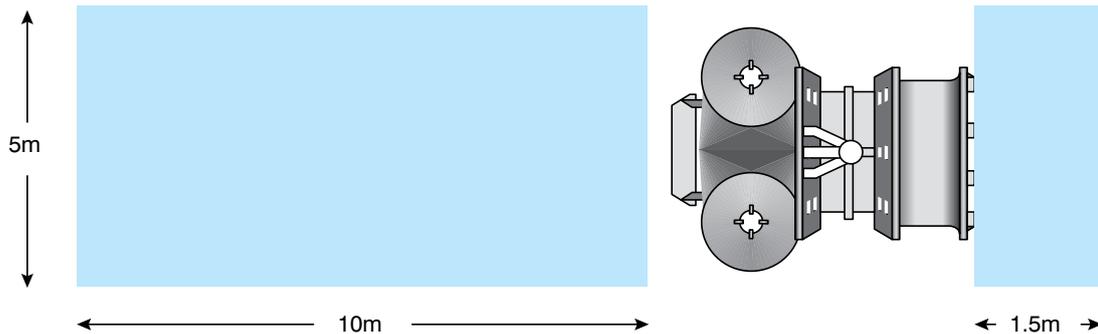
**Figure 2: Apparatus Clearance Requirements**



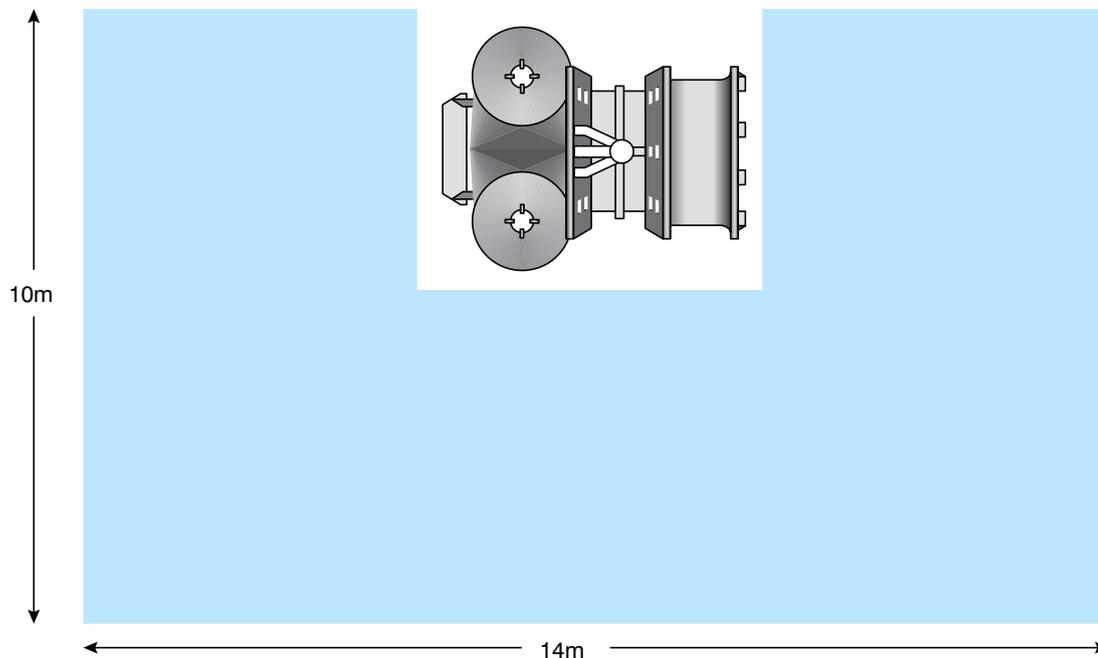
## 6.0 SITE AND SUBGRADE PREPARATION

Depending on the size of the project and the number of units to fill, planning of the site layout and logistics regarding filling and placement will enhance productivity and minimise the need for excessive handling or travelling. Access to J-Bins can be from one side for sites with limited space or from two sides where a larger working area is available or where excavators smaller than 35 tonnes are used (refer to Figure 3 and Figure 4).

**Figure 3: Minimum Apparatus One Side Access Area**



**Figure 4: Minimum Apparatus Two Side Access Area**



The site must be prepared such that there is no debris and the filling area is level and firm. Failure to ensure a level and firm construction area may lead to damage or instability of the filling apparatus. If the apparatus is not level it will be more difficult to connect to the quick hitch.

## 7.0 WEATHER CONDITIONS FOR INSTALLATION

ELCOROCK® installations can be sensitive to climatic conditions including tides, waves, rain and wind. Tidal variations may influence the availability of fill material, ability to place the containers and the area available to work and store raw materials and equipment. For safety reasons, strong or severe wave action can have an effect on the ability to work within an exposed coastal region.

Rain and wind can present hazardous situations in and around the work site, particularly where electricity is present. All of the above factors must be taken into account when planning an installation.

## 8.0 FILLING AND PLACEMENT APPARATUS

The filling apparatus (refer to Figure 5) is delivered on site dismantled. It consists of a large rectangular base with a centre upright (mast); a hopper system (which is supported by the mast) and two filling/placement J-Bins on either side of the base.

The hopper system is designed to pivot about the mast so that it is able to service either of these J-Bins when they are in position. The filling apparatus includes water filling jets which are attached to the hopper and allow for hydraulic compaction of the fill material.

To assemble the filling and placement apparatus the following steps must be followed:

1. The rectangular base must be placed in position on a level, firm foundation with drainage access (refer to Figure 6).
2. The mast is then inserted into the base, ensuring it is clean and free from debris.
3. The J-Bins are then placed on either side of the base, in the appropriate slots.
4. The hopper is then placed onto the top of the mast, ensuring it is clean and free from debris (refer to Figure 7).
5. The water supply is then connected to the splitter boxes.
6. Attach the container lifting device.
7. Attach the shock absorbing retracting lanyards to either side of the hopper.

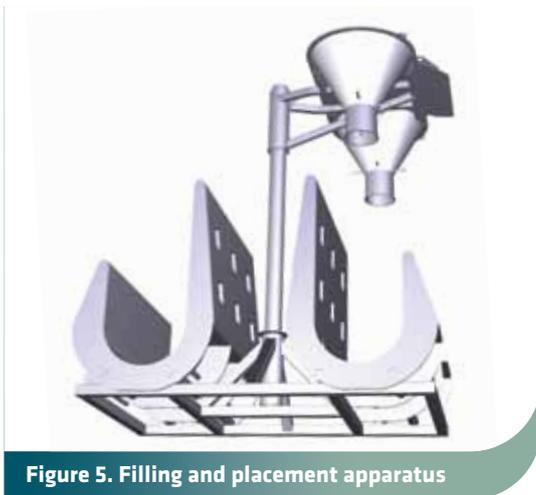


Figure 5. Filling and placement apparatus



Figure 6. Base placement



Figure 7. Hopper placement

## 9.0 FILLING

Filling of sand containers is carried out using an excavator. The bucket of the excavator should be large enough to allow rapid filling of the sand containers but limited in width so as not to spill over the edge of the hopper system.

1. Ensure a sufficient stockpile of sand for a continuous operation and filling.
2. Remove one ELCOROCK® sand container from the pallet and place in a filling/placement cradle.
3. Using the central pulley system, lift the ELCOROCK® sand container up and pull the container until the top of the container touches the bottom of the hopper.
4. Fit the harness correctly for safe effective use as per manufacturers instructions (refer to Figure 8).
5. Climb up onto the J-Bin and attach safety harness to shock absorbing retracting lanyard.
6. Pull the filling trunks of the sand container completely over the hopper chute, ensure 3 points of contact are maintained at all times (refer to Figure 9).
7. Attach the clamp at the top of the hopper chute. The clamp must fit tightly against the chute. The container should now hang freely with the base 20 – 50mm above the base of the J-Bin.
8. Turn on the water jets. This will assist in washing the sand into the container and improve compaction of the fill material.
9. Begin to fill the sand container, slowly at first, ensuring the sand is getting into the bottom corners and no folds or creases exist or form in the sand container (refer to Figure 10).
10. Complete filling until the sand level is within 200mm of the top of the container, ensuring fill material is spread evenly, particularly into the top corners.

**Note:** Coarse sand will require higher water pressure to wash the sand into the centre of the container.

11. When filled correctly, the sand containers will achieve the minimum dimensions (refer to Figure 11).



Figure 8. Safety Harness



Figure 9. Hopper chute



Figure 10. Sand fill process

Figure 11: Minimum 2.5m<sup>3</sup> Container Dimensions



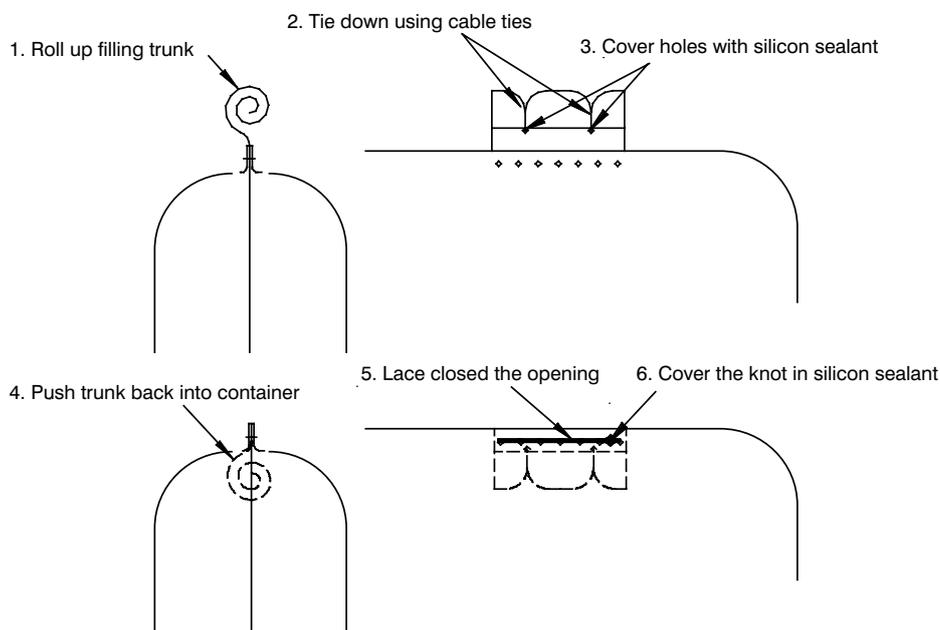
Dimension Range	
Depth (mm)	600-700
Width (mm)	1600-1900
Length (mm)	2400-2600

## 10.0 CLOSURE

The closure of the 2.5m<sup>3</sup> sand containers consists of a double seal system (refer to Figure 12) which reduces the risk of loss of fill material.

1. Carefully release the clamps holding the trunks.
2. Rotate the hopper system 180° to allow filling of the next container.
3. Roll the trunks down and secure through the pre-manufactured holes using the supplied cable ties. Cover the holes with silicon.
4. Push the trunks down into the sand container.
5. Lace closed the opening using the supplied cord, ensuring a double reef knot is used to tie off the cord and cover all knots with a generous amount of silicon.

Figure 12: Closure Sequence



## 11.0 HANDLING AND PLACEMENT

The filling apparatus which has been specifically developed for the 2.5m<sup>3</sup> ELCOROCK<sup>®</sup> sand containers has also been designed for use as a placement device. A quick-hitch attachment on the container allows a 35 tonne excavator to rapidly lift sand containers from either side of the filling apparatus, ensuring a good production rate. Modified rock grabs are not suitable for use as they place the sand container under high levels of stress, which can stretch the fabric out of shape or even cause a failure of the seam.

The ELCOROCK<sup>®</sup> sand containers can be placed directly after the filling and closure procedure is completed. The placement of the sand container should be completed in such a way that the site closed seam is buried/hidden from exposure to prevent untying of the closure through movement or vandalism.

After placement of the ELCOROCK<sup>®</sup> sand container, the underside of the J-Bin can be utilised to press down on the top surface of the sand container to achieve a straight and level finish as follows:

1. Connect the excavator to the J-Bin quick hitch.
2. Lift the J-Bin off the base plate and ensure all personnel are well clear of the working area of the excavator.

**Note:** the contractor must ensure the excavator used is rated to lift the J-Bin and the saturated sand container (approximately 6 tonnes when wet).

3. Walk the excavator into position and place the sand container. A slight backwards and forwards shaking movement of the J-Bin may be required to assist in allowing the sand container to slide forward out of the J-Bin.
4. If the design requires trafficking of the sand containers during placement, a minimum sand cover depth of 500mm is required over the sand containers.

If conditions do not allow immediate placement of the ELCOROCK® sand containers, they should be stored on a soft, sand surface and not stacked. This is to ensure the J-Bin placement apparatus can easily dig under the sand container and lift it as shown below. Failure to do this may lead to lost production or damage to filled sand containers.

1. Slide the J-Bin under the sand container (refer to Figure 13).
2. Some sideways shaking of the J-Bin will be required to dislodge sand that has become trapped under the sand container during the lifting operation.
3. Walk the excavator into position and place the sand container. A slight backwards and forwards shaking movement of the J-Bin may be required to assist in allowing the sand container to slide forward out of the J-Bin (refer to Figure 14).



Figure 13. Sand container handling



Figure 14. Sand container placement

## 12.0 PRODUCTION TARGETS

As with any repetitive process, the key to productivity is to ensure good organisation. An organised site, well laid out with the above available assets, will comfortably fill 3 to 4 ELCOROCK® 2.5m<sup>3</sup> sand containers per hour. The contractor should allow for a 6-hour production period per 8-hour working day and allow for time to replenish the sand stockpile, refuel and general repairs and maintenance to equipment.

Geofabrics can supply a detailed production cost analysis spread sheet which allows site specific costs to be included for budget or costing purposes.

## 13.0 MAINTENANCE

It is the responsibility of the owner to adequately maintain the structure once complete. This will require regular inspections to identify and repair any damage that may have occurred to the structure. It is important to note that where sand containers are located in submerged or intertidal zones and they are ruptured, the sand retained within the sand container can be removed rapidly due to wave and current movements and it is imperative that repairs be carried out as soon as any damage is identified.

If the ELCOROCK® sand container is allowed to lose fill material to a point where the geotextile can flap, the geotextile will tear along the fatigue lines created by the flapping action and catastrophic failure of the container is likely to occur.

The following general guidelines are recommended: walk over the structure once a month; identify sand containers with damage or showing signs of deterioration; ensure all sand containers are inspected, patch or repair damaged containers immediately as per details provided in section 14.

## 14.0 REPAIRS

While the geotextile used to manufacture ELCOROCK® sand containers is extremely tough and durable, the material can be damaged by boat impact, vandalism or other factors. An effective method has been developed to patch the sand containers both above and below the waterline.

### 1. Patch preparation

- a. The patch should extend at least 300mm beyond the edge of the hole,
- b. Ensure all corners of patch are rounded 100mm radius minimum,
- c. 5mm holes should be burnt (using a hot soldering iron) at 100mm centres along the edge of the patch and 50mm in from the edge.

### 2. Surface preparation

- a. Scrub the area with a coarse brush to remove all algae growth,
- b. Shake the geotextile to dislodge the sand trapped in the outer layer of the geotextile, it will not be possible to remove all sand but the more porous the surface the better the bond between the patch and the sand container.

### 3. Patch placement

- a. Place the patch over the hole and punch a hole in the sand container using a sharpened screw driver,
- b. Screw first screw into place, continue process around the patch,
- c. Ensure a thick layer of Silastic 732 adhesive/sealant is applied to the surface of the sand container to ensure a good bond between patch and sand container
- d. After all screws are in place, press down firmly on patch to ensure the adhesive is forced into the geotextile and squeezes evenly out along the edge of the patch,
- e. Where adhesive does not extrude out from under the edge of the patch extra adhesive must be applied to the area by pushing the nozzle under the patch.

Contact Geofabrics Australasia for advice on any unusual repairs or maintenance requirements.

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