

ELCOROCK[®]

Installation Guidelines

Mega Containers



Courtesy of Steve Smith

Quality - Support - Expertise



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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 your consulting or site engineer.

INTRODUCTION

ELCOROCK® mega containers are engineered sand containers that offer excellent performance in durability, robustness and usability. ELCOROCK® mega 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® mega container coastal solutions are designed with submerged and partially submerged locations 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® mega 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 procedure that should to be followed in order to correctly store, fill and install ELCOROCK® mega containers.

Due to the range of applications this guide may not cover all aspects of the installation of the ELCOROCK® mega container system. Further application advice is available from Geofabrics. Utilising an experienced contractor and consultant and careful consideration of site conditions will ensure your project runs smoothly and the desired outcome is achieved.

Good organisation prior to site deployment is critical. Aspects including the weather, tides, location, site access and required equipment should be carefully considered.

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® mega containers are supplied wrapped in waterproof, UV resistant, opaque plastic. For container packaging dimensions refer to Table 1. Transportation of containers is usually by flat-bed truck or similar and unloading is carried out using lifting slings or a spreader bar through the centre core, leaving the protective wrap in place until such time as the mega containers are required for filling. Failure to leave the plastic wrapping in place may lead to saturation of the containers, making them heavy and difficult to handle.

Table 1: Packaging & Transport

Container size/type	Dimensions	Containers per semi load
T1 (20m)	4m x 600mm	33
T1 RP2 (20m)	4m x 900mm	24
T2 (20m)	4.6m x 600mm	22
T2 RP (20m)	4.6m x 900mm	16
T3 (20m)	4.6m x 800mm	16
T3 RP (20m)	4.6m x 1000mm	10
T4 (20m)	4.6m x 900mm	16
T4 RP (20m)	4.6m x 1200mm	10

3.0 ON SITE STORAGE

All deliveries of ELCOROCK® mega containers should remain in as-delivered protective wrapping until filling and placement commences. Ideally, mega 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 ELCOROCK® mega containers;

- ELCOROCK® mega container, Check the following has been supplied;
 - Silicon adhesive (2 per port),
 - Closure Patches (1 per port),
 - Screws (22 per closure patch),
 - Tie cord (1 per port),
 - Plant to manoeuvre mega container,
 - Dredge with 8 to 12 inch dredge line,
 - Flanged dredge line connection,
 - Ratchet tie down,
 - Short sections of rope,
 - Phillips head screw driver (medium-large),
 - Sharpened screw driver,
 - Caulking gun,
 - Personal protection: hats, steel cap boots, sunglasses, sun screen, long sleeve shirts.

Before installing ELCOROCK® mega 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 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.

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.

6.0 WEATHER CONDITIONS FOR INSTALLATION

ELCOROCK® mega container installations can be sensitive to climatic conditions including tides, waves, rain and wind. Tidal variations may influence the availability of fill material, the ability to place and the area available to work and store raw materials and equipment. For safety reasons, strong or severe wave actions 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.

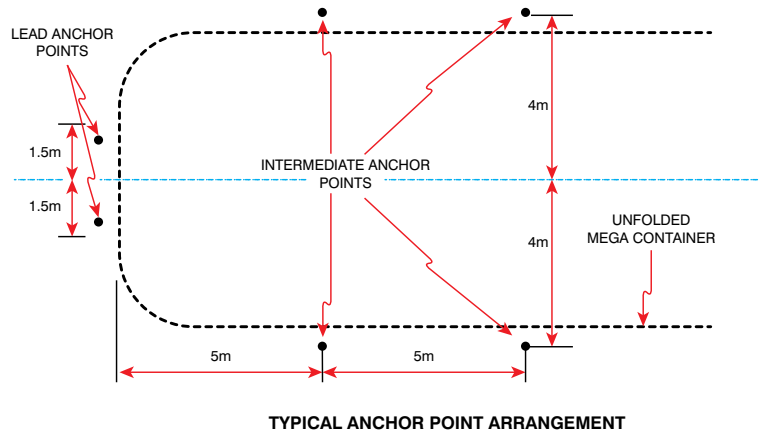
7.0 DEPLOYMENT

7.1 Mark Out Location and Alignment

In all applications, this process is critical for successful installation. Marking out and installing anchor points will help ensure the mega container is in the right place and is aligned. There are several options for anchor points depending on the application and these range from fence posts to concrete blocks. The selection of the most suitable option is based on the available equipment.

1. Install 2 leading anchor points each offset 1.5m from the container's centre line.
2. Install the anchor points at 5m centre's along the length of the container, offset 4m from the centre line.
3. Install the 2 end anchor points each offset 1m from the centre line.

Figure 1: Location & Alignment



7.2 Deploying Mega Container

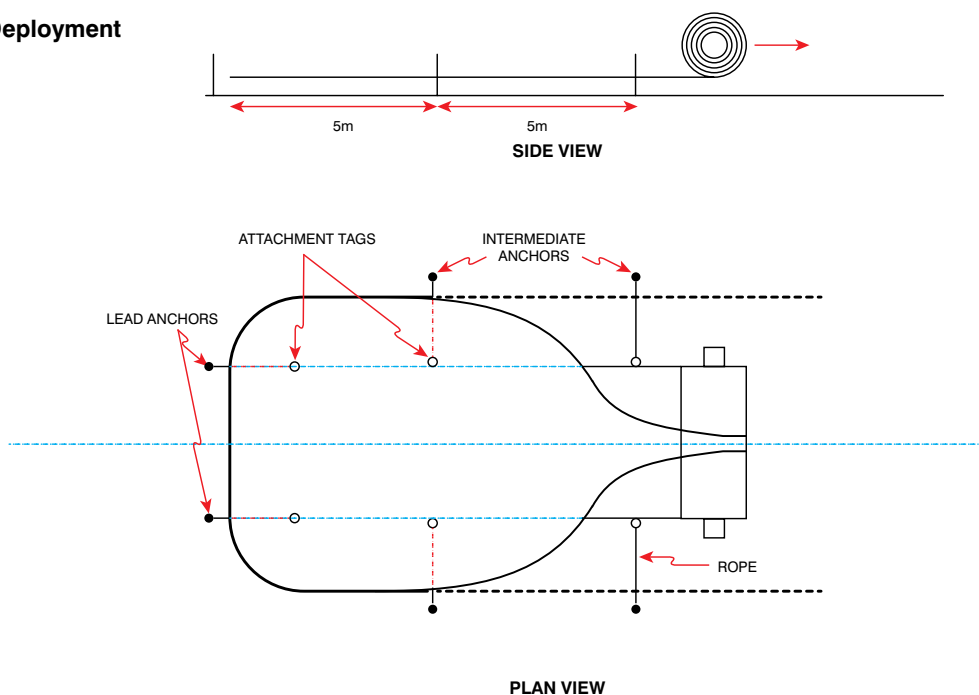
The ELCOROCK® mega container will be delivered rolled up on a pipe core and should be handled using a carpet prong or lifting slings, with care taken not to damage the container during handling. Plant equipment should be used to manoeuvre the container as it is heavy. (A T1RP class ELCOROCK® mega container will weigh approximately 18kg per linear meter of container - a 25m long T1RP, weighs approximately 450kg).

Prior to deployment, the base on which the container is to be placed should be checked for protruding objects and to make sure it is level and smooth. This will prevent damage or excessive movement during the filling process.

1. Remove plastic wrapping, but retain the strapping.
2. Place the rolled up mega container in position to allow accurate unrolling along the deployment length.
3. Cut the packaging strapping.
4. Tie off from start attachment tags to lead anchors (rope to be supplied by contractor).
5. Unroll in 5m increments ensuring mega container is tied off securely to side anchors before unrolling further (rope to be supplied by contractor).
6. Tie off from end attachment tags to 2 end anchors (rope to be supplied by contractor).

Note: In submerged or semi submerged applications the deployed container should never be left in position unfilled, the installer must ensure that site conditions will allow placement and filling to be completed in a working day.

Figure 2: Deployment



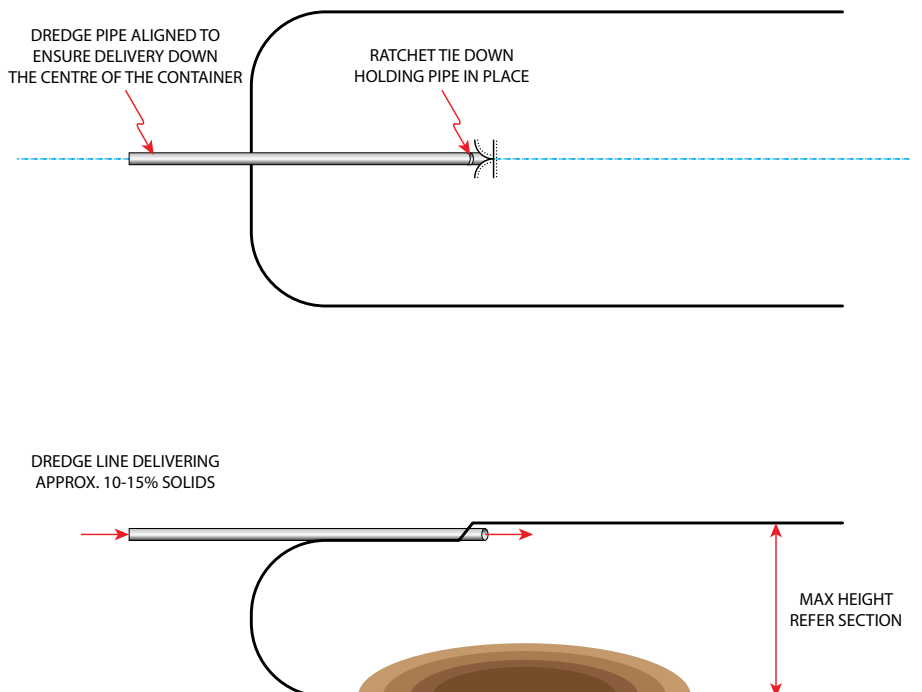
7.3 Connect Dredge Line

When the ELCOROCK® mega container is in position the dredge line must be securely fastened to the fill ports (refer to Figure 3). This connection must be secure as the volume of material entering the tube and the force created by the dredge is significant.

1. Pull filling trunk out of first fill port of the mega container.
2. Insert dredge line into mega container; ensure pipe extends beyond the end of the filling trunk.
3. Tie off the trunk to the dredge line, a short straight flanged section or elbow is ideal for the inlet section as it allows the trunk to be locked in place behind the flange. Locking the dredge line onto the port is achieved using a ratchet tie down clamp.
4. The dredge line should be positioned so that the flow is directed down the length and along the top of the mega container. If the dredge line is incorrectly positioned the mega container will tend to roll towards the direction of flow.

- Note:**
1. If the dredge line is inclined towards the base of the container, excessive scouring will occur at the dredge line outlet point creating unnecessary undulations in the final profile.
 2. Support in the form of a tripod or frame may be required to support the dredge line to assist with positioning.
 3. Standard length ELCOROCK® mega containers have 3 ports positioned along the centre line of the top of the container.

Figure 3: Connect Dredge Line



8.0 FILLING

Filling of the ELCOROCK® mega container can now commence. The slurry mixture, fill time and pass through will all depend on the material being pumped. The dredge should be capable of delivering 10 to 15% solids. However factors such as grading of dredge material and pumping distance will affect the solids delivery rate.

Depending on the environmental conditions, treatment of the pass through material may be required to prevent turbidity or contamination.

1. Begin to pump sand/water slurry mixture into container.
2. Allow the mega container to inflate and discharge water through the outlet ports. Ensure maximum height of the containers is not exceeded during the filling process (refer to Table 1 for safe filling heights).
3. Discharge ports must not be closed during filling as this may result in excessive pressure build up within the mega container and possible rupture of the seams. If required, discharge excess pressure through a Y piece in the dredge line.
4. The contractor may have to move the dredge line to secondary filling ports on longer tubes or if the dredge is incapable of supplying consistently high volumes of sand/water mix.
5. Filling of a standard 20m mega container should take between 30 minutes and 2 hours depending on dredge and fill material quality. Coarse fill material will result in faster fill times (maximum particle size 10mm).
6. Measure level of fill material within the mega container by pushing firmly against the side or top of the container. The mega container is full when solid and unyielding under foot.
7. Once filling is completed, remove anchors and cut off locating ropes as close to the mega container as possible. Care must be taken not to damage the container during this operation.

- Note:**
1. Contractor will have to allow for turbid discharge water in sensitive environments.
 2. Moving the dredge line from port to port or controlling the pass through by restricting flow can also fill depressions and even out the filled profile. A final “top up” is generally recommended before closing up.
 3. An experienced dredge operator is essential to ensuring the successful filling of the ELCOROCK® mega containers. Careful monitoring during filling (e.g. ensuring that the slurry flow is horizontal and along the centre line of the mega container) is essential.
 4. When using a high volume dredge, a Y piece should be inserted into the dredge line to allow pressure release to prevent over inflation of the container and allow flushing of the dredge line.
 5. The container must be filled to capacity so that there is no possibility of flapping of the geotextile due to wave action or tidal movements. If the geotextile is allowed to flap the geotextile will fatigue and will rapidly result in the failure of the container.
 6. Folds in the profile are acceptable as long as the folds are firm and filled with sand i.e. no flapping.

Table 2: Maximum Allowable Height

Container typer	Maximum height during filling (m)	
	Emergent	Submerged
T1	1.7	2.1
T2	1.9	2.3
T3	2.1	2.5
T4	2.1	2.8

9.0 CLOSURE

The final step in the process is to seal the ELCOROCK® mega container to prevent the material escaping, and to provide a neat finish.

1. Remove dredge line from filling port.
2. Fill any small depressions near the dredge line entry manually with a shovel if necessary.
3. Roll up and tie off the filling trunks with cable ties.
4. Push trunks back into the mega container.
5. Lace the filling port closed using supplied cord through the holes in the container fabric, tie off securely when complete (refer to Figure 4).
6. Place supplied cover over port, punch first locating hole in mega container using sharpened screw driver and use screw supplied to fix in place.
7. Apply thick coat of silicone adhesive to inner face of cover, push down firmly to ensure good bond. This will require 2 tubes of adhesive to ensure a good bond between the container and the cover (refer to Figure 5).
8. Punch remaining holes and drive screws in place (refer to Figure 6).
9. Run a bead of silicone adhesive around the edge of the cover to prevent the edge from lifting.



Figure 4. Laced closure



Figure 5. Glue application



Figure 6. Screwed closure

10.0 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 mega containers are located in submerged or intertidal zones, the sand retained within the mega 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 mega 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 follow general guidelines are recommended:

1. Dry inspections

Walk over the structure once a month; identify containers with damage or showing signs of deterioration. Ensure all containers are inspected, patch or protect the affected areas ASAP as per details provided in section 10.

2. Underwater inspections

The risk of damage to the structure will vary from site to site and the asset owner should adapt these recommendations to suite the risk profile of the site and/ or structure.

Whatever the application, all under water applications must be designated as no anchor areas and in shallow applications, a no boat area, as boat activity will be a major threat.

Geofabrics Australasia recommends a regular inspection dive be carried out once every two months for the first six months while the structure settles into position. In the longer term, the minimum period between inspections should be 6 months. Immediate repair of damage as per details provided in section 11 is essential.



Figure 7. Silicone application



Figure 8. Patch in place

11.0 REPAIRS

While the geotextile used to manufacture mega containers is extremely tough, the material can be damaged either by boat impact or vandalism. A simple yet effective method has been developed to patch the mega 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 container.

3. Patch placement

- a. Place the patch over the hole and punch a hole in the 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 container to ensure a good bond between patch and 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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