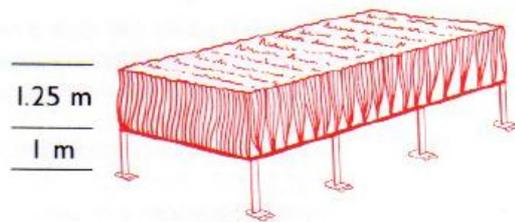
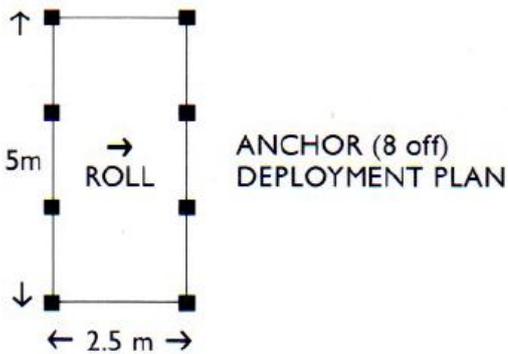




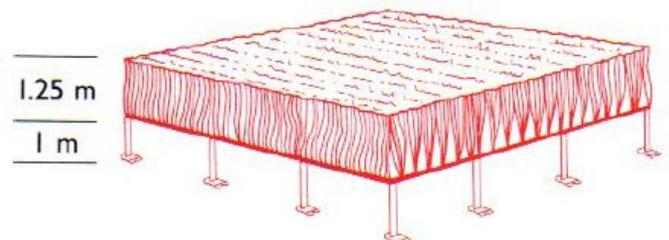
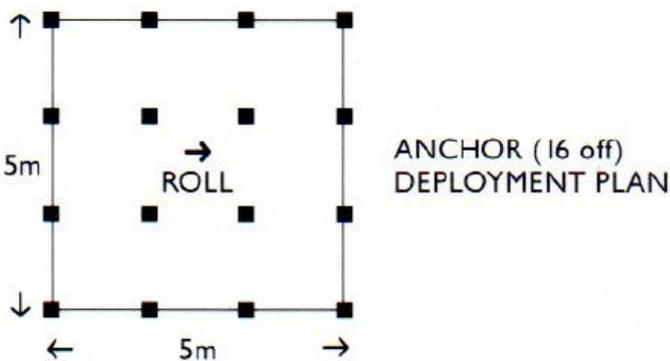
SSCS Anchor Retained Frond Mat Specification and Installation Procedures

T12



Net Deployed weight 45 kg
Gross Packed weight 100 kg
Size packed 5.8 m × 0.35 mØ

T25



Net weight 85 kg
Gross Packed weight 140 kg
Size packed 5.8 m × 0.5 mØ



**Introduction and General Procedures
Pages 3 – 4**

**Installation Equipment and Specifications
Pages 5 – 8**

**Selloc Pin Replacement Schedule and Procedure
Pages 9**

**SSCS Frond Mat Installation Procedure
Pages 10 – 13**



Introduction and General Procedures

Seabed Scour Control Systems (SSCS) recommends that a pre-dive meeting be held between the diving supervisor, dive team (if available) and SSCS representative(s) to discuss the installation procedures and work scope prior to deployment.

SSCS Frond Mat deployment requires 2 divers working simultaneously.

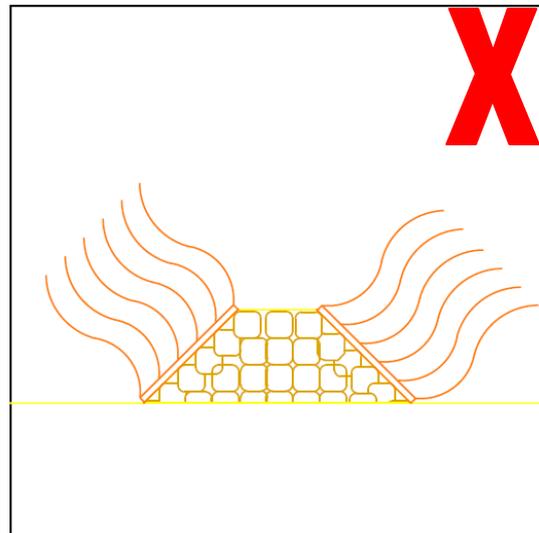
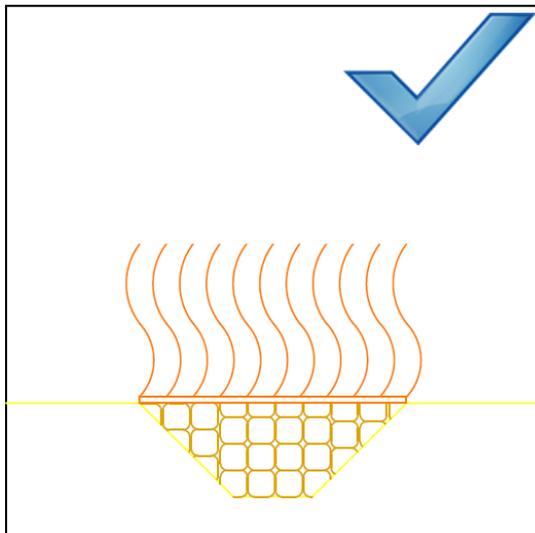
The SSCS Frond Mats will be installed according to the design layout provided by SSCS during the technical proposal stage, and as discussed in the pre-dive meeting.

Divers are to test the hydraulic hammer and set the hammer and hydraulic hose before Mat deployment close to the work area on the seabed.

Deck personnel will remove the SSCS Frond Mat polythene protective cover **BEFORE** attaching the crane slings to lower the Mat to the seabed.

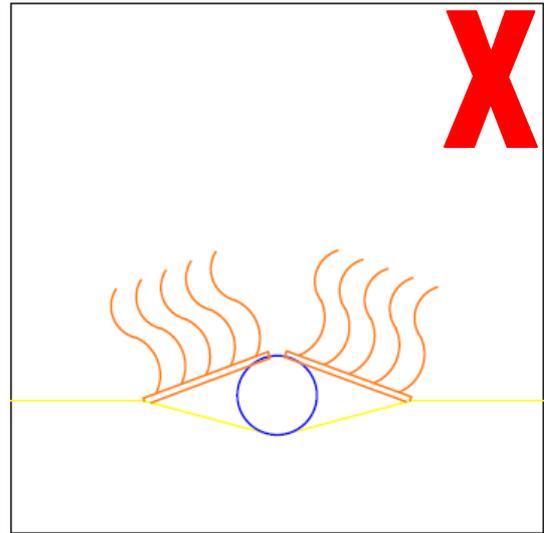
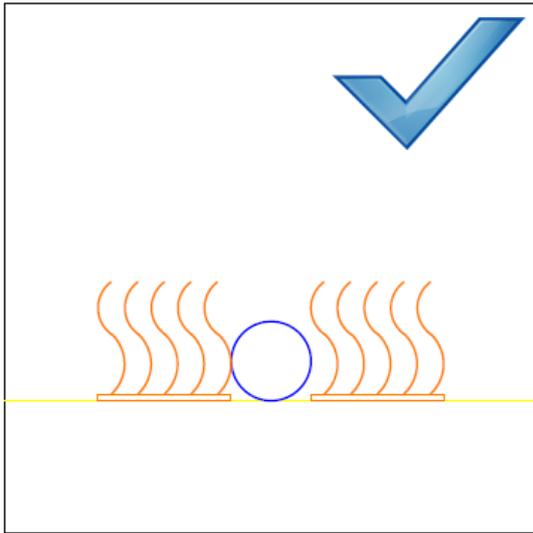
DO NOT remove anchor tie wraps or the 6 (six) banding strips that hold the Mat tight. These are marked by white loops).

IMPORTANT DO's AND DONT's FOR SSCS FROND MAT DEPLOYMENT



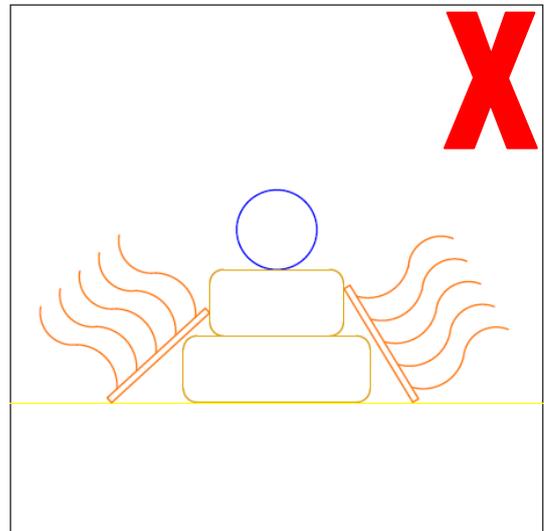
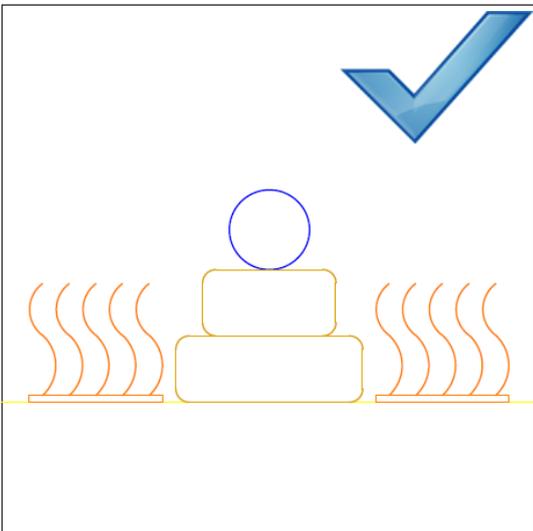
DO: Place the SSCS Frond Mats **FLAT** on the seabed and / or **FLAT** over in-filled scour pits

DO NOT: Place the SSCS frond Mats on an **incline / decline**



DO: Place the SSCS Frond Mats flat on the seabed along both sides of the pipeline

DO NOT: Place the SSCS Frond Mats over the pipeline



DO: Place the SSCS Frond Mats flat on the seabed around the perimeter of any pipe supports (support construction is irrelevant to Mat placement)

DO NOT: Place the SSCS Frond Mats on / over the supports or on sloping surfaces



Installation Equipment and Specifications

SSCS are able to supply a full spread of equipment to be used when installing the SSCS anchor retained Frond Mats. We understand that some of the equipment listed may be readily available on site, and should individual items be required please contact SSCS accordingly.

Installation Equipment available for supply by SSCS:

All equipment is provided with current certification where applicable.

Tool Container

All steel watertight universal storage and work station; 1.5m (l) x 0.8m (w) x 1.0m (h). Gross Weight approx 1050kg.

Container Contents

<i>2-3 each</i>	<i>Stanley BR45 hydraulic jackhammer adapted for underwater use</i>
<i>6 each</i>	<i>SSCS Spigot Rods and Holders</i>
<i>1 box</i>	<i>Sellock Pins</i>
<i>20 each</i>	<i>Spare SSCS Anchors with 6 tonne MBS webbing strap ("Safety Anchors")</i>

Other Installation Equipment – Primary & Secondary outfits

The below list is standard although where a Dive Support Vessel (DSV) has installed hydraulic capacity for subsea deployment a secondary outfit may not be required.

Primary Outfit

Power Pack Diesel hydraulic skid-mounted self-contained manual star (or compressed start) – fitted with spark arrestor and Chalwyn shut down device. 1.5m (l) x 1.0m (w) x 1.2m (h). Gross Weight approx 1000kg.

Hose Reel Complete with hydraulic hose and snap-lock fittings. Tested 200bar. 2.1m (l) x 1.5m (w) x 1.5m (h). Gross Weight approx 2500kg.

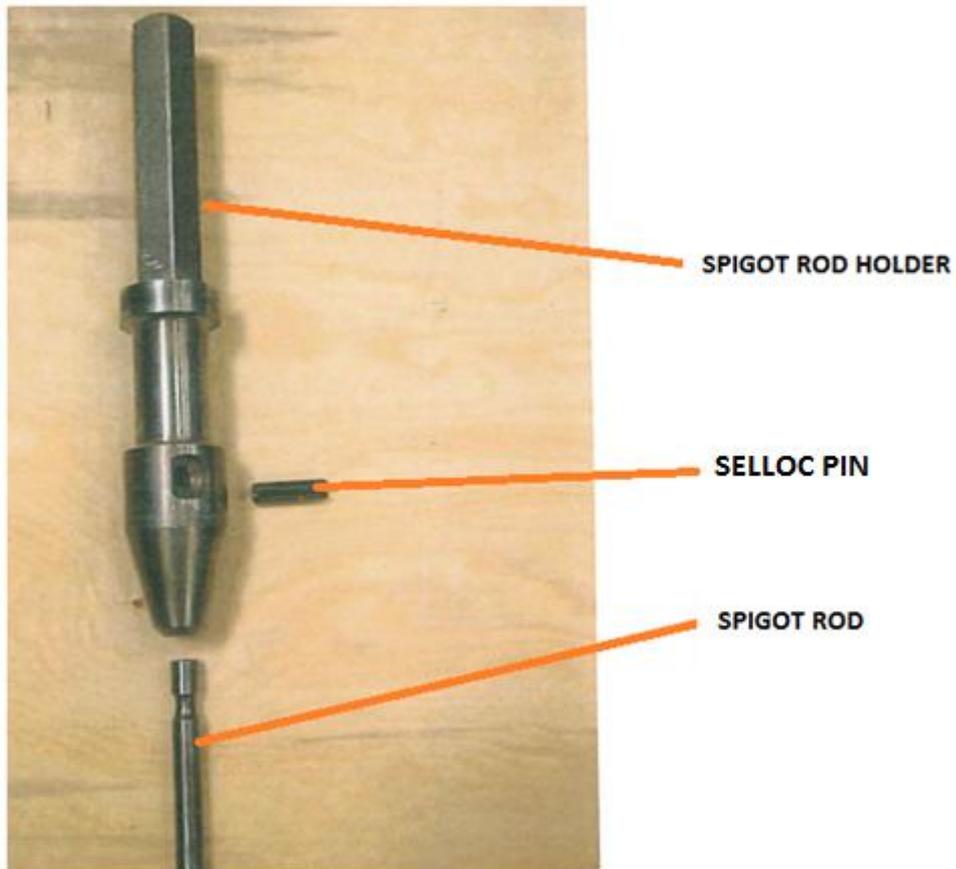
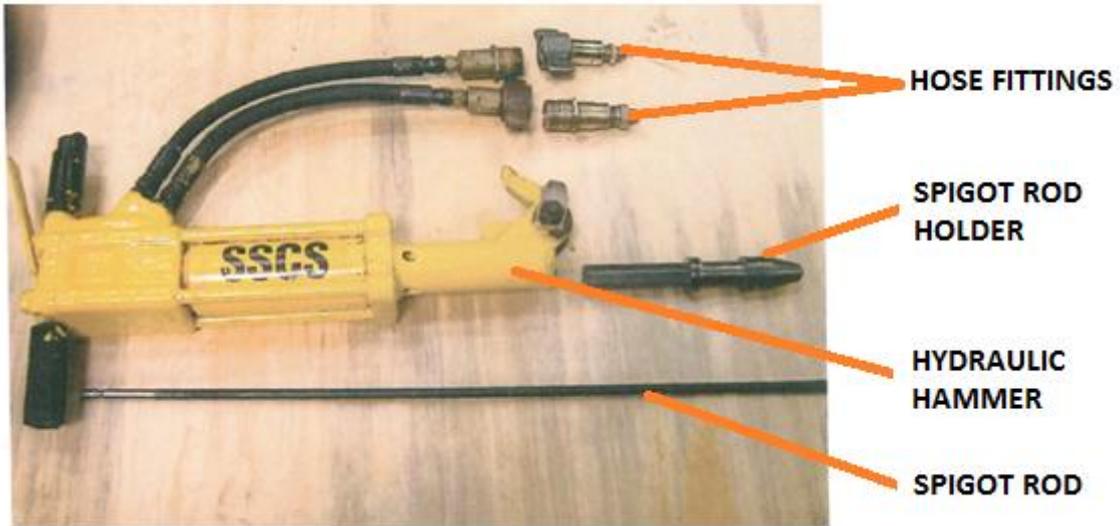
Secondary Outfit (Stand-by Outfit)

As Primary outfit. A stand-by system is strongly recommended to mitigate against delays or extension of DSV time.

Options

The dive contractor may elect to supply equivalent power packs and / or hoses which must be capable of supply, through maximum hydraulic hose run of up to 150m (500ft), to the hydraulic jackhammer at 30 to 34 litres / minute at 1800 to 2000psi (124 to 138 bar).

The jackhammer will work (more slowly) on pressures as low as 1500psi (103 bar) but the maximum length of supply hose must be restricted down to 60m (200ft) and installation of the SSCS anchors may take considerably longer.



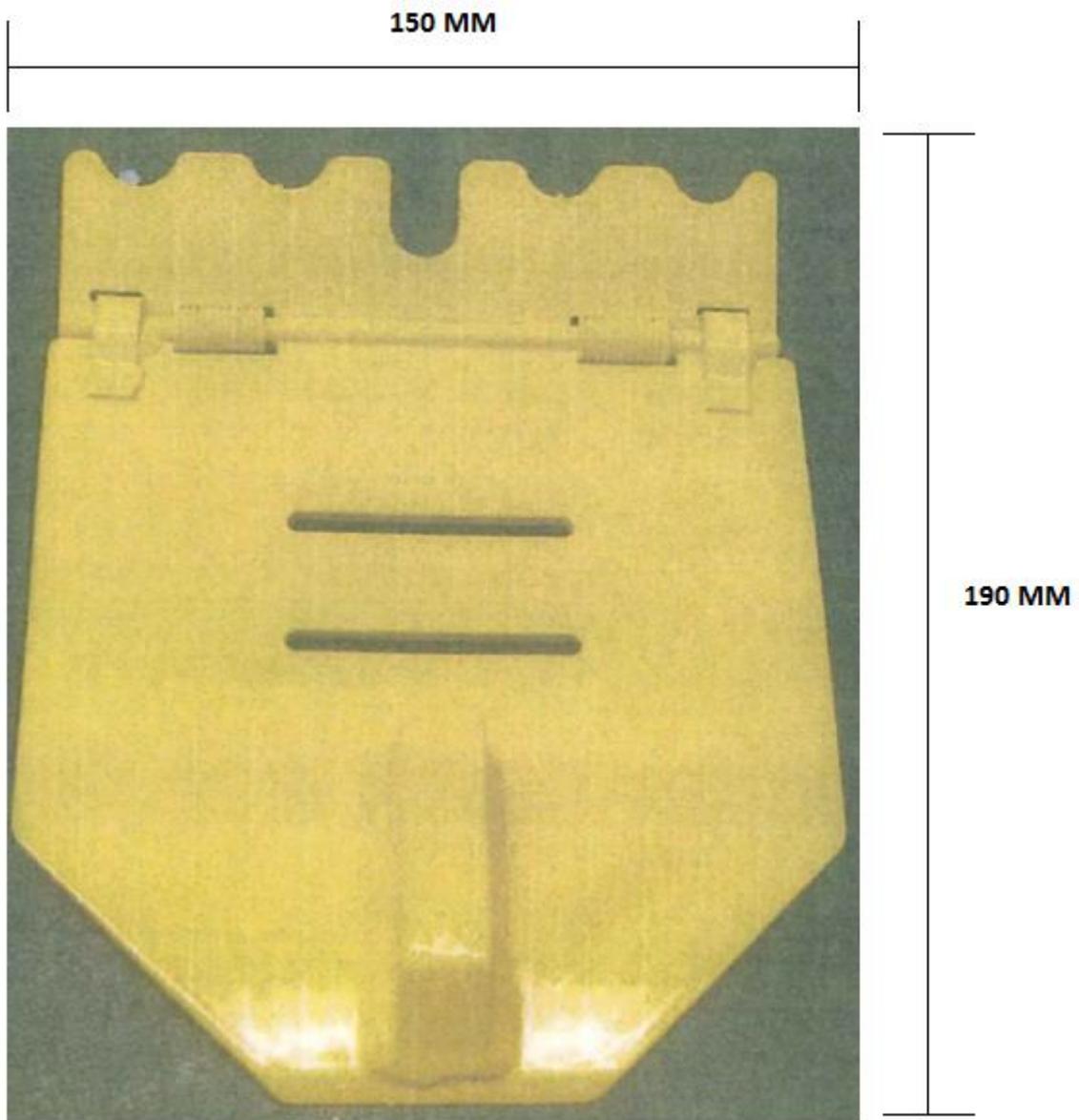
SELLOC PIN MUST BE REPLACED AFTER THE INSTALLATION OF 32 ANCHORS MAX.

(see "Selloc Pin Replacement Schedule and Procedure on Page 9")



SSCS Anchor

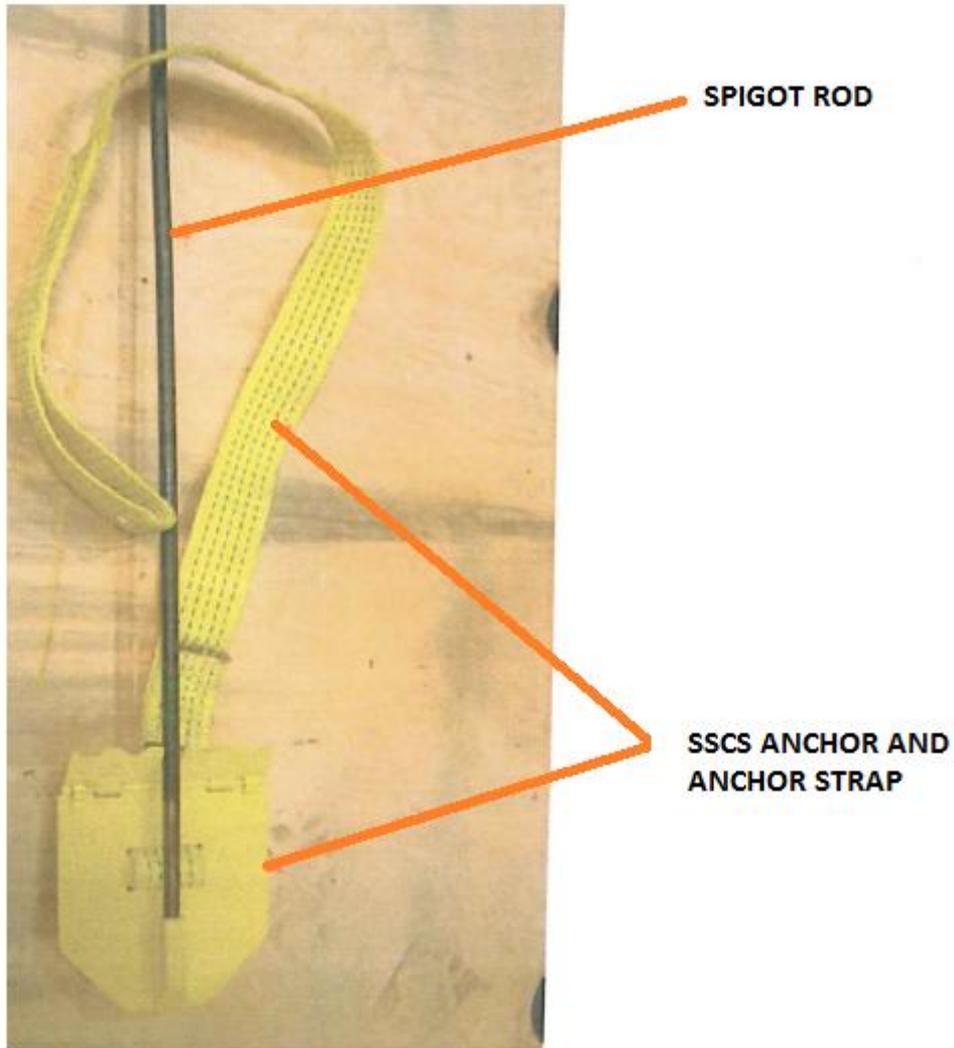
Pre-attached to the Frond Mats as standard





SSCS Safety Anchor

Supplied in addition to the standard SSCS Frond Mats and SSCS Anchors to be used as required to attain the satisfactory tight hold down of the SSCS Frond Mats on the sea/riverbed

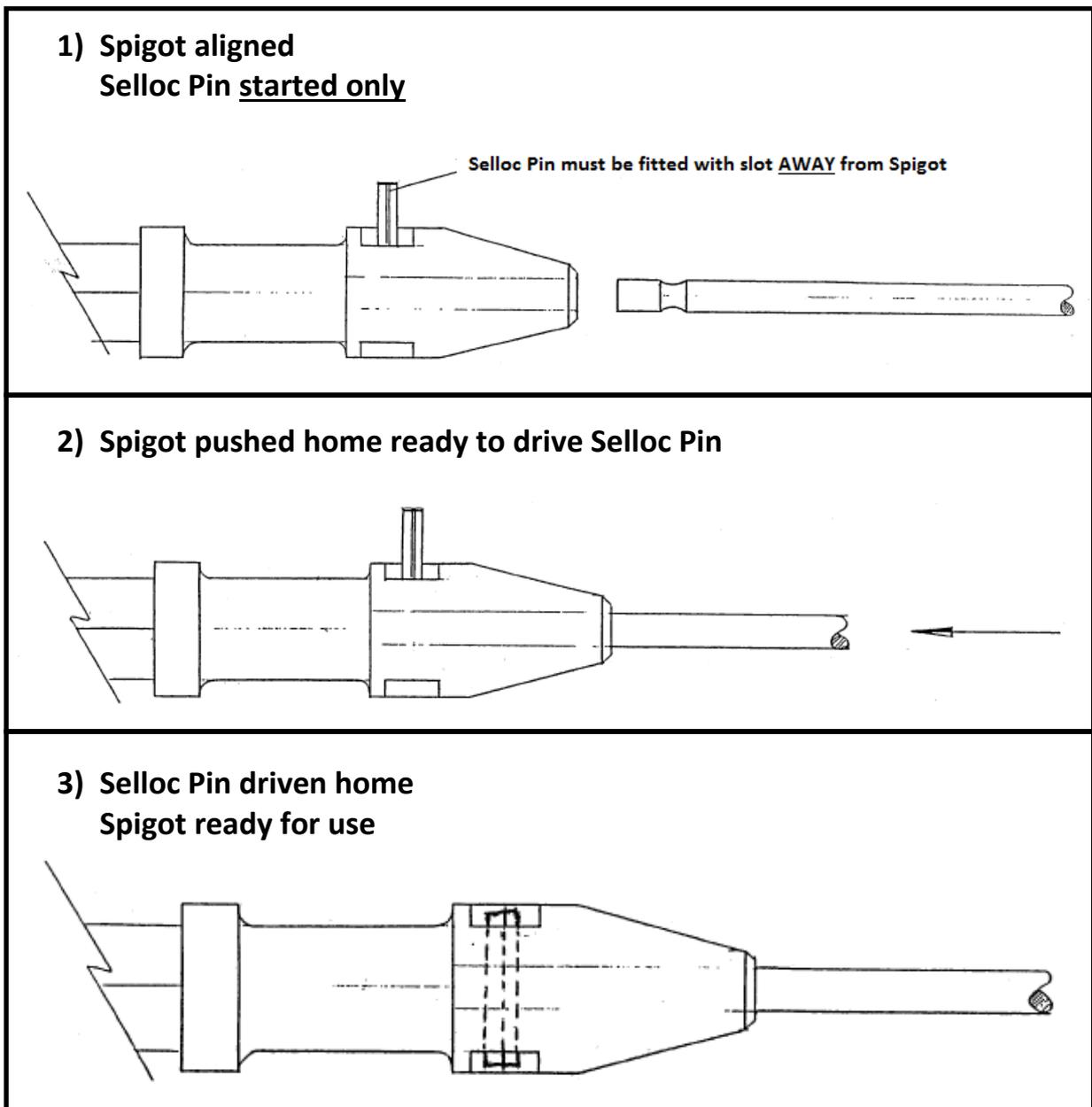




Selloc Pin Replacement Schedule and Procedure

The Selloc Pins should be replaced after the installation of maximum 32 SSCS Anchors to ensure the Spigot Rod is securely held into position during Anchor installation.

The following steps demonstrate the correct way to replace the Retention Pins.

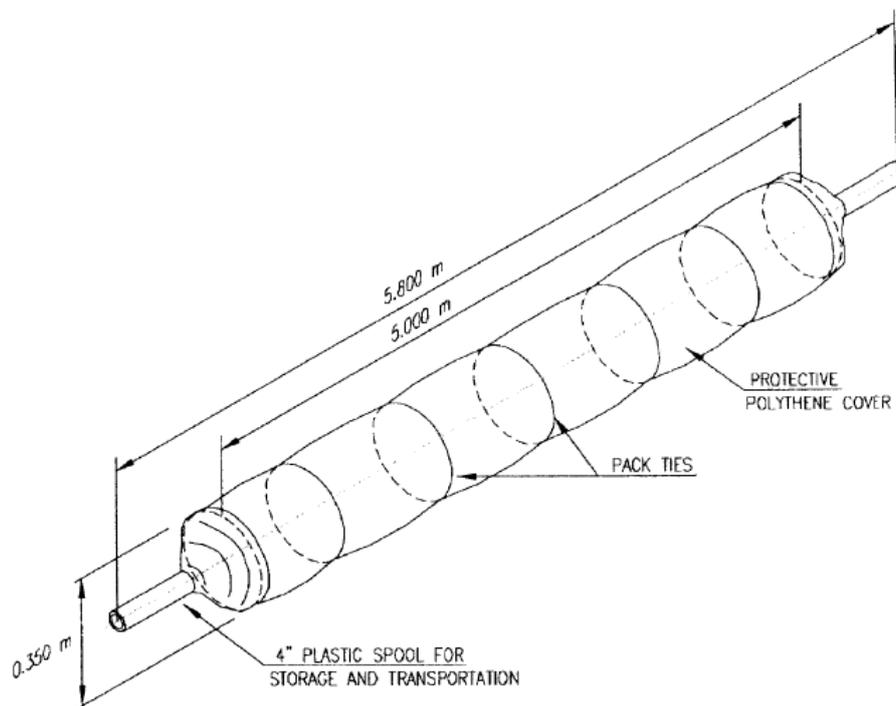




SSCS Frond Mat Installation Procedure

Each SSCS Type 12 Frond Mat (T12) will be rolled onto a 4" diameter plastic tube or metal spool (depending on installation requirements as advised by SSCS), and each SSCS Type 25 Frond Mat (T25) will be rolled onto a metal spool.

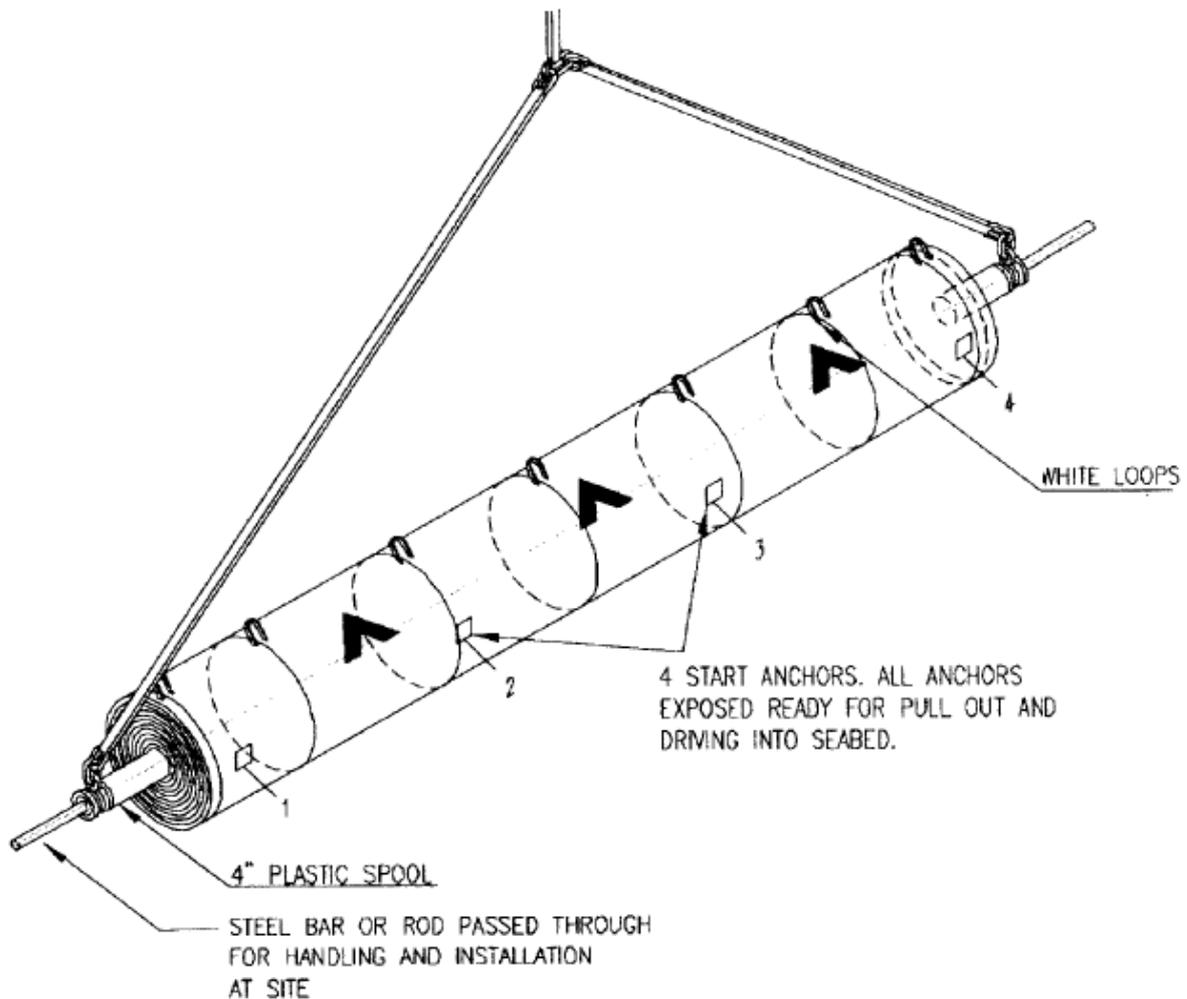
Note that metal spools are to be recovered following Mat installation and returned to SSCS.



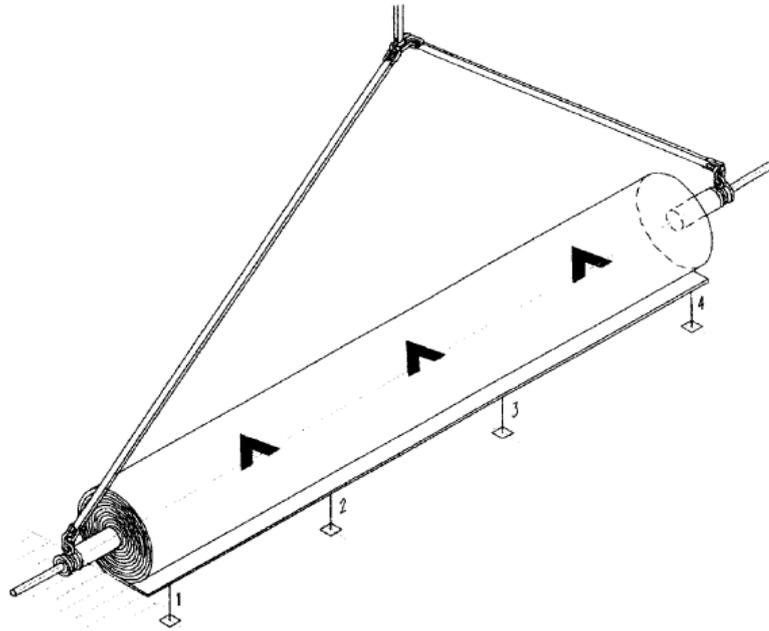
- 1) If the T12 is supplied on a plastic tube it will be necessary to insert a steel bar of approx. 50kg in weight to lift each T12 over the side of the installation vessel and lower / sink it to the seabed. Not applicable for T25.
- 2) Divers are to test the hydraulic hammer and set the hammer and hydraulic hose before Mat deployment close to the work area on the seabed.
- 3) Deck personnel to remove the polythene protection cover from the Mat before attaching the crane slings to lower each Mat to the seabed.

Do not remove the anchor tie wraps or the 6 (six) banding straps that hold the Mat tight. These are marked by white loops.

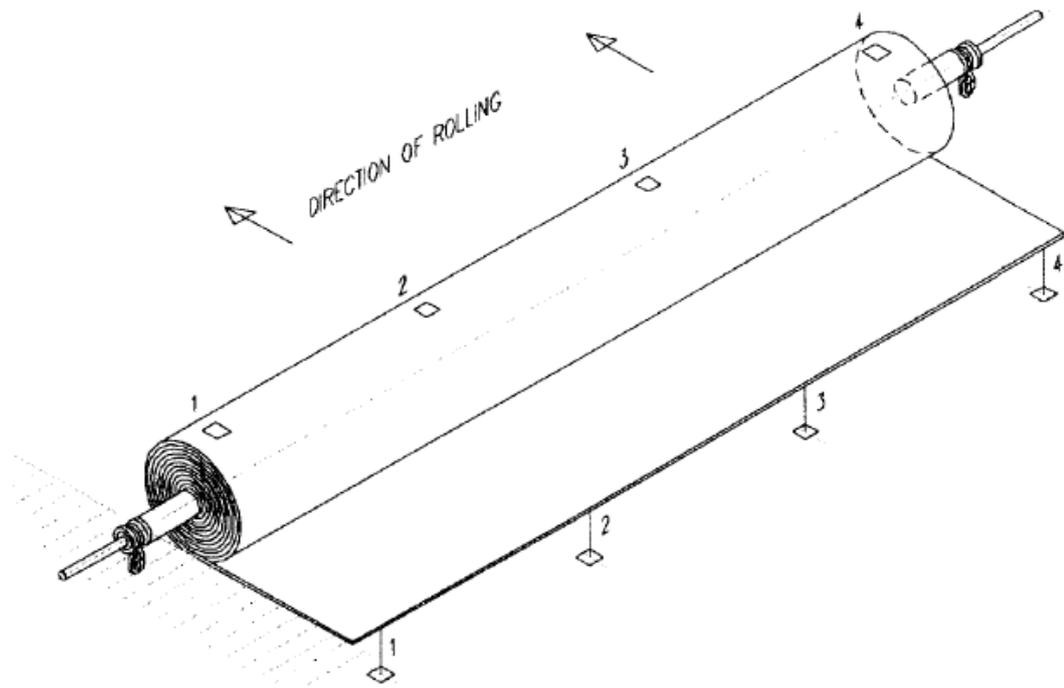
- 4) Attach metal spool / inserted steel bar ends to down lines to enable each Mat to be correctly orientated on the seabed.



- 5) Divers to position themselves at each end of the Mat and release the crane slings.
- 6) Each Mat has indicator arrows to show the correct direction to unroll them.



- 7) Divers to position the Mat with the first row of 4 (four) anchors facing upwards and cut the tie wraps holding the anchors to the Mat.
- 8) Divers to set up the first row of anchors approx. 0.35m from the edges of the Mat and drive them into the seabed using the hydraulic hammer to their maximum 1m depth (the full length of the Spigot Rod).





NOTE: The anchors will pull in the direction of the Mat during installation, this should happen and the diver MUST NOT try to fight this force and hold the hammer vertical. The hammer will be almost horizontal when the anchor reaches its full 1m depth.

- 9) When the first row of anchors has been driven the divers are to cut the 6 (six) banding straps marked by white loops and pull the rip cord to open and release the white net. The Mat can then be rolled in the direction of the arrows.

NOTE: The Mat must be pulled tight in the direction of the roll

- 10) Keep the hydraulic hammer and umbilical in front of the Mat.
- 11) Roll the Mat until the second row of anchors appear in clear plastic sleeves. Remove the anchors from the plastic sleeves and drive them into the seabed each in turn. For the T25 repeat until all anchors are driven into the seabed.
- 12) As each Mat is rolled out a cover net, "Safe Net", will appear. When each Mat has been completely laid the divers should locate the white marker buoy which when pulled will remove the Safe Net and activate the Fronds.
- 13) Divers to cut the tie wraps, marked with loops, that hold the Mat spool to the Mat and recover the plastic tube / metal spool as required.

NOTE: Removal of the Safe Nets should take place when the divers are finished working in the vicinity of the Mat to ensure the Fronds do not impair the divers' vision during operations; this includes installation of all adjacent Mats.

- 14) Recover the hydraulic installation equipment after SSCS Frond Mat installation is complete and wash with fresh water.