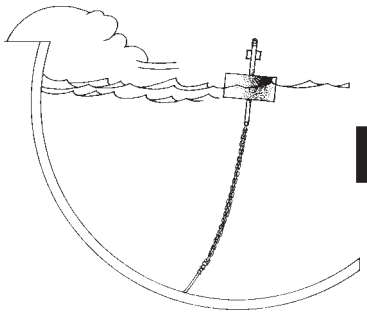


HANDS-ON FADs

Two FAD systems recommended by SPC

by Peter Cusack

INTRODUCTION

In the region served by the South Pacific Commission the use of fish aggregating devices, or FADs, is widespread. Twenty of the Commission's twenty-two member countries and territories, are known to have made use of these devices at one time or another, and the majority maintain ongoing FAD programmes.

Since the introduction of FADs into the Pacific from the Philippines in the late 1970s, regional FAD experience has passed through several distinct phases. Between 1979 and 1983, FAD effort centered on modifying the traditional Filipino payao system to withstand the harsher, deeper-water, high-energy ocean environments typical of the Pacific. The second period, from 1984 through 1990, saw the introduction and widespread adoption of the inverse catenary curve mooring system*. Since that time development efforts have focused on refinement of the inverse catenary curve mooring, the development of strict material specification, improvement of buoy technology, and establishment of sound procedures for FAD-site surveys and deployments. The SPC has maintained an active FAD research and development programme since the early 1980s.

In early 1996, SPC will publish the first two volumes of its *Fish Aggregating Device (FAD) manual*. *Volume I, Planning FAD programmes* is designed to help fisheries managers decide whether FADs are likely to be worthwhile investments in particular fisheries, while *Volume II, Rigging deep-water FAD moorings*, provides a practical guide to rigging two mooring systems field-tested and recommended by SPC: the SPC steel spar buoy FAD and the SPC Indian Ocean FAD. These FAD systems are considered suitable for the majority of deep-water deployments in the region and both make use of the inverse catenary curve mooring, differing only in the raft, or floating surface part, and the uppermost part of the subsurface mooring. Each system has advantages of cost or ease of construction in particular circumstances.

Volume II is presented in sections, describing in turn: FAD rafts, FAD mooring components, ropes, mooring calculations and anchors. Detailed specification of materials and components are given, as well as descriptions of the way in which materials are used to rig both systems. Numerous drawings and tables are included which clarify each step of raft construction and rigging of moorings.

The two raft designs, and the associated variations in the standard catenary curve mooring, have been widely deployed in the Pacific Islands. The systems are not the cheapest that can be deployed, but when rigged properly (and barring vandalism, fish bite and severe cyclonic storms) are considered likely to provide two years or more of service.

An overview of both FAD system designs is given here. It is important to note that the successful use of these designs is dependent on the strict use of the materials recommended and, in the case of deployments in less than 1100 metres, the use of supplementary buoyancy in the way described in the *SPC FAD manual*.

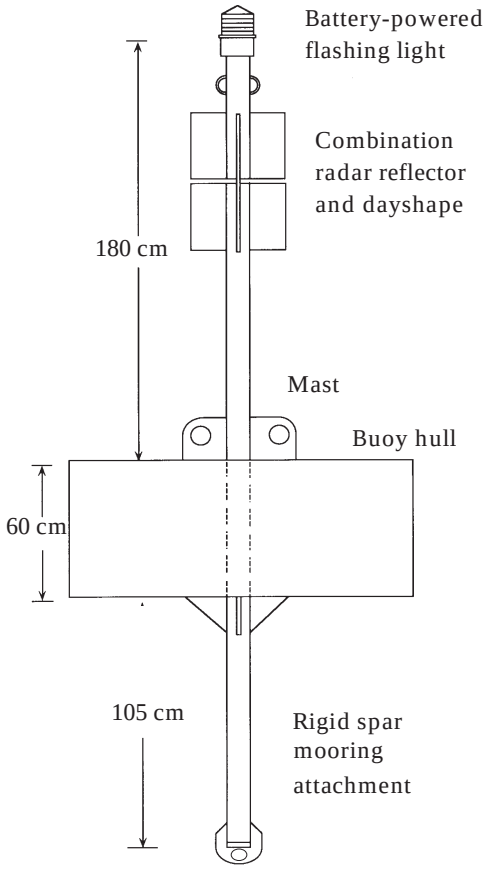
Readers interested in receiving a copy of Volumes I and II of the SPC FAD manual are invited to contact: Peter Cusack, Fisheries Development Adviser, South Pacific Commission, BP D5, Noumea, New Caledonia.

*The essential feature of the inverse catenary curve mooring is the use of sinking rope in the upper part of the mooring combined with floating rope in the lower part to form a reserve of rope that is held at a specified depth below the surface. This provides scope, or slack, in the mooring to cope with the stresses of currents and wave action. The floating rope in the lower mooring also serves to buoy up the bottom chain and hardware and so ensure that the rope does not contact the sea floor and so come in danger of abrasion. The SPC-recommended mooring system uses the following proportions:

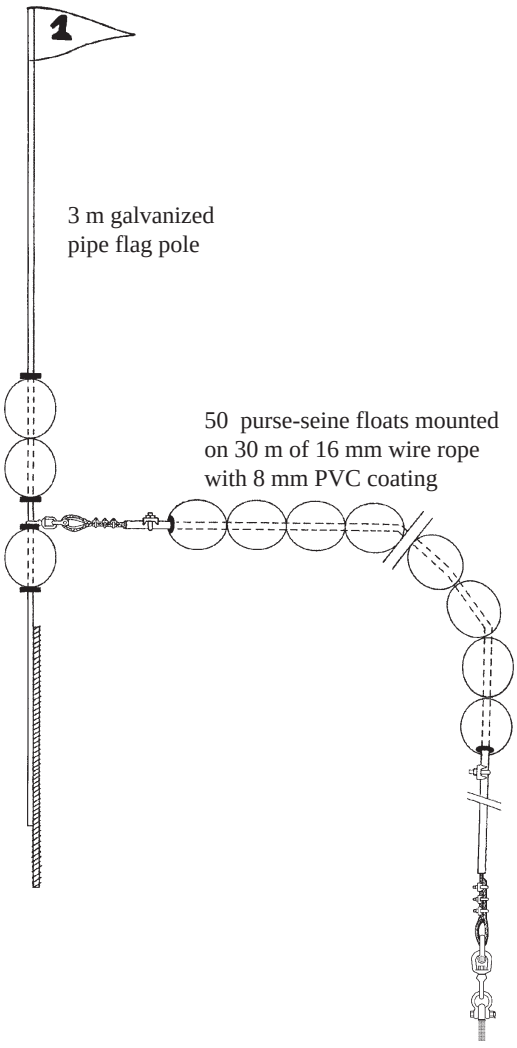
- Length of slack line (scope): 25 % of depth (of which 3/4 is nylon rope and 1/4 polypro. rope)
- Length of nylon rope: 150 m + 3/4 of scope
- Length of polypro. rope: depth – 150 m + 1/4 of scope

SOME CONSTRUCTION DETAILS FOR THE FLOTATION DEVICES

Steel spar buoy

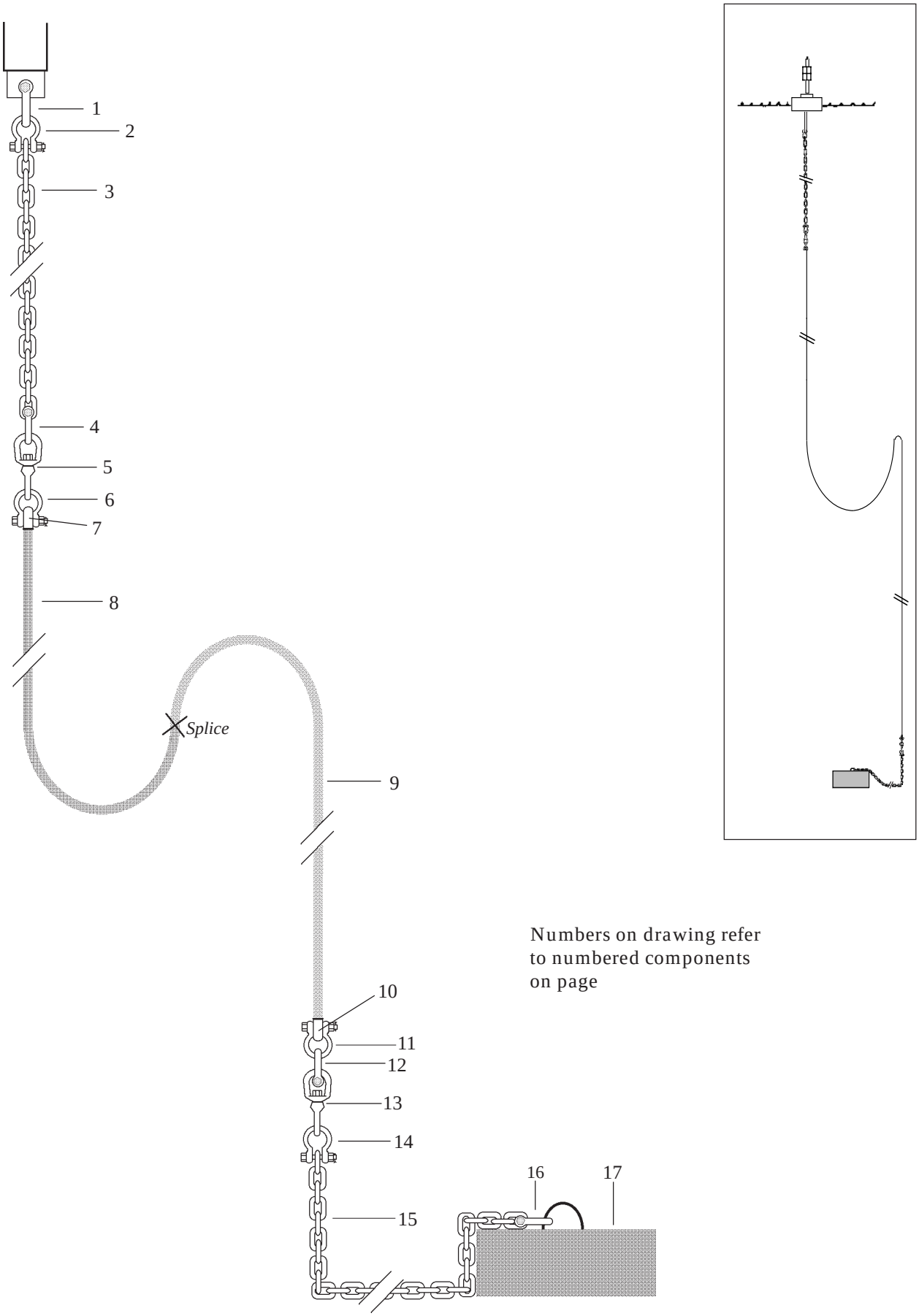


Indian Ocean FAD flotation device



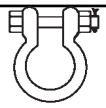
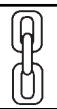
Notes:
- Both flotation devices have a minimum reserve buoyancy of 300 litres.
- The handbook recommends the use of plastic strapping attached to the top part of the mooring as appendages ('attractors'). It is interesting to note that the effectiveness of these appendages seem to vary with the locations of FADs: French Polynesia, American Samoa and Cook Islands don't use them, while Vanuatu and Fiji think they are absolutely necessary . . .

STEEL SPAR BUOY FAD SYSTEM MOORING ARRANGEMENT

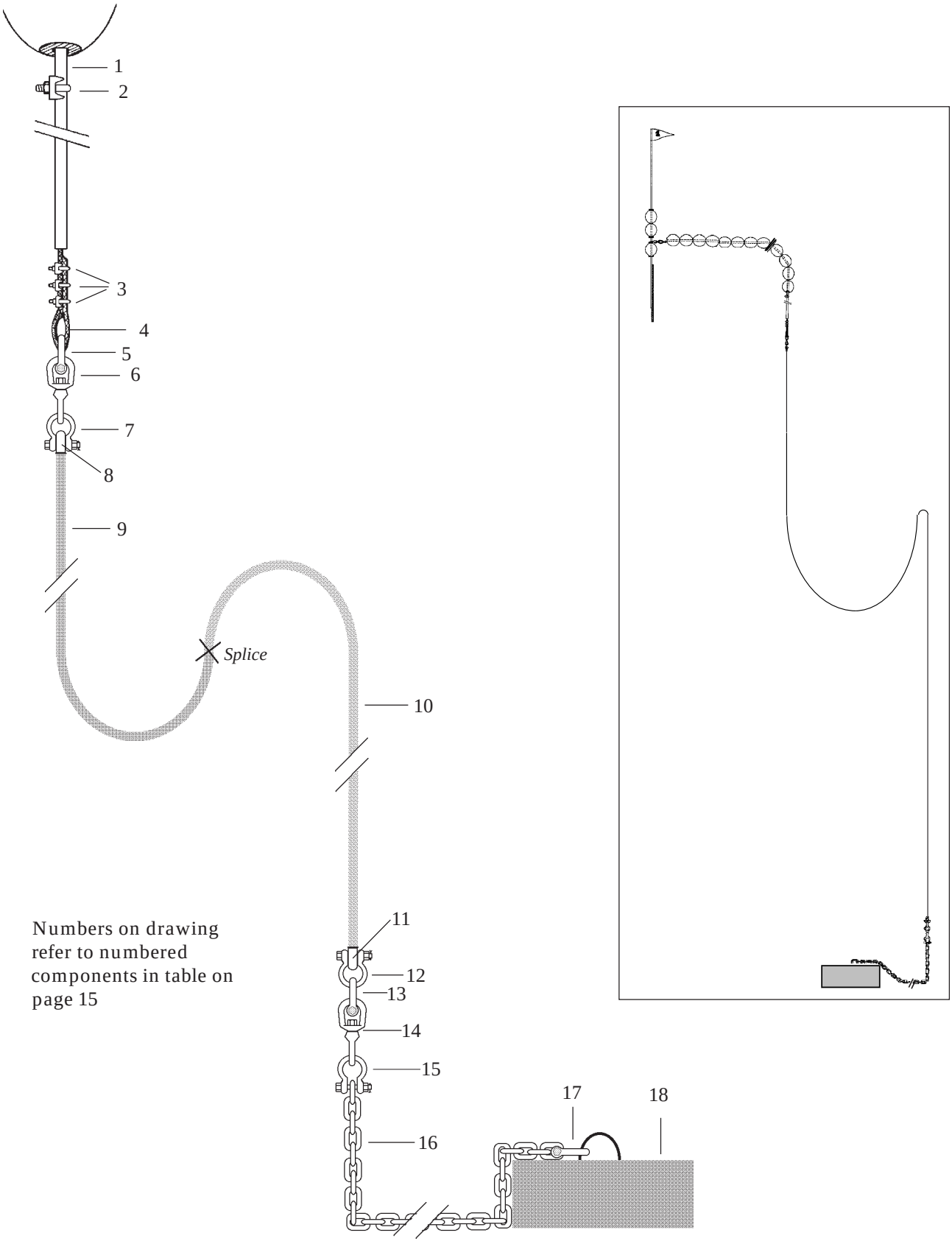


Numbers on drawing refer to numbered components on page

Steel spar buoy system components

Components		Description	Size	Material	Minimum breaking strength
1		Safety shackle with stainless steel (SS) cotter pin	25 mm 1 in	Hot-dip galvanised low-carbon steel (Hdg-lcs)	25,000 kg 56,000 lb
2		Safety shackle with SS cotter pin	16 mm 5/8 in	Hdg-lcs	10,000 kg 22,000 lb
3		Long-link chain	15 m of 13 mm 50 ft of 1/2 in	Hdg-lcs	9,000 kg 19,000 lb
4		Safety shackle with SS cotter pin	16 mm 5/8 in	Hdg-lcs	10,000 kg 22,000 lb
5		Forged swivel (eye and eye)	22 mm 7/8 in	Hdg-lcs	22,700 kg 50,000 lb
6		Safety shackle with SS cotter pin	22 mm 7/8 in	Hdg-lcs	19,500 kg 49,000 lb
7		Rope connector (*Samson*; size 3)	19 mm 3/4 in	Nylite	
8		Sinking rope, 8–12 strand, plaited	19 mm 3/4 in 47 kg/220 m 14.3 lb/100 ft	Nylon	6,400 kg 14,200 lb
9		Buoyant rope, 8–12 strand, plaited	22 mm 7/8 in 45 kg/220 m 13.7 lb/100 ft	Polypropylene	5,200 kg 11,500 lb
10		Rope connector (*Samson*; size 4)	22 mm 7/8 in	*Nylite*	
11		Safety shackle with SS cotter pin	25 mm 1 in	Hdg-lcs	25,000 kg 56,000 lb
12		Safety shackle with SS cotter pin	19 mm 3/4 in	Hdg-lcs	14,000 kg 31,000 lb
13		Forged swivel (eye and eye)	19 mm 3/4 in	Hdg-lcs	16,200 kg 40,000 lb
14		Safety shackle with SS cotter pin	19 mm 3/4 in	Hdg-lcs	14,000 kg 31,000 lb
15		Long-link chain	15 m of 19 mm 45 ft of 3/4 in	Hdg-lcs	14,000 kg 31,000 lb
16		Safety shackle with SS cotter pin	22 mm 7/8 in	Hdg-lcs	19,500 kg 49,000 lb
17		Anchor	900 kg 2000 lb	Concrete block	Compress. strength 3,000 psi

INDIAN OCEAN FAD SYSTEM MOORING ARRANGEMENT



Numbers on drawing refer to numbered components in table on page 15

Indian Ocean FAD system components

Component		Description	Size	Material	Minimum breaking strength
1		Float cable	30 m of 32 mm 100 ft of 1 1/4 in	Steel wire rope with PVC coating	5,000 kg 11,000 lb
2		Cable clamp	32 mm 1 1/4 in	Hot-dip galvanised low-carbon steel (Hdg-lcs)	
3		Cable clamp (6 pieces)	16 mm 5/8 in	Hdg-lcs	
4		Thimble (2 pieces)	16 mm 5/8 in	Hdg-lcs	
5		Safety shackle with SS cotter pin	19 mm 3/4 in	Hdg-lcs	14,000 kg 31,000 lb
6		Forged swivel (eye and eye)	19 mm 3/4 in	Hdg-lcs	16,200 kg 40,000 lb
7		Safety shackle with SS cotter pin	19 mm 3/4 in	Hdg-lcs	14,000 kg 31,000 lb
8		Rope connector (*Samson*: size 3)	19 mm 3/4 in	*Nylite*	
9		Sinking rope, 8–12 strand, plaited	19 mm 3/4 in 47 kg/220 m 14.3 lb/100 ft	Nylon	6,400 kg 14,200 lb
10		Buoyant rope, 8–12 strand, plaited	22 mm 7/8 in 45 kg/220 m 13.7 lb/100 ft	Polypropylene	5,200 kg 11,500 lb
11		Rope connector (*Samson*: size 4)	22 mm 7/8 in	*Nylite*	
12		Safety shackle with SS cotter pin	25 mm 1 in	Hdg-lcs	25,000 kg 56,000 lb
13		Safety shackle with SS cotter pin	19 mm 3/4 in	Hdg-lcs	14,000 kg 31,000 lb
14		Forged swivel (eye and eye)	19 mm 3/4 in	Hdg-lcs	16,200 kg 40,000 lb
15		Safety shackle with SS cotter pin	19 mm 3/4 in	Hdg-lcs	14,000 kg 31,000 lb
16		Long-link chain	15 m of 19 mm 45 ft of 3/4 in	Hdg-lcs	14,000 kg 31,000 lb
17		Safety shackle with SS cotter pin	22 mm 7/8 in	Hdg-lcs	19,500 kg 49,000 lb
18		Anchor	900 kg 2,000 lb	Concrete block	Compressive strength 3,000 psi