

# **Chapter 5**

# **Rafting Equipment**

## Raft Anatomy

**Main Tube:** Rafts have main tubes that provide the majority of the structure and buoyancy for the raft. In most rafts the main tubes are internally divided into four sections by rubber baffles. Rafts are typically symmetrical, meaning that both the bow and stern are identical.

**Thwarts/Cross Tubes:** Thwart/cross tubes provide structural stability, preventing the boat from folding in half lengthwise. Thwarts are often removable and rafts can typically be outfitted with zero to four thwarts.

**Valves (A6):** Modern boats are equipped with one-way valves in each section of the Main Tube and each thwart. Each valve has a plastic cap, and underneath the cap is the one-way system. When the center toggle is out, air can enter into the chamber but will not release. When the center toggle is pushed in and turned, the valve becomes a two-way valve.

**Self-Bailing Floor:** Modern rafts are constructed to be self-bailing, meaning they automatically drain water. Self-bailing rafts have inflatable floors and holes where the floor connects to the main tubes to allow water to drain. Because floors can easily build pressure (ultimately causing damage to the raft) raft floors are typically equipped with a pressure release valve in addition to the one-way valve. Self-bailing floors improve maneuverability characteristics of the raft by eliminating the need to maneuver the boat when it is full of water.

**Bow and Stern Lines:** Rafts should be equipped with bow and stern lines that are securely attached to the boat and can be used to secure the raft to shore.

**D-Rings:** Rafts are equipped with metal D-rings that can be used to strap in equipment or rig a rowing frame. D-ring location typically varies between raft models and sizes.

**Handles:** Rafts are typically equipped with handles on the sides and end of the boat.

**Foot Cups:** Some rafts are equipped with foot cups on the floor of the boat, which are a space for paddlers to secure their feet while in the raft.

## ETC Rafts

ETC has a variety of rafts to fit the varying need of the program. ETC's rafts are manufactured by Hyside or Avon and range in length from 14 to 16 feet.

- **14 Foot:** The majority of ETC's fleet is composed of 14-foot Hyside and Avon rafts. 14-foot Hyside rafts have three thwarts and are used exclusively for paddle guiding, while the 14-foot Avon rafts have variable and adjustable thwart configuration and can be used for paddle guiding or rowing.
- **15 Foot:** ETC has 15-foot Hyside rafts with 4 thwarts for paddle guiding and 15-foot Avons with variable and adjustable thwart configuration that can be used for paddle guiding or rowing.
- **16 Foot:** ETC has 16-foot Avon rafts used exclusively for rowing.

### **Care of Rafts:**

- A. **Inflation:** Rafts must be properly inflated to effectively navigate whitewater. Each guide will develop a preference for the level of inflation of his or her raft, but generally each chamber in the main tube should be filled evenly so the raft is tight. Here are a couple tips for inflating rafts:
  - a. When topping off a raft (inflating the raft to a pressure where it can be taken on a river) it is best to fill opposite chambers of the boat rather than rotating around the main tube filling each chamber.
  - b. Because air shrinks when it gets cold, it is best to inflate boats when they are in the water.
  - c. When a boat will be out of the water, it is important to bleed air from all air chambers to prevent the raft from popping as the air expands.
  - d. When a raft is sitting stationary in the water in warm weather, it is important to splash the raft with cold river water to prevent the air from expanding to the point where the raft pops.
- B. **Cleaning:** While rafts are made of durable rubber, dirt and sand can degrade the material causing weakness. For this reason it is important to have participants wash their feet before entering the raft and to make sure the rafts are free of dirt and debris at the end of a trip.
- C. **Drying:** When rolling a boat for storage, it is critical to ensure the boat is dry. Water or dampness in a rolled raft will cause the glue and rubber to degrade.

**Raft Configurations:** ETC uses rafts configured for paddling, rowing, or a combination to take participants down the river.

- A. **Paddle Rafts:** The Guide steers the boat from the stern using a paddle and the crew is equipped with paddles to provide momentum.
- B. **Oar Rafts:** The Guide rows the boat using oars and participants are not required to paddle. Oar rafts can be used to transport equipment or ETC uses them regularly to accommodate people with disabilities.
- C. **Stern Frame Rafts:** The raft is equipped with an oar frame in the back where the guide is rowing to maneuver the raft and paddlers sit in the front of the boat to provide momentum. This set up can be used for weaker paddle crews or with people with disabilities.

**Raft Condition Check:** Prior to use, each raft should be checked to ensure it is in good condition and safe for use. The following should be evaluated:

- A. Proper inflation
- B. No apparent holes, slow leaks, or weak seams
- C. Functioning valves
- D. Floors are properly secured to raft
- E. Secure bow and stern lines
- F. D-rings are secure

## **Raft Rigging**

Each Guide will develop a preference for how they prepare their boat and strap in equipment, and this will depend on whether the person is guiding a paddle boat, oar boat, or stern frame. Below are some general pieces of equipment used for rigging:

**Cam Straps:** Cam straps are strong nylon webbing with a metal buckle that can be used to attach oar or stern frames to rafts and equipment to frames. ETC cam straps range in length from 1 to 12 feet, color coded, and stored in boxes according to size. Guides should not tie knots in cam straps, as they are typically unnecessary, difficult to remove, and weaken the strap.

**Handle Straps:** ETC has straps with a handle and metal d-ring that is wrapped around the thwart. Handle straps serve two primary purposes: participants may grab the handle if they feel unstable and the d-ring is an attachment point to clip equipment.

**Mesh Bags:** ETC has two sizes of mesh bags with cam straps that are strapped around the thwart of a boat and used for participants to store water bottles and other personal items.

**Carabineers:** ETC has carabineers to attach equipment to d-rings in the raft. For safety reasons, carabineers used in rafting should be locking.

**Saddlebags:** Saddlebags are very durable and used to carry safety equipment including the Wrap Kit, First Aid Kit, and Repair Kit. Saddlebags are typically attached to the thwart and can be carried in an oar or paddle raft.

**Coolers:** ETC has coolers in a variety of sizes to transport lunch on the river. The smaller coolers and gotts can be rigged into a paddle raft, while the larger coolers are intended for use in oar rafts.

## Equipment for On-River Lunch

### Equipment

- Cooler or Gott (enough to store food and equipment)
- Roll tables (2)

### Hand Wash Station

- Buckets (2)
- Potable Water (2 Gallons)
- Bleach
- Hand Soap
- Cup or Foot Pump

### Utensils (stored in a Lunch Utensil Tupperware)

- Sharp knives (2)
- Forks (8)
- Spoons (8)
- Knives (8)

### Other Kitchen Materials

- Cutting Boards (2)
- Serving Trays (2)
- Serving Bowls (2)
- Plates (enough for each person)

### Disposables

- Paper Towels or Napkins
- Garbage Bags (2)

## Rowing Equipment

**Oar Frames:** Oar frames are strapped to the raft and provide a platform to attach oars to the raft. ETC has three frame types and all are equipped with oar locks (the method the oars attach the frame):

- Red Frames: Red frames have a platform for attaching equipment and a slant bar for the rower to sit. Red frames fit 14-foot and 15-foot rafts.
- Black Frames: Black frames have a platform for attaching equipment and a slant for for the rower to sit. Black frames fit 15-foot and 16-foot rafts.
- Expedition Frames: ETC has drop frames used for rigging equipment for expedition trips. These frames are rarely used for day-trips and fit 15-foot and 16-foot rafts.

**Stern Frames:** ETC's stern frames are equipped with a slant board and oarlocks. Stern frames are sized to fit 14-foot or 15-foot rafts.

**Oars:** ETC has nine-foot and ten-foot oars made from a variety of materials (plastic, wood, or composite). All oars are wrapped for use in oarlocks and many are equipped with oar rights to prevent feathering. Nine-foot oars are marked with red paint intended for use in the stern frames and red frames. Ten-foot oars are marked with black paint and intended for use in the black frames and expedition frames. When rowing it is critical to bring a spare oar, so all of ETC oars are in sets of three.

## Personal Equipment

**Personal Floatation Device:** Each participant must wear a Type V Coast Guard approved PFD. Each participant's PFD must be checked for proper fit, which includes the following:

- A. All buckles (typically 3 or 4) are clipped
- B. All straps are tight
- C. When the shoulder straps are pulled vertically the PFD does not rise above the person's ears.

**Helmet:** ETC requires participants wear helmets on rivers with Class II rapids or above. ETC has two types of helmets, a universal fit with a strap that tightens in the back of the helmet to adjust the size and a model with varying sizes from extra small to extra large. Each participant's helmet must be checked to ensure it is tight and will not slip off.

**Paddle:** Each participant who is going to paddle will be equipped with a plastic paddle with a t-grip.

**Paddle Jackets:** Paddle jackets can be provided to participants in colder weather and a limited number should be carried in a dry bag in the event that someone gets cold later in the trip. ETC paddle jackets are available in small, medium, large, and extra large.

## Guide Personal Outfitting

**Whistle:** Each Guide must have a whistle accessible at all times. Typically, a Guide will wear a whistles attached to his or her PFD.

**Knife:** Each Guide must have a knife accessible at all times. This may be a front mounted knife on a PFD or folding knife that is accessible, typically in a PFD pocket. Knives are valuable pieces of safety equipment and should be checked regularly for function and sharpness.

## Safety Equipment

**Throw bag:** Each raft must be equipped with a throw bag that contains 50-70 feet of polypropylene rope. Each Guide should stuff their own throw bag to ensure it is done properly and is ready for use. Throw bags should be clipped to the boat and be accessible to the Guide.

**Pump:** ETC has four types of pumps used for inflating rafts:

- High pressure (small barrel): this pump is used to top off rafts
- Hive volume (large barrel): this pump is used for filling rafts, though is not able to achieve high pressure
- Electric pump: ETC has electric pumps that can be used to fill empty rafts. Additionally, the electric pumps are able to build significant pressure in the raft though often rafts must still be topped off when they are put in the river.
- Car Pump: ETC has one car pump for expedition trips that can connect to a car battery. This pump is made for filling rafts though is not capable of topping them off.

One pump (typically a high volume) must be carried in each pod in the event that a boat is not properly inflated, is losing air, or requires repair.

**Spare Personal Equipment:** Each pod must carry, at minimum, the following personal equipment:

- 1 extra PFD
- 1 extra helmet
- 1 extra paddle

**Repair Kit:** Each pod must carry a complete repair kit. The repair kit is contained in an ammo can and typically carried in a saddlebag with the First Aid Kit in the sweep boat. Repair kits must be inventoried before each trip and contain the following:

- Materials
  - Tear Aid: Type B
  - Spare Valve (C7)
  - Oar Lock
  - Key Chain Ring
  - Duct Tape
  - Spare Frame Bolt & Nut (2)
  - Frame Pin (2)
- Tools
  - Valve Tool
  - Channel Lock
  - Crescent Wrench
  - Screw Driver (Phillips and Flat)
  - Sharpie
  - Grease
  - Rag
  - Allen Wrench
  - Socket Tool (1/2 Inch)



**Sweep Kit:** Each pod must carry a complete wrap kit. The wrap kit is typically carried in a saddlebag in the sweep boat. The wrap kit must be inventoried before each trip and contain the following:

- 200 feet static line
- 3 pulleys
- 6 locking carabineers
- 3 prussic loops
- 3 15-foot lengths of 1-inch tubular webbing

**First Aid Kit:** Each pod must carry a complete First Aid Kit. The First Aid Kit is contained in a Pelican Case and is typically carried in a saddlebag in the sweep boat. The First Aid Kit must be inventoried before each trip (See inventory on Page 56)

**Communication:** Cell phones are valuable for communicating with outside support agencies and ETC Staff in the event of an emergency. One cell phone with Verizon service must be carried in the First Aid Kit of each pod (Verizon has service on the majority of the South Fork of the American River).

## First Aid Kit Contents River Program

Item	Size or Amount	Quantity
<b>Equipment/General Supplies</b>		
Trauma Shears		1
Tweezers		1
Safety Pins		4
Lighter		1
Thermometer		1
Rescue Mask		1
Emergency Blanket	56 x 84	1
Gloves (Nitrile)		10 Total
Zip Lock Bags	Quart	3
Hand Sanitizer	2 ounces	1
<b>Forms</b>		
SOAP Note		2
Incident Report Form (Yellow Card)		2
Call Down List (Red Card)		1
Spiral Note Book	3 x 5	1
Pens		2
Sharpie		1
<b>Wound Management</b>		
Irrigation Syringe	10 cc	1
Povidone Iodine Solution: 10% (e.g. Betadine)	0.5 ounces	1
Alcohol Towelette		6
Wound Closure Strips	1/3 x 3	3 sheets
Tincture of Benzoin Swabs		2
Antibiotic Ointment Packets	0.5 grams	4
Fabric Bandages (e.g. Band Aids)	1 x 3	10
Fabric Bandages (e.g. Band Aids)	Knuckle	5
Sterile Gauze Pad	4 x 4	4
Sterile Gauze Pad	2 x 2	2

Item	Size or Amount	Quantity
<b>Wound Management (continued)</b>		
Sterile Gauze Pad	4 x 4	4
Sterile Gauze Pad	2 x 2	2
Roller Gauze	3 inch	2
Coban Wrap	3 inch x 5 yards	1
Transparent Film Dressing	4 X 4.75	2
Trauma Dressing	10 x 30	1
2nd Skin Dressing		2
Moleskin Dressing	4-5/8 x 3-3/8	1
<b>Other Injury Management</b>		
Cloth Tape	1 inch x 10 yards	1
SAM Splint		1
Triangular Bandage		2
Elastic Wrap: 3 inches x 5 yards (Ace Wrap)	3 inches x 5 feet	1
Cold Pack		1
Feminine Hygiene Pads		2
<b>Medications</b>		
Medication Information Card (Blue Card)		1
Acetaminophen (e.g. Tylenol)	325 milligrams, 2/pack	4
Aspirin (e.g. Bayer)	325 milligrams, 2/pack	2
Ibuprofen (e.g. Advil)	200 milligrams, 2/pack	4
Diphenhydramine Hydrochloride (e.g. Benadryl)	25 milligrams, 1/pack	4
Hydrocortisone	1/32 grams	4
Calcium Carbonate (e.g. Tums)	750 milligrams, 2/pack	4
Meclizine (e.g. Bonine)	50 milligrams, 12/pack	
Loperamine Hydrochloride (e.g. Imodium)	2 milligrams, 1/pack	4
Glucose Paste	15 grams	1
Sooth a Sting swabs		2