

# Aviation Management Tech Tips

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## Helicopter Dip Tank Capabilities and Users' Guide

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### Background

Firefighting helicopters use dip tanks when other water sources are not an option. Dip tanks cut the distances that helicopters must travel to the nearest body of water, help when the local water source is not deep enough, or alleviate the environmental concerns with using local water.

Dip tanks come in many sizes and shapes. They are mobile so they can be positioned for optimum access and effect during a fire incident. Frameless tanks are self-supporting and made of soft, synthetic materials. They collapse for easy transport and storage. These tanks are usually round when fully filled, and have a large opening at the top for bucket access.

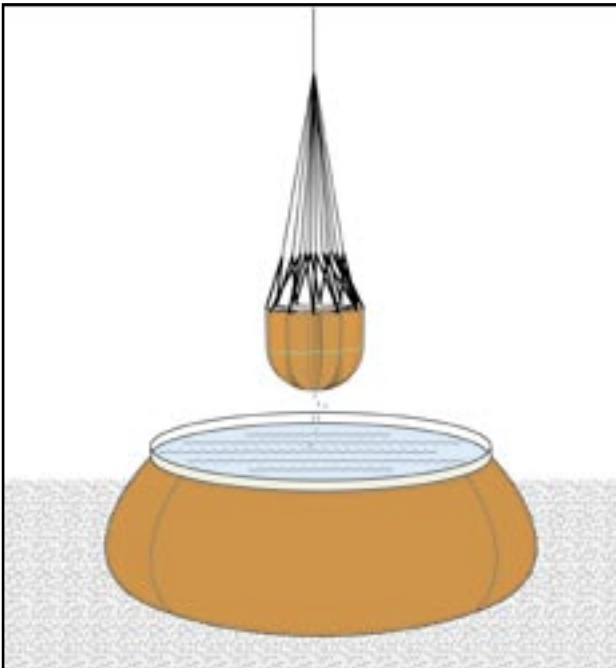


Figure 1—Helicopter bucket and collapsible dip tank.

Framed tanks use a steel or aluminum frame in combination with an internal layer of synthetic material to contain the water. This design works best for tanks holding a large volume of water (5,000 to 14,900 gallons) and is available in round or rectangular forms. They have a larger opening at the top to accommodate wider buckets. These frames are collapsible.

Rigid tanks are made with heavy aluminum or steel and do not collapse. These tanks are rectangular with wheels attached to the bottom and only can be moved by a large truck or tractor. These tanks resemble an open top trailer. Due to their size, they are usually positioned next to roads or parking lots. Collapsible tanks can be placed in more remote locations.

### Introduction

This guide provides helicopter field operators with the information needed to match the proper dip tank with the equipment. It also includes care and maintenance information to extend the service life of various tanks. This matching information improves the safety of helicopter operations and reduces costs from improper dip tank and equipment compatibility. Tables provide most of the information quickly and easily. This guide was written with the help of helicopter field operators, equipment manufacturers, and other experienced technicians to provide practitioners the most up-to-date information available.

Trouble with dip tanks can occur in several ways:

- If the helicopter's bucket has a larger diameter than the opening of the dip tank, then interference can occur.
- If the bucket is taller than the dip tank, then the bucket cannot be filled completely.
- If the tank has sharp edges, then buckets or snorkels can be damaged.

These problems arise during critical times when fire-support crews expect the equipment to perform reliably. A helicopter using a too large bucket may have to change to a smaller bucket or fly to another location that has a larger tank. This results in extra fuel costs and equipment downtime. When the dip tank is too shallow to fill a bucket to its maximum capacity, more flights are needed to suppress a fire than if the bucket was filled completely each time. This results in increased operating time and cost to the fire incident.

Other costs include damage to the dip tanks from buckets and snorkels hitting the tank's bottom and causing tears or holes. Sharp objects on or near the edges of the dip tank also can cause damage to the bucket. Buckets are expensive pieces of equipment and some cost as much as a new luxury car!

Natural hazards (sun and heat) can damage the tank's synthetic fabric if improperly stored. Mildew can form inside a wet tank causing foul odors. Also, rodents have been known to chew holes into the tank's fabric.

### Product Specification and Prices

Table 1 lists dip tank, bucket, helicopter, and helicopter belly-tank manufacturers and vendors. It includes the product name, model number, capacity, dimensions, and per unit price of the items. Some of the boxes in the table have "N/A" because the information is not available. Company names are listed in alphabetical order. The prices were current when this guide was posted on the U.S. Department of Agriculture (USDA) Forest Service San Dimas Technology and Development (SDTDC) Intranet Web site and are subject to change.

Table 1—Product specifications and prices.

Dip Tank Manufacturer/Vendor				
Product	Model Number	Capability	Dimensions	Price
<b>FoI-Da-Tank</b>				
Frameless/Portable tanks	SSTFS-500	500 gallons	3' x 5' x 6'6"	\$714
Frameless/Portable tanks	SSTFS-1000	1000 gallons	4' x 7' x 8'2"	\$1,050
Frameless/Portable tanks	SSTFS-1200	1200 gallons	4' x 7' x 8'10"	\$1,102
Frameless/Portable tanks	SSTFS-1600	1600 gallons	4' x 7' x 9'6"	\$1,207
Frameless/Portable tanks	SSTFS-1800	1800 gallons	4' x 7' x 9'10"	\$1,312
Frameless/Portable tanks	SSTFS-2000	2000 gallons	4' x 7' x 10'8"	\$1,680
Frameless/Portable tanks	SSTFS-2500	2500 gallons	4' x 8' x 12'6"	\$1,837
Frameless/Portable tanks	SSTFS-3000	3000 gallons	4' x 9'10" x 13'1"	\$2,257
Frameless/Portable tanks	SSTFS-4000	4000 gallons	4' x 12'2" x 16'10"	\$2,940
Frameless/Portable tanks	SSTFS-4800	4800 gallons	5' x 11' x 16'	\$3,200
Frameless/Portable tanks	SSTFS-5000	5000 gallons	4' x 13' x 17'6"	\$3,360
Frameless/Portable tanks	SSTFS-6000	6000 gallons	5' x 12' x 17'	\$3,600
Frameless/Portable tanks	SSTFS-10000	10,000 gallons	6'8" x 12' x 19'8"	\$5,800
Frameless/Portable tanks	SSTFS-14000	14,000 gallons	7'9" x 21'8"	\$6,850
Frameless/Portable tanks	SSTFS-20000	20,000 gallons	8' x 18' x 24'	\$5,466
DBL-HI	DBLH-2000	2000 gallons	90" x 90" x 60"	\$5,040
DBL-HI	DBLH-3000	3000 gallons	108"x108"x60"	\$5,265
<b>SEI Industries</b>				
"Fireflex"/Water Reservoir	FFTF-0112*	120 gallons	60"D x 23"H	\$704
"Fireflex"/Water Reservoir	FFTF-0253*	300 gallons	84"D x 32"H	\$770
"Fireflex"/Water Reservoir	FFTF-0506*	600 gallons	84"D x 38"H	\$969
"Fireflex"/Water Reservoir	FFTF-1012*	1200 gallons	124"D x 40"H	\$1,191
"Fireflex"/Water Reservoir	FFTF-1518*	1800 gallons	133"D x 48"H	\$1,517
"Fireflex"/Water Reservoir	FFTF-2530*	3000 gallons	164"D x 48"H	\$1,838
"Fireflex"/Water Reservoir	FFTF-4048*	4800 gallons	195"D x 60"H	\$3,140
"Fireflex"/Water Reservoir	FFTF-5060*	6000 gallons	209"D x 60"H	\$4,021
"Fireflex"/Water Reservoir	FFTF-80100*	6000 gallons	236"D x 80"H	\$4,622

"Fireflex"/Water Reservoir	FFTF-120144*	10000 gallons	260"D x 93"H	\$6,408
"Heliwell"/Portable tanks	HW-0500*	5650 gallons	12'8"D x 6'H	\$10,618
"Heliwell"/Portable tanks	HW-0700*	7100 gallons	12'8"D x 8'H	\$11,532
"Heliwell"/Portable tanks	HW-1000*	9425 gallons	12'8"D x 10'H	\$13,088
"Heliwell"/Portable tanks	HW-1500*	14,900 gallons	16'D x 10'H	\$16,154
<b>Firetak</b>				
Portable water tanks (F-series)	FF2300	600 gallons	7.5'D x 40"H	\$925
Portable water tanks (F-series)	FF4500	1200 gallons	9.5'D x 40"H	\$1,095
Portable water tanks (F-series)	FF7700	2000 gallons	11'D x 54"H	\$1,295
Portable water tanks (F-series)	FF9500	2500 gallons	12'D x 54"H	\$1,395
Portable water tanks (F-series)	FF11300	3000 gallons	13'D x 54"H	\$1,450
Portable water tanks (F-series)	FF15000	4000 gallons	14.5'D x 54"H	\$1,850
Portable water tanks (F-series)	FF19000	5000 gallons	17'D x 54"H	\$2,350
<b>Aqua Express</b>				
Heli-Troff	N/A	6400 gallons	8'W x 15'L x 8'H	\$1,600/day
<b>Phos-Chek</b>				
Steel Portable Retardant Tank	N/A	5000 gallons	N/A	N/A
<b>Runningwater Wildland Fire Equipment</b>				
Helicopter Water Dip Tank	N/A	7300 gallons	7'W x 20'L x 8'D	\$1,800/day
<b>Intermountain Fire Department</b>				
Self Contained All Purpose Mix Plant (SCAMP)	N/A	4000 gallons	8'W x 11'L x 8'H	N/A
Self Contained All Purpose Mix Plant (SCAMP)	N/A	5000 gallons	9'W x 11'L x 8'H	N/A
Self Contained All Purpose Mix Plant (SCAMP)	N/A	6000 gallons	10'W x 12'L x 8'H	N/A
* Impact pad available				
<b>Buckets</b>				
<b>Product</b>	<b>Model Number</b>	<b>Capability</b>	<b>Dimensions</b>	<b>Price</b>
<b>HELIFIRE</b>				
Helicopter Bucket	HF-180	45 gallons	22"H x 32"D	\$3,020
Helicopter Bucket	HF-345	86 gallons	34"H x 32"D	\$3,775
Helicopter Bucket	HF-500	125 gallons	24"H x 42"D	\$4,530
Helicopter Bucket	HF-900	225 gallons	55"H x 42"D	\$6,040
Helicopter Bucket	HF-1500	375 gallons	59"H x 43"D	\$7,382
Helicopter Bucket	HF-2000	500 gallons	59"H x 87"D	\$8,054
<b>SEI Industries</b>				
Bambi Bucket	6072	72 gallons	28"H	\$4,598
Bambi Bucket	8096	96 gallons	29"H	\$4,858
Bambi Bucket	9011	108 gallons	29"H	\$5,246
Bambi Bucket	1012	120 gallons	31"H	\$5,534
Bambi Bucket	1214	144 gallons	33"H	\$5,833
Bambi Bucket	1518	180 gallons	39"H	\$6,580
Bambi Bucket	1821	210 gallons	41"H	\$7,417
Bambi Bucket	2024	240 gallons	43"H	\$8,448
Cobra Bambi Bucket	2732	324 gallons	48"H	\$8,630
Bambi Bucket	3542	420 gallons	57"H	\$9,317
Bambi Bucket	4453	530 gallons	57"H	\$10,868

Bambi Bucket	5566	660 gallons	62"H	\$15,338
Bambi Bucket	5870	700 gallons	58"H	\$16,872
Bambi Bucket	6578	780 gallons	67"H	\$17,460
Bambi Bucket	7590	900 gallons	73"H	\$18,779
Bambi Bucket	HL5000	1320 gallons	70"H	\$22,041
Bambi Bucket	HL7600	2000 gallons	86"H	\$25,658
Bambi Bucket	HL9800	2,600 gallons	97"H	\$28,549
K-MAX(BB680K) Bambi Bucket	BB680K	680 gallons	N/A	N/A
<b>Belly Tank System</b>				
<b>Product</b>	<b>Model Number</b>	<b>Capability</b>	<b>Dimensions</b>	<b>Price</b>
<b>Isolair Helicopter Systems</b>				
Eliminator II Fire Fighting System	4600-205	323 gallons	N/A	N/A
Eliminator II Fire Fighting System	4600-212	323 gallons	N/A	N/A
Eliminator II Fire Fighting System	4600-214B	660 gallons	N/A	N/A
Eliminator II Fire Fighting System	4600-350B	250 gallons	N/A	N/A
Eliminator II Fire Fighting System	4600-350B3	250 gallons	N/A	N/A
Eliminator II Fire Fighting System	4600-W3A	N/A	N/A	N/A
<b>Simplex Manufacturing</b>				
Fire Attack System 301	301	238 gallons	N/A	N/A
Fire Attack System 304	304	369 gallons	N/A	N/A
Fire Attack System 308	308	264 gallons	N/A	N/A
Fire Attack System 310	310	237-317 gallons	N/A	N/A
Fire Attack System 311	311	291 gallons	N/A	N/A
Fire Attack System 314	314	2000 gallons	N/A	N/A
Fire Attack System 316	316	600 gallons	N/A	N/A
Fire Attack System 323	323	1200 gallons	N/A	N/A
Fire Attack System 327	327	200 gallons	N/A	N/A
Fire Attack System 10900-050	10900-050	780 gallons	N/A	N/A
<b>Helicopter</b>				
<b>Product</b>	<b>Model Number</b>	<b>Capability</b>	<b>Dimensions</b>	<b>Price</b>
<b>Canadian Air Crane</b>				
Erickson Aircrane Helitanker	S 64	2,500 gallon tank	N/A	N/A
<b>Mil Aircraft</b>				
Mi-14		1,057 gallon tank	N/A	N/A
<b>Kaman Aerospace Corp.</b>				
K-MAX with FIREMAX system		700 gallons	N/A	N/A
<b>Sikorsky</b>				
Firehawk	S-70A/UH-60L	1000 gallons	N/A	N/A
	S-76C	575 gallons	N/A	N/A
	S-92	1100 gallons	N/A	N/A

## Dip Tank and Bucket Compatibility

Table 2 shows which buckets and dip tanks are compatible. It also shows how many full dips are available with that bucket, assuming that the dip tank is not refilled. The colored boxes in the table show which bucket and dip tank combination are compatible, free of interference, and capable of getting a full dip by the bucket. The colors also represent the number of dips available when the dip tank is filled to its maximum capacity and no refills are available. The color code only provides a rough estimate of the number of dips. During a real incident, the refill and usage rates can vary widely. These color codes assume the worst case situation when the refilling of the dip tank is not possible during usage.

- Red - one dip is available with that particular combination.
- Orange and yellow - two and three dips available, respectively.
- Green - four or more dips are available.

The number of dips available can increase in a real incident when the refill rate matches the usage rate.

Some boxes have “N/C” in them to indicate this particular bucket and dip tank combination is not compatible due to interferences, incomplete dips, or the volume of the bucket is more than the dip tank. Having a suction system in the bucket, like the power-fill option from SEI Industries, allows tall buckets to get a complete fill from shallower dip tanks. Be aware that the external suction systems on the side of the bucket increase the chances for snagging with the edge of a dip tank.

Table 3 provides the dry and filled weights of common helicopter buckets. The model number and volume capacity of each bucket are included.

## Dip Tank and Equipment Compatibility Table

Table 4 shows which equipment and dip tank combinations are compatible. The equipment includes helicopters and helicopter belly-tank systems. The color code indicates the number of complete fills from each dip tank, assuming the dip tank is not refilled.

The colored boxes in the table show which equipment and dip tank combination are compatible, free of interference, and capable of getting a full dip by the helicopter tank. The colors also represent the number of dips available when the dip tank is filled to its maximum capacity and no refills are available. The color code only gives a rough estimate of the number of dips.

During a real incident, the refill and usage rates can vary widely, and this guide cannot predict what those rates may be. This is to assume the worst case situation when the refilling of the dip tank is not possible during usage.

- Red - one dip is available with that particular combination.
- Orange and yellow - two and three dips available, respectively.
- Green - four or more dips are available.

The number of dips available can increase in a real incident when the refill rate matches the usage rate.

Boxes that have “N/C” in them indicate this particular equipment and dip tank combination is not compatible due to interferences or the volume of the helicopter tank is more than the dip tank. Note that a helicopter snorkel needs a depth of at least 18 inches for proper suction.

## Dip-Tank Maintenance and Care Information

Dip tanks require maintenance to provide reliable service. Improper use, care, or storage techniques may result in damages and render the tank useless. Table 5 provides information on proper care tips from dip-tank manufacturers .

Before the tank is put in service, clear away any sharp objects from the area where the tank will sit. Place a tarp between the ground and tank bottom to prevent minor tears from small rocks and objects. Ensure that the tank is placed on level ground to prevent it from rolling over. Strap the tank in place if necessary.

For example, SEI Industries has ground pads for their Fireflex tanks. If an impact pad (figure 1) is available for your tank, place it at the inner bottom of the tank to prevent contact damages from a falling bucket or a snorkel hitting the bottom. Note that the steel-reinforced snorkel from an Erickson Air-Crane can cause severe damage to a tank bottom.

4 or more
3
2
1
Incompatible

Table 2—Dip Tank and Bucket Compatibility.

Dip Tanks	Buckets	Industries	8072 (72 gallons)	8096 (96 gallons)	9011 (108 gallons)	1012 (120 gallons)	1214 (144 gallons)	1518 (180 gallons)	1821 (210 gallons)	2024 (240 gallons)	2732 (320 gallons)	3542 (420 gallons)	4453 (530 gallons)	5566 (660 gallons)	5870 (700 gallons)	5878 (700 gallons)	7590 (900 gallons)	1320 (1500 gallons)	2000 (2400 gallons)	2600 (3100 gallons)	HELIPURE	HF-180 (45 gallons)	HF-345 (88 gallons)	HF-500 (125 gallons)	HF-500 (225 gallons)	HF-1500 (375 gallons)	HF-2000 (500 gallons)	
<b>Aqua Express</b> Hot-Tief (6400 gallons)																												
<b>Firetek (E-Series)</b> FF4600 (1200 gallons) FF7400 (2000 gallons) FF9600 (2900 gallons) FF11800 (3600 gallons) FF15000 (4000 gallons) FF17600 (4800 gallons)																												
<b>FoDa-Tank</b> <b>Firetek ProBak</b> SSTFS-1000 (1000 gallons) SSTFS-1200 (1200 gallons) SSTFS-1600 (1600 gallons) SSTFS-1800 (1800 gallons) SSTFS-2000 (2000 gallons) SSTFS-2500 (2500 gallons) SSTFS-3000 (3000 gallons) SSTFS-4000 (4000 gallons) SSTFS-4800 (4800 gallons) SSTFS-6000 (6000 gallons) SSTFS-10000 (10000 gallons) SSTFS-14000 (14000 gallons) SSTFS-20000 (20000 gallons)																												
<b>FoDa-Tank DBL-HI</b> DBLH-2000 (2000 gallons) DBLH-3000 (3000 gallons)																												
<b>Interstate Fire Department</b> SCAMP-4000 (4000 gallons) SCAMP-5000 (5000 gallons) SCAMP-6000 (6000 gallons)																												
<b>Rex-Check</b> Porcine Resistant Tank (5000 gallons)																												
<b>Chemistry</b> Wuland Fire Ed. 7200 (7200 gallons)																												
<b>Fireflex</b> FFTF-012 (120 gallons) FFTF-025 (300 gallons) FFTF-090 (900 gallons) FFTF-1012 (1200 gallons) FFTF-1518 (1800 gallons) FFTF-2530 (3000 gallons) FFTF-4800 (4800 gallons) FFTF-5060 (6000 gallons) FFTF-6000 (6000 gallons) FFTF-120144 (10000 gallons)																												
<b>SEI Industries</b> Hawell HW4500 (4500 gallons) HW6700 (6700 gallons) HW1000 (1000 gallons) HW1500 (1400 gallons)																												

Table 3—Bucket weight.

Bucket	Weight	
	Empty (Lbs.)	Full Load (Lbs.)
<b>SEI Industries Bambi Bucket</b>		
6072 (72 gal)	66	666
8096 (96 gal)	70	870
9011 (108 gal)	70	971
1012 (120 gal)	72	1,072
1214 (144 gal)	73	1,273
1518 (180 gal)	75	1,574
1821 (210 gal)	76	1,876
2024 (240 gal)	135	2,135
2732 (320 gal)	154	2,853
3542 (420 gal)	167	3,667
4453 (530 gal)	170	4,587
5566 (660 gal)	304	5,805
5870 (700 gal)	330	6,170
6578 (780 gal)	356	6,846
7590 (900 gal)	375	7,775
HL5000 (1,320 gal)	390	11,390
HL7600 (2,000 gal)	465	17,115
HL9800 (2,600 gal)	530	22,180
<b>HELIFIRE</b>		
HF-180 (45 gal)	82	458
HF-345 (86 gal)	82	800
HF-500 (125 gal)	82	1,125
HF-900 (225 gal)	82	1,959
HF-1500 (375 gal)	82	3,210
HF-2000 (500 gal)	82	4,252

Table 4—Dip tank and equipment compatibility.

Color Code	Dips Available			
	4 or more	3	2	1
Green				
Yellow				
Orange				
Red				
NC				
Incompatible				

Dip Tank	Equipment/Aircraft	400-205 (223 gal.)	400-212 (223 gal.)	400-2146 (860 gal.)	400-3005 (240 gal.)	400-3068 (225 gal.)	400-417 (220 gal.)	301 (238 gal.)	304 (268 gal.)	310 (317 gal.)	311 (221 gal.)	314 (200 gal.)	316 (800 gal.)	323 (200 gal.)	327 (200 gal.)	1090 (260 gal.)	Helicopter (Comp)	Edson S-64 Increase Helicopter (Comp)	M-14 (1027 gal.)	M-14 Aircraft	Kaman Airframe Corp.	K-MAX with FIREMAX (1000 gal.)	S-70A/UH-60L (1400 gal.)
<b>Annual Expenses</b>																							
<b>Heli-Tyre (400 gal.)</b>																							
<b>Frederick (F-Series)</b>																							
FF2300 (600 gal.)																							
FF4000 (1200 gal.)																							
FF7000 (2000 gal.)																							
FF11000 (2500 gal.)																							
FF11300 (3000 gal.)																							
FF14000 (4000 gal.)																							
FF14600 (4200 gal.)																							
<b>Edson S-64</b>																							
<b>Edson S-64 Increase Helicopter (Comp)</b>																							
SSTFS-3000 (3000 gal.)																							
SSTFS-4000 (4000 gal.)																							
SSTFS-5000 (5000 gal.)																							
SSTFS-6000 (6000 gal.)																							
SSTFS-7000 (7000 gal.)																							
SSTFS-8000 (8000 gal.)																							
SSTFS-9000 (9000 gal.)																							
SSTFS-10000 (10000 gal.)																							
SSTFS-14000 (14000 gal.)																							
SSTFS-20000 (20000 gal.)																							
<b>Four-Tank DBL-HI</b>																							
DH1000 (2000 gal.)																							
DH15000 (3000 gal.)																							
<b>Intermountain Fire</b>																							
SCAMP 4000 (4000 gal.)																							
SCAMP 5000 (5000 gal.)																							
SCAMP 6000 (6000 gal.)																							
<b>Boyle-Clark</b>																							
Boyle-Clark (5000 gal.)																							
<b>Ruppel/White</b>																							
White (5000 gal.)																							
<b>Frederick</b>																							
FF1100 (100 gal.)																							
FF1025 (300 gal.)																							
FF1400 (600 gal.)																							
FF11000 (2500 gal.)																							
FF11100 (3000 gal.)																							
FF12000 (4000 gal.)																							
FF12300 (4800 gal.)																							
FF14000 (6000 gal.)																							
FF14000 (6000 gal.)																							
FF14000 (6000 gal.)																							
FF14000 (6000 gal.)																							
FF14000 (6000 gal.)																							
FF14000 (6000 gal.)																							
<b>Helwell</b>																							
HW500 (500 gal.)																							
HW900 (900 gal.)																							
HW1500 (1500 gal.)																							
HW1500 (1500 gal.)																							
HW1500 (1500 gal.)																							



Table 5—Maintenance and care.

Manufacturer	Maintenance/Care Information
<b>Firetak</b>	Dry off completely before storage
	Patch inside of tank for maximum effectiveness
	4" diameter patch kits with glue available from manufacturer
	Pest control spray will not damage material
	Mildew will not degrade material
	Carrying case available to prevent damage during storage
	Use no more than 1:4 bleach/water ratio for cleaning
<b>SEI Industries</b>	Dry completely for a day before storage
	Dry by hanging upside down
	Mildew will not degrade material
	Pest spray will not damage tank material
	Impact pad available for Fireflex and Heliwell tanks
	Use plastic top caps on Heliwell tanks
	Use no more than 5% bleach in a bleach/water solution for cleaning
<b>Fol-Da-Tank</b>	Use any household cleaner for mildew problem
	Keep liner dry after cleaning
	Mildew will not degrade material
	Pest control spray will not damage material
	Use no more than one tablespoon per gallon of water for cleaning

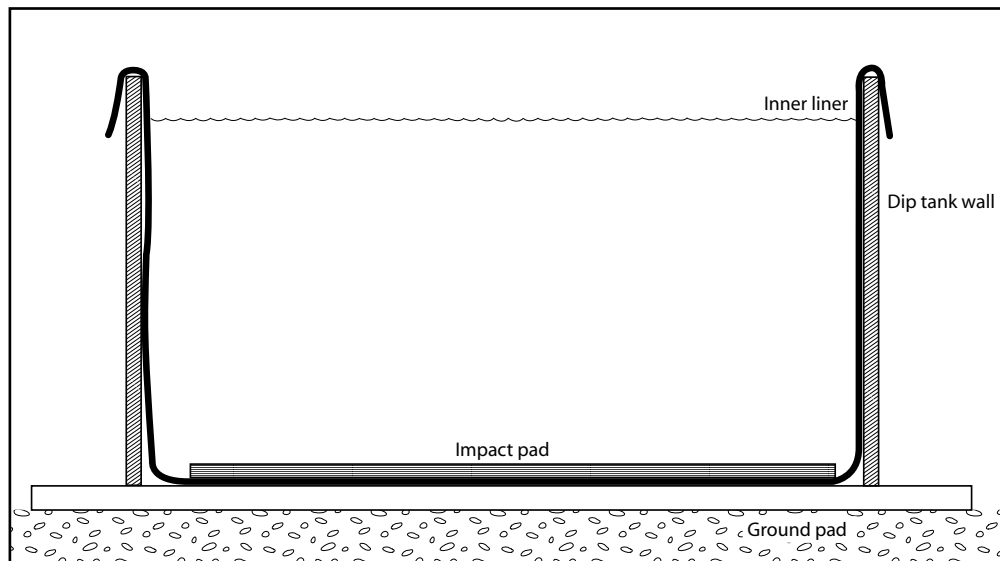


Figure 2—Dip tank with tarp and impact pad.

To prolong a synthetic tank's life, store the tank in a dry, cool, and dark area when not in use.

Rodents, and other pests, also can cause damage to tanks. Rats and mice have been known to chew small holes into the tank's vinyl fabric in search of food, water, and shelter during the colder months. Applying pest control sprays on the tank can prevent some rodent problems and not harm the synthetic material. One nontoxic solution to rodents is to apply peppermint or spearmint oils around the tanks. The oil's scent repels these creatures. One company, Mouse Magic Repellent, makes pellets soaked in peppermint oil for an easy and mess-free application. Another nontoxic method is to apply the scent from rodent predators. Shake Away Rodent Repellent makes a fox- and bobcat-scented powder. Both of these products are available from Gardener's Supply Company.

## Acceptance of Dip Tanks

At a fire incident, contractors with dip tanks may show up to get their equipment added into the incident. For dip tanks that are not listed in this guide, use these criteria to help determine whether to accept for use a non-listed tank.

First, inspect for sharp surfaces. Nothing sharp or pointed should be inside the tank and at the upper outside sections of the tank. These areas are most likely to come in contact with a helicopter bucket or snorkel. Examples of sharp objects are jagged edges of a sheet metal, exposed screws or bolt heads, hooks, and pipes with sharp ends.

Second, look for any object that will create interference with a bucket or snorkel. These objects can be ladders that have the potential to catch the side of a snorkel, edges that are not flush, support beams that can tangle with the bucket line, and pipes that can snag another object.

Third, the dip tank must have a stable base. Its bottom has to rest on the ground or have support points that rest on the ground. The supports need to have large ground-contact pads so it does not sink into any soft soil or pavement. These supports not only prevent road damage but prevent the tank from tipping over if it starts to sink unevenly. A tank towed in by truck needs support other than its wheels. The brakes on the wheels can fail on a sloped surface and allow the tank to shift with unpredictable results.

Fourth, the dip tank has to accommodate the largest buckets expected to be used in the incident. A dip tank is no good if a bucket will not fit in it.

## Purchase Sources

Table 6 lists possible purchase sources for dip tanks, buckets, helicopters, and helicopter tank manufacturers mentioned in this guide. The list is alphabetical, with addresses, telephone numbers, Web sites, and product information. Information not available is noted with "N/A" in the box. This chart is only for information. Refer to table 1 for product details. SDTDC will update all tables in this guide with new products, manufacturers, and vendors when additional information is available (see table 6).

Table 6—Possible purchase sources.

<b>Company</b>	<b>Address</b>	<b>Telephone</b>	<b>Website</b>	<b>Item(s)</b>
Agusta Westland	Yeovil, Somerset, BA20 2YB, United Kingdom	44 (0) 1935 475222	www.agustawestland.com	Helicopters
Aqua Express	P.O. Box 290494, Phelan, CA 92329-0494	(760)963-1763	N/A	Mobile steel water tank
Bell Helicopter	P.O. Box 482, Fort Worth, TX 76101	(817)280-2011	www.bellhelicopter.textron.com	Helicopters
Canadian Air Crane	7293 Wilson Avenue, Delta, B.C. Canada	(604)940-1715	www.air-crane.com	Erickson Aircrane Helitanker
Cascade Fire Equipment Company	P.O. Box 4248, Medford, OR 97501	(800)654-7049	www.cascadefire.com	Fol-Da-Tank
Erickson Air-Crane	3100 Willow Springs Rd., P.O. Box 3247, Central Point, OR 97502	(541)664-7615	www.ericksonair-crane.com	Erickson Aircrane Helitanker
ETT Fire	751 Moon Branch Drive, Dadeville, AL 36853	(877)827-2797	www.ettfire.com	Fol-Da-Tank
Eurocopter	N/A	(800)232-0323	www.eurocopter.com	Helicopters
Firetak	1497 Dublin Avenue, Winnipeg, Canada R3E 3G8	(800)475-5734	www.firetak.com	Portable water tanks (F-Series)
Fol-Da-Tank	1275 W. 11th Street, P.O. Box 110, Milan, IL 61264	(800)637-8265	www.fol-da-tank.com	Fol-Da-Tank
Gardener's Supply Company	64 Harvest Lane, Williston, VT	(888)833-1412	www.gardeners.com	Mouse Magic & Shake Away
Intermountain Fire Department	N/A	(760)533-4241	N/A	SCAMP Retardant Tanks
Isolair Helicopter Systems	1620 N.W. Perimeter Way, Troutdale, OR 97060	(503)492-2105	www.isolairinc.com	Belly Tank Systems
Nor E First Response	3890 Hammer Drive, Bellingham, WA 98226	(360)647-5277	www.nor-e.com	Fireflex and Heliwell tanks
Phos-Chek	810 East Main Street, Ontario, CA 91761	(909)983-0772	www.phoschek.com	Retardant and portable retardant tanks
SEI Industries	7400 Wilson Avenue, Delta, British Columbia, Canada V4G 1E5	(604)946-3131	www.sei-ind.com	Fireflex and Heliwell tanks
Sikorsky		(800)946-4337	www.sikorsky.com	Helicopters
Star Fire Equipment	36846 AL Highway 91, Holly Pond, AL 35083	(866)600-7827	www.starfireequip.com	Fol-Da-Tank
Runningwater Wildland Fire Fighting Equipment	126 Second Canyon, Mesquero, NM 88340	(505)464-3742 or (505)937-4251	N/A	Helicopter Water Dip Tank

## Contact Information

For additional information on dip tank capabilities or this users' guide, contact Ronald Tam at SDTDC. *Phone 909–599–1267 ext. 274, or by e-mail at: [rontam@fs.fed.us](mailto:rontam@fs.fed.us).*

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