

# KOOL SUIT

**PERSONAL COOLING & HYDRATION SYSTEM**



**When The Heat Is On,  
*Get Into a KOOL SUIT***

**Working in hot climates, particularly for long periods, is physically stressful and can compromise a person's safety, focus and efficiency.** Initially developed at the request of the U.S. Department of Defense (DoD) for use under body armor, the patented **Kool Suit** has been scientifically tested by U.S. Navy Seals and proven to be highly effective at maintaining the user's body temperature at safe levels and for longer periods than any other self-contained cooling system available.

The **Kool Suit** is modular and can be tailored to task requirements. It minimizes the effects of environmental extremes and related heat stress by cooling the body **and** providing chilled drinking water to the user. Consisting of a garment connected to a backpack the **Kool Suit** is both easy to don and comfortable to wear. The primary features of the **Kool Suit** include:

- ⊕ **Self-Contained Operation** - affords the user freedom of movement
- ⊕ **Dual Role as a Hydration System** - affords the user the benefit of drinking ice cold water
- ⊕ **Optional Temperature Ranges (55°F, 65°F or 75°F)** - choose based on your task or mission requirement
- ⊕ **Longest Cooling Charge Available** - 3 to 5 hours depending on temperature range selected
- ⊕ **Lightweight Construction** - 4.75 lbs. dry (net) weight. 10.75 lbs. fully loaded weight
- ⊕ **Reusable Materials** - garment is Wash & Wear



## THE GARMENT

Designed in a vest configuration with a zippered front, the specially designed cotton/lycra undergarment is easy to don, lightweight, comfortable and washable. Embedded on the garment is a flat, flexible serpentine tube that transfers the cooling solution. The design and durability of this tubing greatly minimizes 'squeeze-off' of flow caused by point pressure from protective vests, seat belts, load carrying harnesses or pressure from the user sitting or leaning against a firm surface. Unlike icepack vests that cool limited portions of the user's torso, the tubing on the **Kool Suit** is evenly distributed over the vast majority of the torso to provide maximum coverage for thermal transfer.

## THE BACKPACK

The backpack contains the Cooling System Support Assembly that controls the supply and temperature of the cooling fluid. The assembly consists of seven main components including:

1. **A 2.5 liter Hydration Bladder** that provides 40 ounces of chilled drinking water to the user and absorbs heat from the cooling solution circulating within the bladder's heat exchanger.
2. **A Pump** that quietly moves cooling solution throughout the garment and bladder.
3. **A Control Valve** that maintains the garment temperature at 55°F, 65°F or 75°F.
4. **A Battery Pack** that powers the System Support Assembly with (4) Ni-MH rechargeable C-size batteries.
5. **A Hydration Tube** that is connected to the bladder and from which the user can drink up to 30-oz. of chilled potable water.
6. **A Switch** that extends from the battery pack turns the System on or off.
7. **A Backpack Cover** that houses all of the aforementioned components. Insulated and made of high grade Nylon, the backpack is designed to be worn directly on the body with its H-harness and sternum strap configuration or can be attached to tactical vests, SCBA's or other similar equipment with a set of secondary straps.



## PREPARING THE KOOL SUIT FOR USE

To prepare the system for use, remove the hydration bladder from the backpack, fill it with clean, potable water and lay it flat in a freezer. If necessary, the bladder can be filled with ice cubes and topped off with water. Secondly, charge the Ni-MH batteries in the battery charger that comes with the system.

Once it is frozen, install the hydration bladder in the backpack and install the charged batteries in the battery compartment. The **Kool Suit** is now ready to be used.

## HOW THE KOOL SUIT WORKS

The garment and bladder are conveniently connected after donning by soft, flexible tube assemblies. When connected, the garment tubing and heat exchanger tubing (suspended within the hydration bladder) form a closed loop of cooling solution. Once the switch is turned on, the **Kool Suit** automatically operates actively or passively. This is accomplished by a control valve within the backpack assembly that continually senses the temperature of the cooling solution flowing through the garment. If the user is at rest, the **Kool Suit** senses no cooling is needed and circulates the cooling solution through the garment only (diagram 1). If the user starts to exert energy, the control valve senses an over-temperature condition and automatically diverts the cooling solution from the garment through the heat exchanger within the ice-filled bladder, dissipating that heat and returning cooled solution back to the garment (diagram 2).

Diagram 1  
Flow Path When No Cooling Is Necessary

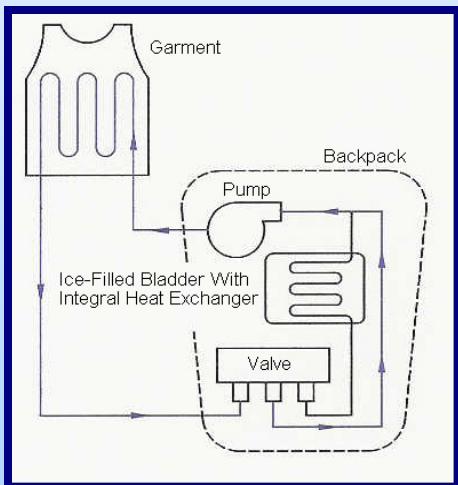
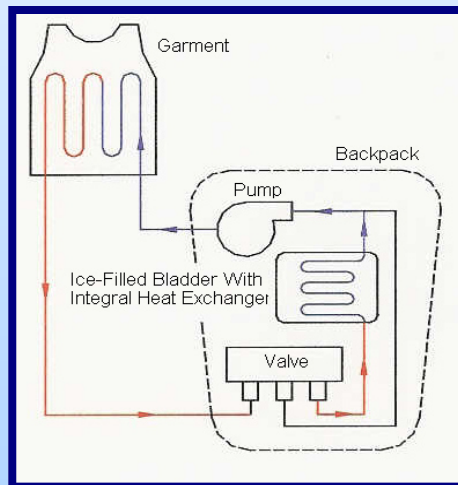


Diagram 2  
Flow Path When Cooling Is Necessary



## SYSTEM CHECKLIST

Each Kool Suit system comes complete with the following components:

- (1) Garment
- (1) Cooling System Support Assembly
- (4) Ni-MH rechargeable batteries
- (1) Battery charger
- (1) Set of cleaning brushes for hydration bladder
- (1) Garment laundry bag
- (1) Cooling solution priming kit

★ Components Can be Purchased Separately ★

## SYSTEM PERFORMANCE

Test results from the United States Navy Experimental Diving Unit demonstrated that the **Kool Suit**, with a temperature setting of 75°F, provided over 125-W of metabolic heat removal and increased the subject's duration to heat exposure by as much as 54%. The test results also demonstrated a 50% reduction in fluid (perspiration) loss.

Since the **Kool Suit** is automatically controlled, the cooling time is maximized and is inversely proportional to the heat loading. For example, a 500-Wh capacity system could extract 125-W for 4-hr or 65-W for approximately 8-hr.

The **Kool Suit** system weighs just 4.75 pounds dry. Total weight is a function of task duration and hydration requirements, but as a guide, a 500-Wh system (with a 4-hr mission life at 125-W) and capable of supplying up to a quart of cold drinking water without effecting cooling performance weighs less than 11-lbs complete. The Kool Suit is offered in three factory-set temperature ranges. The cooling time for each temperature set point is shown in Table 1. Users can select the optimum temperature set point to suit their task or mission requirements.

**Table 1**

| Temperature | Cooling Time *<br>(Ice Cubes in Bladder) | Cooling Time *<br>(Fully Frozen Bladder) |
|-------------|--|--|
| 55°F        | 2 hours                                  | 3 hours                                  |
| 65°F        | 2 1/2 hours                              | 4 hours                                  |
| 75°F        | 3 hours                                  | 5 hours                                  |

\* Cooling times shown are average. User results may vary by +/- 20% depending on variables such as ambient temperatures and workload.

## COMPARATIVE SYSTEM ANALYSIS

There are several personal cooling devices on the market today that offer many different features and cooling means. Here's how the **Kool Suit** stacks up against the competition:

|                         | Ice or Gel Pack Vest | Phase Change Vest | Umbilical Systems | Refrigeration-Based Systems | TPM <b>Kool Suit</b> |
|-------------------------|----------------------|-------------------|-------------------|-----------------------------|----------------------|
| Self-Contained          | Yes                  | Yes               | No                | Yes                         | Yes                  |
| Constant Cooling Rate   | No                   | Yes               | Yes               | Yes                         | Yes                  |
| Conductive Cooling      | Yes                  | Yes               | No                | Yes                         | Yes                  |
| Weight Fully Loaded     | <6 lbs.              | <6 lbs.           | <3 lbs.           | 12.6 lbs.                   | 10.75 lbs            |
| Cooling Time Per Charge | 1 hour               | 1.5 hours         | Unlimited         | 1 hour                      | 3-5 Hours            |
| Hydration Available     | No                   | No                | No                | No                          | Yes                  |
| Active/Passive Cooling  | No                   | No                | No                | No                          | Yes                  |
| Cools Entire Torso      | No                   | No                | No                | Yes                         | Yes                  |
| Cost                    | Low                  | Low               | Low               | High                        | Low                  |

**For Sales, Service & Training Please Contact:**

### TP MANUFACTURING

31 Willow Road  
Ayer, MA 01432

Phone: 978-772-4980

Fax: 978-772-4981

E-mail: [info@technicalproductsinc.us](mailto:info@technicalproductsinc.us)

Web: [www.kool-suit.com](http://www.kool-suit.com)