



BEVERAGE COOLING UNIT (BCU) | DoD CFD

The Beverage Cooling Unit (BCU) has been developed by Natick Soldier Research, Development and Engineering Center's (NSRDEC) Combat Feeding Directorate (CFD) – Systems Equipment and Engineering Team (SEET) to give Warfighters the capability to rapidly cool their potable water supply.

PURPOSE:

Average ambient temperatures in places such as Iraq can be anywhere between 95°F to 125°F. In these conditions, Warfighters may be required to remain static inside their tactical vehicles from 6 to 48 hours or mobile outside in the high ambient temperatures. Such extreme operating environments can lead to heat induced ailments such as heat exhaustion, heat stroke and dehydration. These factors can reduce the combat effectiveness of the Warfighter, which can be detrimental to mission requirements. Reports have demonstrated that troops will drink more water if it is cool and palatable. To combat the effects of extreme heat on the Warfighter, the BCU is capable of directly cooling the Warfighter's drinking water and has been independently tested and developed by the SEET team.

TECHNICAL CHARACTERISTICS:

The tested cooling system is comprised of a micro vapor-compression refrigeration system with quick disconnect fittings which allow the system to connect to a standard 5-Gallon water container. Utilizing an extremely efficient design in a small footprint, the cooling system is capable of chilling water in a standard water container a minimum difference of 40°F in 25 minutes in ambient temperatures up to 145°F. Cooling performance also improves as ambient temperature increases, providing quicker cool down rates at increased starting water temperatures. Based on Warfighter water consumption rates, the BCU is capable of providing a platoon sized force with consumable cold water for as long as power is available. In current configuration, the BCU is designed, but not limited to operate either inside an HMMWV cab or in the HMMWV bed. No daily maintenance is required except for a daily cleaning which requires the user to circulate a provided non-toxic food grade cleaning solution through the system. The BCU has also been vibration approved to MIL STD 810G.



The BCU is compatible with two other newly developed items that also aid in providing cooled palatable water to Warfighters in the most efficient way possible. One of these items is a newly updated Insulated Bag for the 5 gallon water container (IC5) that is capable of keeping the chilled water at a palatable temperature in the container for over 24 hours. The second item is the High Strength Collapsible Water Bag (HSCWB), designed to alleviate current issues with the traditional 5 gallon container: poor pouring characteristics and cap design (water loss/leakage/contamination), damage during resupply

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airdrops, difficult cleaning requirements, and high logistical burden when carrying water into battle. As a replacement to the 5 gallon container, the prototype HSCWB allows for more efficient resupply airdrops and a reduction in cube storage volume inside infantry patrol vehicles while maintaining the overall quality of the water being stored.

CAPABILITIES & BENEFITS:

- Highly portable; weighing only 40 lbs, the entire system can be quickly removed and used anywhere where a proper power receptacle can be found.
- Quick disconnect fittings on the ends of the umbilical hoses have been utilized to simplify and speed up the breakdown process.
- The IC5 utilizes integrated shoulder straps to allow for easy transport and is flexible enough to be rolled up and stored within another backpack.
- The HSCWB offers:
 - Ability to withstand airdrops from heights as high as 37 feet multiple times.
 - Cover cap-sealing feature that prevents dirt from hindering the seal and contaminating the water; also making the bag easier to sanitize.
 - New nozzle feature to improve pouring and filling, as well as modified handles to support a cargo strap for transportation.
 - Constructed using a 1050 denier ballistic Nylon material coated with FDA approved silicone rubber on to eliminate film growth and leaching at high temperatures, which occur with plastics; water quality remains high with no potential for bacterial growth.
 - The bag is more physically robust than the current 5-gallon plastic water containers to prevent damage during quick airdrop techniques from short heights at low speeds.



**Insulated Bag Being Used On
5 Gallon Water Container**

COMMENTS:

An initial prototype of the BCU has been tested and developed to function with the standard military 5 gallon water container as well as the prototype HSCWB. An updated BCU prototype has been designed and is in the fabrication process. The updated prototype includes more durable quick disconnect fittings, more durable hoses and faster cool down rates.

The BCU, in conjunction with the IC5 and HSCWB, is designed for all armed services.

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