

EFFECTIVE THERMAL MANAGEMENT FOR THE FIRST RESPONDER

MUSTANG SURVIVAL WE SAVE LIVES FOR A LIVING



There are a multitude of factors that affect the outcome of any mission, especially one involving water. These might include team training, area of operation, environmental conditions, mission complexity/ purpose as well as personal protective equipment (PPE). While Mustang Survival cannot control many of these factors, we can help control the operator's comfort and personal safety while by offering the user the proper PPE. Based on years of work with the world's leading special operations personnel, we have learned that maximizing one's comfort while in the field greatly enhances one's ability to stay focused on the mission at hand. To this end, Mustang Survival's Engineers continue to work on breathable PPE solutions that provide long term comfort and wearability while providing a mission appropriate level of thermal management. With the introduction of a light and mid-weight base layer, a complete four-season Thermal Management System can now be achieved in combination with the Mustang Survival waterproof breathable dry suits.

Key benefits include:

- **Wicking control:** Optimal moisture propagation critical to breathable garment systems
- **Versatility:** Modular and scalable depending on conditions and mission profile
- **Best-in-class comfort:** Carefully designed with performance in mind

HOW IS THIS ACHIEVED?

Key to developing systems for a multi-climate environment is the ability to provide this thermal management and breathability to wick moisture away from the operator's body. For the system to work the moisture must stay a water vapor (gas) and not become a water molecule (liquid). The key in any wicking system is to always have a form-fitting next-to-skin wicking garment that doesn't allow air pockets to form between the surface of your skin and the next-to-skin item. Additionally, all components within the system must be wicking. When the moisture comes out of your skin it is in a vapor state and is then transformed into water molecules on your skin's surface. Those water molecules are the liquid beaded sweat such as that which drips down your face. A wicking system cannot transfer water molecules only water vapor. Water molecules will overload the system.

Since individual missions are often of different duration, physical intensity and carried out in a variety of environmental and temperature ranges, the Mustang Survival Team has developed a range of thermal management products that can be worn alone or in a multitude of combinations to meet the operational profile. The Thermal Management System is comprised of three (3) weights of base layer products:

- **Light Weight** (MSL 604 top & MSL 605 pants)
- **Mid Weight** (MSL 602 top & MSL 603 pants)
- **Heavy Weight** (MSL 600 one piece & MSL 601 one piece - female)

The moisture transfer rate of light (silk) weight layer is much higher than a mid-weight. As such operators often will wear the lightweight garment (MSL 604/605) if they are going to be in a high tempo/exertion situation that could cause substantial perspiration regardless of the overall thermal requirement. While Mustang Survival's Thermal Management System provides a means to pull moisture from your body and provide thermal protection it does not add external barrier protection (this is provided by the MSDxxx drysuit system). When used in unison, these components which have been developed to complement each other provide a PPE solution that is not only flexible with increased wearability but allows the operator increased effectiveness by allowing them to keep their eyes on the mission without "fighting" their PPE. This not only increases the comfort of the operator but greatly increases their chance of a successful mission.

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WHAT DOES ALL OF THIS REALLY MEAN TO THE OPERATOR ON/IN THE WATER?

To measure the projected effectiveness of thermal management systems, a system known as *Clo* is used. Clo is the relative measure of the ability of insulation to provide warmth. One Clo is defined as the amount of clothing required by a resting (sedentary) person to be indefinitely comfortable at ambient conditions where temperature is 21°C (70°F), relative humidity is less than 50 percent, and wind velocity is 250 centimeters per second or about 0.9 kilometers per hour (about 20 feet per minute or just over half a mile per hour). Lowest Clo value (0) is that of a nude person, highest practical Clo value (4) is that of Eskimo clothing (fur pants, coat, hood, gloves, etc.). Winter clothing (weighing about 6.6 pounds) has an average Clo value of 1, and summer clothing (weighing about 3.90 pounds) of 0.6.¹

Mustang Survival conducts all its Clo testing using a Department of Defense (DOD) recognized lab, calculating survivability times based on the best models available today. Many variables like sea state, BMI, injury, etc. can affect your immersed survival time.

CLO VALUES OF COMMON MUSTANG SURVIVAL PRODUCTS

CONDITION	PROTECTION	CLO VALUE
OUT OF WATER	Normal Indoor Clothing (as defined above)	1.000
IN WATER	Nude	.060
	Normal Indoor Clothing	.100
	(MJ6224)	.185
	Sentinel™ Series Water Rescue Dry Suit (MSD624)	.660
	Ice Commander Rescue Suit (IC9001v03)	.960
	MSD624 + MSL602/603 + MSL600	1.120

Laboratory testing, as well as, operator testimonials indicate that an Mustang MSDxxx drysuit when worn with the mid and heavy weight thermal layers provides substantially greater warmth and far superior mobility and dexterity over the IC9001v3 (long considered to be the warmest suit on the market for cold static water rescue operations).

The Mustang Survival **Thermal Management System** (MSL600 - MSL606) provides the operator with a modular and scalable wicking solution allowing the user to mix and match the various layers of the system to meet their individual thermal requirements.

¹Read more: <http://www.businessdictionary.com/definition/clo.html>