



**FREDERICK COUNTY GOVERNMENT  
DIVISION OF FIRE & RESCUE SERVICES  
5370 Public Safety Place  
Frederick, MD 21704**

## **HEAT ACCLIMATIZATION, HYDRATION AND FITNESS LITERATURE**

### **Individual guidance for Heat Acclimatization**

This heat acclimatization guidance is for those Recruits who will be attending a Fire Recruit Academy during the hot weather of the summer months. It provides practical guidance to obtain optimal heat acclimatization to both maximize performance and minimize the risk of becoming a heat casualty.

### **Should you be concerned about hot weather?**

If you are used to working in cool or temperate settings, then exposure to hot weather will make it much more difficult to complete a Fire Recruit Academy. Hot weather will make you feel fatigued, make it more difficult to recover, and increase your risk of being a heat casualty. Recruits with the same abilities but who are used to training in hot weather will outperform you.

### **What is heat acclimatization?**

- a. Heat acclimatization refers to biological adaptations that reduce physiologic strain (e.g., heart rate and body temperature), improve physical work capabilities, improve comfort and protect vital organs (brain, liver, kidneys, muscles) from heat injury. The most important biological adaptation from heat acclimatization is an earlier and greater sweating response, and for this response to improve it needs to be invoked.
- b. Heat acclimatization is specific to the climate and physical activity level. However, acclimatization to warm or hot climates markedly improves the ability to work in the other similar climates. Individuals who only perform light or brief physical work will achieve the level of heat acclimatization needed to perform that task. If they attempt a more strenuous or prolonged task, additional acclimatization and improved physical fitness will be needed to successfully perform that task in the heat.

### **How do you become heat acclimatized?**

- a. Heat acclimatization occurs when repeated heat exposures are sufficiently stressful to elevate body temperature and provoke perfuse sweating. Resting in the heat, with limited physical activity to that required for existence, results in only partial acclimatization. Physical exercise in the heat is required to achieve optimal heat acclimatization for that exercise intensity in a given hot environment.
- b. Generally, about two weeks of daily heat exposure is needed to induce heat acclimatization. Heat acclimatization requires a minimum daily heat exposure of about two hours (can be broken into two 1-hour exposures) combined with physical exercise that requires cardiovascular endurance, (for example, walking or jogging) rather than strength training (push-ups and resistance training). Gradually increase the exercise

intensity or duration each day. Work up to an appropriate physical training schedule adapted to the required physical activity level for the Academy.

- c. The benefits of heat acclimatization will be retained for about 1 week and then decay with about 75% percent lost in about 3 weeks, once heat exposure ends. A day or two of intervening cool weather will not interfere with acclimatization to hot weather.

### **How fast can you become heat acclimatized?**

- a. For the average individual, heat acclimatization requires about two weeks of heat exposure and progressive increases in physical work. By the second day of acclimatization, significant reductions in physiological strain are observed. By the end of the first week and second week, 60-80% of the physiologic adaptations are complete, respectively. Individuals who are less fit or unusually susceptible to heat may require several days or weeks more to fully acclimatize.
- b. Physically fit individuals should be able to achieve heat acclimatization in about one week. However, several weeks of working in the heat may be required to maximize tolerance to high body temperatures.

### **What are the best heat acclimatization strategies?**

- a. Maximize physical fitness and heat acclimatization prior to arriving to the Academy. Maintain physical fitness after arrival with maintenance programs tailored to the environment, such as training runs in the cooler morning or evening hours.
- b. Integrate training and heat acclimatization. Train in the coolest part of the day and acclimatize in the heat of the day. Start slowly by reducing training intensity and duration (compared to what you could achieve in temperate climates). Increase training and heat exposure volume as your heat tolerance permits. Use interval training (work/rest cycles) to modify your activity level.
- c. If the new climate is much hotter than what you are accustomed to, recreational activities may be appropriate for the first two days with periods of running/walking. By the third day, you should be able to integrate PT runs (20 to 40 minutes) at a reduced pace.
- d. Consume sufficient water to replace sweat losses. A sweating rate of > 1 quart per hour is common. Heat acclimatization increases the sweating rate, therefore increases water requirements. As a result, heat acclimatized Recruits will dehydrate faster if they do not consume fluids. Dehydration negates many of the thermoregulatory advantages conferred by heat acclimatization and high physical fitness.
- e. Meal consumption is just as important as water consumption. Food will replace the minerals lost in sweat as well as provide the needed calories. Salt food to taste, and do NOT take salt tablets. Rigorous training in hot weather requires a daily calorie consumption of approximately 2100 calories per day.

### **Proper Hydration**

Proper hydration is a must in order for you to perform to your fullest potential. If you are not hydrated prior to starting an activity, regardless of the temperature, you risk jeopardizing your health as well as the safety of your team. Possible repercussions include heat illnesses, injuries and death.

Proper hydration is imperative for many of your body's processes and helps to maintain healthy blood flow, proper kidney function, proper sodium/potassium /electrolyte balance and proper digestive functions.

## **How to Become Properly Hydrated**

In order to properly hydrate, the first step is to start early. Most references state that an individual should start the hydration process three days in advance of the anticipated activity. During this time, a relatively **inactive** individual should drink approximately 8-10 cups of water a day. Not only is it important to take in adequate amounts of water, it is also important to restrict things that will cause your body to rid itself of water. These items commonly referred to as diuretics, include but are not limited to coffee, soda, tea and alcoholic beverages.

## **Maintaining Proper Hydration Levels**

In order to maintain these levels, it will require you to consume far more water. Depending on your size and perspiration rate, you lose about a quart of water per hour of exercise. If you are working out in a mild climate, you are probably losing about 1/2 gallon of water through perspiration. This amount of water lost will be detrimental to your performance and health in the academy and on the fireground. While sports drinks have their place in an industrial athlete's regimen, they should never be used as the sole source to rehydrate. Hydration can only occur through the consumption of water. Sports drinks will help to replace necessary electrolytes that are lost through sweating while exercising. When utilized, it is best to dilute the sports drink in water, thereby giving you the benefits of both.

## **“Minimum Level of Fitness” Expectation**

As you are taking appropriate actions to acclimatize and hydrate on your own, you should also be working to maintain if not improve upon your physical fitness. We are in essence Industrial Athletes. And as athletes, it is expected that a certain level of physical fitness is maintained. This is not only beneficial to you as an individual, but to the entire workforce. Physically fit and healthy individuals are far less likely to suffer on the job injuries, or call out sick on a frequent basis and have been proven to be more capable of dealing with the stress of our profession in a far more positive and productive manner.

It will be expected that you will be able to run a minimum of 1.5 miles in no less than 15 minutes. This is a 6 mph pace or a 10 minute mile and should be a fairly easy task. It will also be expected that each individual can perform a minimum of 10 regular push-ups and 25 crunches/sit-ups within a 1 minute time frame. Please understand that these are MINIMUM expectations. Those capable of performing more will find the daily PT regimen a little more bearable.

PT will be an integral part of your daily activities and will usually be on the schedule for approximately 1.5 hours a day, four days a week.

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## **Works Cited**

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**CANDIDATE ACKNOWLEDGEMENT OF  
HEAT ACCLIMATIZATION, HYDRATION AND FITNESS  
LITERATURE**

I, \_\_\_\_\_ acknowledge  
PRINT FULL LEGAL NAME  
receipt of the Heat Acclimatization, Hydration, and Fitness literature on  
\_\_\_\_\_ and will review all the information prior to the start of the  
Academy:

- Heat Acclimatization Literature
- Hydration Literature
- Fitness Expectations

Please sign your full legal name below to affirm the above:

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***Signature***