



# *Department of Fire Services* Commonwealth of Massachusetts

## **MASSACHUSETTS FIREFIGHTING ACADEMY**

### **POLICY FOR REHABILITATION DURING TRAINING EVOLUTIONS**

#### **Purpose:**

This policy provides a method of action to guide Massachusetts Firefighting Academy (MFA) personnel in the provision of appropriate rehabilitation methods. Its purpose is to ensure that the physical and mental condition of students, instructors, and support staff operating at any MFA training program does not deteriorate to a level that affects the safety or well-being of each participant. It further serves to provide the participants of training activities with the opportunity for the following:

- Rest and recovery
- Fluid replenishment
- Relief from climatic conditions
- Medical evaluation and treatment if necessary

#### **Scope:**

The conditions of this policy shall be adopted and implemented by all MFA programs during the delivery of all fire and non-fire training evolutions. It is the responsibility of each program coordinator and/or lead instructor to ensure adherence to this policy as necessitated by climatic conditions. The policy includes training conducted at the Stow campus as well as all off-site training areas.

#### **General Principles:**

The job of the firefighter is often performed in a variety of adverse climatic conditions. As a result of improved firefighter personal protective equipment (PPE) and technology, encapsulated firefighters are at risk for overexertion and heat/stress related injuries which may include dehydration, heat stress, and cardiac disorders. Although the modern firefighter is better protected from external/thermal injury and can reach further into heated environments, these risks are increased. A recommended way to reduce risk is through sufficient hydration, diet, limited physical activities on hot days, acclimatization, and monitoring of weather conditions to ensure the safety of all training participants. Rehabilitation operations shall commence whenever training operations pose a risk to students who may exceed a safe level of physical or mental endurance.

### **Implementation:**

It shall be the daily responsibility of each program coordinator and/or lead instructor to evaluate the elements of each training evolution. Factors to be considered should include:

- *Time – Extended use of turnout gear; extended exposure to extreme weather conditions*
- *Complexity – Long term training exercises*
- *Intensity – Mental and/or physical stress on participants such as major extrications, actual fire attack, or search and rescue evolutions*
- *Climate – Conditions such as hot or cold weather*

To properly assess climatic conditions, the program coordinator and/or lead instructor shall obtain a weather report. (One source is the National Weather Service Boston at <http://www.erh.noaa.gov/er/box>) The report should include a heat index or wind chill index (as applicable) for the location and day of the training evolution. If heat index and wind chill are not provided, obtain current temperature and humidity, or temperature and wind speed, and determine the heat index or wind chill from the charts provided in this document. A determination can then be made as to the level of rehabilitation necessary with due regard to weather conditions and level of physical exertion.

### **REHABILITATION LEVELS WILL BE DETERMINED AS FOLLOWS:**

#### **LEVEL I**

The program coordinator and/or lead instructor shall designate a staff member to serve as EMS officer for the training day. The EMS officer will be responsible for the management of the rehabilitation area and shall be a minimum MA licensed EMT-B.

Level I rehab shall be included in **ALL** evolutions conducted by MFA training programs, both fire and non-fire, of which each segment is less than 60 minutes in duration and/or performed under normal climatic conditions.

After each segment, participants will be directed to report to a pre-determined rehabilitation area. The area should provide suitable protection from the prevailing environmental conditions as follows:

1. *During hot weather, it should be in a cool, shaded area*
2. *During cold weather, it should be in a warm, dry area*

Rehabilitation areas may include but are not limited to the following:

1. *A nearby garage, building lobby or other structure*
2. *A protected open area*
3. *Tents or other portable structures*
4. *A school bus or municipal bus*
5. *Enclosed areas of fire apparatus or other emergency vehicles*
6. *Specially designed rehabilitation apparatus*



Participants in the rehab area shall be directed to "dress down" and remove PPE when appropriate.

The EMS officer shall conduct a general physical assessment of personnel in the rehab area. This should include forming an overall impression of the participants' well-being. Visual signs and symptoms remain the best method to evaluate personnel in the rehab area. Vital sign measurements can and may be used as a baseline or to assist with treatment should it be deemed necessary.

All participants shall be afforded at least one 10 minute rest break (with hydration) every hour. During simulated firefighting evolutions, a minimum of one 20 minute rest break (with hydration) shall be provided every hour (40 minutes work, 20 minutes rest). This timeframe can and should be modified to provide longer rest breaks, as appropriate, after considering level of exertion, duration of activity, weather conditions, and any other factors that might affect levels of stress inflicted upon personnel. Instructional and support staff shall also be afforded the same opportunity to rest and re-hydrate.

Participants should consume between 12 and 32 ounces of fluids during each rest period to aid in rehydration. Drinks should be noncarbonated caffeine free drinks such as water or sports drinks.

## **LEVEL II**

Level II rehab shall be included in **ALL** evolutions conducted by MFA training programs, both fire and non-fire, of which each segment is more than 60 minutes in duration and/or performed under extreme climatic conditions.

Extreme climatic or environmental conditions that indicate the need to establish Level II rehab are a heat stress index above 90 degrees Fahrenheit (see Table A), or wind-chill index below 10 degrees Fahrenheit (see Table B).

Level II rehab shall encompass all of the elements of Level I along with the inclusion of medical monitoring.

The EMS officer shall be assisted by at least one emergency medical technician (EMT) for every ten rehab participants in conducting medical monitoring.

Medical monitoring shall consist of a minimum of a visual exam, blood pressure, pulse, and temperature. A complete list of recommended medical assessment criteria can be found in Table C. No participant shall be allowed out of the rehab area unless these vital signs are documented.

Accurate records of all medical monitoring in the rehab shall be maintained through the use of the evaluation form identified in Table D.

No participant shall be allowed to leave the rehab area until cleared by the EMS officer.

### **Staff Responsibilities:**

Members should recognize heat/cold stressors and stress symptoms as follows:

- *Heat stress symptoms include nausea, flushed skin, cramping, headache, mental confusion, rapid heartbeat, shortness of breath, weakness or exhaustion, seizures, sunburn, and absence of sweating*
- *Cold stress symptoms include headache, mental confusion, numbness, waxy/pale skin, dehydration, low or absent blood pressure, slow pupil response, muscle rigidity or stiff posture, and blistered skin*

### **Operations in extreme heat conditions:**

Determine the Effective Heat Stress Index, as follows:

1. *Using the Heat Index chart (see Table A), select the row indicating the current temperature to the nearest 2 degrees;*
2. *Select the column indicating the humidity, to the nearest 10%;*
3. *Find the value for Humiture (or Heat Stress Index) at the intersection of the selected row and column;*
4. *Add 10 degrees to this number for operations in which turn-out gear is worn;*
5. *Add an additional 10 degrees for operations in direct sunlight, or for firefighting evolutions.*

The resultant number is the Effective Heat Stress Index. Compare this number to the chart in Table A to assess the threat of heat-related injuries.

"Extreme Heat Conditions" are those conditions in which the Effective Heat Stress Index is 90 degrees or higher. Under such conditions, rehabilitation shall include the following:

- Removal of protective clothing during rest periods;
- Fluid and food to replace electrolytes and calories lost during the evolution;
- A shaded or misted area for initial cool-down of personnel;
- An air-conditioned area (or vehicle) for extended rehabilitation as needed;
- Medical evaluation and treatment as required

Additionally, the Lead Instructor shall adjust the activity level so that work periods are shorter, and breaks are longer, as the Effective Heat Stress Index increases. At an Effective Heat Stress Index below 90 degrees, firefighting training evolutions may be conducted for 40 minutes, followed by a 20 minute break. At an Effective Heat Stress Index of 130, work periods should not exceed 15 minutes, followed by at least 45 minutes rest and re-hydration.

If the Effective Heat Stress Index exceeds 130 degrees, serious consideration should be given to rescheduling the training evolution.



### **Operations in Extreme Cold Conditions:**

Determine the Wind Chill Index, as follows:

- Using the Wind Chill chart (see Table B), select the column indicating the current temperature to the nearest 5 degrees;
- Select the row indicating the wind speed, to the nearest 5 mph;
- Find the value for Wind Chill at the intersection of the selected row and column;

For the purposes of this document, "Extreme Cold Conditions" are those conditions in which the Wind Chill Index is 18 degrees below zero or colder. Under such conditions, rehabilitation shall include the following:

- A dry area shielded from the wind or other elements;
- Fluid and food to replace electrolytes and calories lost during the evolution;
- The opportunity to remove wet clothing and don dry clothing;
- A heated area (or vehicle) for extended rehabilitation as needed;
- Medical evaluation and treatment as required.

The Lead Instructor must assess the availability of suitable clothing for all participants prior to allowing them to engage in cold weather activities. Additionally, the Lead Instructor shall adjust the activity level so that work periods are shorter, and breaks are longer, as the Wind Chill Index grows colder.

If the Wind Chill Index drops below minus 30 degrees, serious consideration should be given to rescheduling the training evolution.

### **Hydration:**

Research has shown that hydration status clearly affects performance during training evolutions. Therefore, the MFA will implement this policy to protect students and instructors during all exercises or tests that are physically demanding. This policy presents the recommended hydration guidelines for participants prior to, during, and after the completion of strenuous practical training evolutions in order to maintain proper hydration and prevent dehydration. This policy will apply to all training exercises and all certification test sites.

The instructor shall encourage the students to follow these hydration guidelines for all strenuous practical evolutions and other situations that may result in dehydration. While hydration is a personal responsibility, it is the responsibility of the instructors to monitor participants for the signs and symptoms of dehydration such as muscle weakness, dizziness, disorientation, hypotension, tachycardia and lack of sweating. The presence of these signs and symptoms constitutes a true medical emergency. The instructor should remove any individual exhibiting these signs and symptoms from the training environment and seek emergency medical support immediately. Additionally, the instructor should be alert to environmental conditions that may exacerbate dehydration.

**Pre-Hydration:** The goal of pre-hydrating is to start the training session **euhydrated** (properly hydrated) and with normal plasma electrolyte levels. Pre-hydrating should begin at least several hours before the training session to enable fluid absorption and allow urine output to maintain normal levels. Prior to the training session, students should slowly drink one ounce of water for every ten pounds of body weight at least four hours before the training session. If the student does not produce urine, or if the urine is dark or highly concentrated, the student should slowly drink an additional one ounce of water for every 20 pounds of body weight about two hours before the training session. Do not substitute beverages with alcohol or caffeine for water. Caffeine and alcohol act as diuretics and can exacerbate dehydration. Students should not attempt to hyperhydrate prior to a training session as it has been shown to provide no clear physiologic or performance advantage and can increase the risk of **hyponatremia**, a potentially lethal condition.

**Preventing Dehydration:** The goal of drinking during the training session is to prevent excessive dehydration and excessive changes in electrolyte balance. The specific amount and rate of fluid replacement is highly variable depending on individual sweat rate, session intensity and duration, and environmental conditions. Ideally, students should create a customized fluid replacement plan based on pre and post training session weight with the goal to prevent loss of more than 2% of baseline body weight during activity. In the absence of an individualized fluid replacement plan, students should drink water slowly and continuously during the breaks provided during the training session. Electrolyte replacement beverages may be beneficial in the most extreme training conditions, but the primary goal should be volume replacement, which is best accomplished with water.

Students should continue fluid replacement even if they do not feel thirsty. By the time thirst is detected, the student is already dehydrated which results in decreased performance and increased health and safety risk.

**Rehydration:** The goal of rehydration is to fully replace any fluid and electrolyte deficit. Individuals should drink 20 ounces of fluid for every pound of body weight lost during the training session. If the total body weight lost during training is unknown, students should drink water slowly and continuously until urine is no longer dark or highly concentrated. Consuming beverages and snacks with sodium will help expedite rapid and complete recovery by stimulating thirst and fluid retention.



**TABLE A**

<b><u>HEAT STRESS INDEX</u></b>										
T E M P E R A T U R E  F		Relative Humidity								
		10%	20%	30%	40%	50%	60%	70%	80%	90%
	104	98	104	110	120	132				
	102	97	101	108	117	125				
	100	95	99	105	110	120	132			
	98	93	97	101	106	110	125			
	96	91	95	98	104	108	120	128		
	94	89	93	95	100	105	111	122		
	92	87	90	92	96	100	106	115	122	
	90	85	88	90	92	96	100	106	114	122
	88	82	86	87	89	93	95	100	106	115
	86	80	84	85	87	90	92	96	100	109
	84	78	81	83	85	86	89	91	95	99
	82	77	79	80	81	84	86	89	91	95
	80	75	77	78	79	81	83	85	86	89
	78	72	75	77	78	79	80	81	83	85
	76	70	72	75	76	77	77	77	78	79
	74	68	70	73	74	75	75	75	76	77

Note: Add 10F when protective clothing is worn and add 10F when in direct sunlight.

Humidity Index F	Danger Category	Injury or Threat
Below 60 F	None	Little or no danger under normal circumstances
80 – 90 F	Caution	Fatigue possible if exposure is prolonged and there is physical activity
90 – 105 F	Extreme Caution	Heat cramps and heat exhaustion possible if exposure is prolonged and there is physical activity
105 – 130 F	Danger	Heat cramps or exhaustion likely, heat stroke possible if exposure is prolonged and there is physical activity
Above 130 F	Extreme Danger	Heat Stroke Imminent!!

**TABLE B**

<b><u>WIND CHILL INDEX</u></b>														
		Temperature Degrees Fahrenheit												
		45	40	35	30	25	20	15	10	5	0	-5	-10	-15
W	5	43	37	32	27	22	16	11	6	0	-5	-10	-15	-21
I	10	34	28	22	16	10	3	-3	-9	-15	-22	-27	-34	-40
N	15	29	23	16	9	2	-5	-11	-18	-25	-31	-38	-45	-51
D	20	26	19	12	4	-3	-10	-17	-24	-31	-39	-46	-53	-60
S	25	23	16	8	1	-7	-15	-22	-29	-36	-44	-51	-59	-66
P	30	21	13	6	-2	-10	-18	-25	-33	-41	-49	-56	-64	-71
E	35	20	12	4	-4	-12	-20	-27	-35	-43	-52	-58	-67	-75
E	40	19	11	3	-5	-13	-21	-29	-37	-45	-53	-60	-69	-76
D	45	18	10	2	-6	-14	-22	-30	-38	-46	-54	-62	-70	-78

Wind Chill Temperature °F		Danger
A	Above -25 F	Little danger for properly clothed personnel
B	-25F / -75F	Danger, flesh may freeze
C	Below -75F	Flesh may freeze in 30 seconds



**TABLE C**

**MEDICAL ASSESSMENT CRITERIA**

**MENTAL STATUS:**

- Alert and oriented on arrival at rehab

**If any alteration in mental status – Provide Immediate Transport**

**HEART RATE:**

- < 110 BPM = Within normal limits
- > 110 BPM = Close monitoring required by medical personnel

**Normal = < 100 BPM five minutes after arrival in Rehab**

**SKIN CONDITION:**

- May be somewhat flushed on arrival. Should be improved five minutes after arrival in Rehab.
- If skin remains flushed or is unusually dry, monitor patient for signs of heat stress/stroke.

**BLOOD PRESSURE:**

- Systolic Pressure < 150 and Diastolic Pressure < 100
- Systolic Pressure > 150 and Diastolic Pressure  $\geq$  100 = Close monitoring by medical personnel

**Normal: Systolic Pressure < 140 and Diastolic Pressure < 90 five minutes after arrival in Rehab**

**Abnormal: Systolic Pressure > 140 or Diastolic > 90 after 15 minutes in Rehab – Consider Transport**

**RESPIRATIONS:**

- < 26 = Within normal limits
- < 20 = Five minutes after arrival in Rehab

**Abnormal:  $\geq$  26 after 5 minutes in Rehab**

**TABLE D**

**MASSACHUSETTS FIREFIGHTING ACADEMY**

**Level II Rehabilitation Report**

Program \_\_\_\_\_ Coordinator/Lead Instructor \_\_\_\_\_  
Training Location \_\_\_\_\_ Date \_\_\_\_\_  
EMS Officer \_\_\_\_\_ Assistants \_\_\_\_\_

Name Student #	Time In/Out	# SCBA Cylinders	Exam Period	BP	Pulse	Resp	Temp	Skin	Trans. Y / N
			INITIAL						
			10 Min.						
			20 Min.						
			30 Min.						
			INITIAL						
			10 Min.						
			20 Min.						
			30 Min.						
			INITIAL						
			10 Min.						
			20 Min.						
			30 Min.						
			INITIAL						
			10 Min.						
			20 Min.						
			30 Min.						
			INITIAL						
			10 Min.						
			20 Min.						
			30 Min.						

Submitted By:

Name: \_\_\_\_\_

Signature: \_\_\_\_\_



**References:**

Maryland Fire and Rescue Institute, *Hydration Policy*

Mutual Aid Box Alarm System (MABAS), Division XII, *Rehabilitation Policy* (2007)

NFPA 1403, *Standard on Live Fire Training Evolutions* (2007 ed.)

NFPA 1584, *Recommended Practice on the Rehabilitation of Members Operating at Incident Scene Operations and Training Exercises* (2003 ed.)

New York State Academy of Fire Science, *EMS Care and Firefighter Rehab During Training Evolutions and Documentation of Injuries* (2005)

**Prepared by:**

Bruce D. Gauvin  
Recruit Program Coordinator  
Massachusetts Firefighting Academy

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