

HALIFAX FIRE DEPARTMENT R&R ARTICLE 21	HOT WEATHER OPERATIONS GUILDLINES
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Purpose

This policy provides a method of action to guide firefighting personnel in the provision of appropriate rehabilitation methods. Its purpose is to ensure that the physical and mental condition of firefighters operating at any incident does not deteriorate to a level that affects the safety or well-being of each participant. It further serves to provide the participants of firefighter activities with the opportunity for the following:

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

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.

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, incident commanders 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 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.

Hydration

Research has shown that hydration status clearly affects performance during physical activity. Therefore, this policy is to protect firefighters during all activities that are physically demanding. This policy presents the recommended hydration guidelines for participants prior to, during, and after the completion of strenuous physical activities in order to maintain proper hydration and prevent dehydration.

The incident commander shall encourage firefighters to follow these hydration guidelines for all physical activities and other situations that may result in dehydration.

While hydration is a personal responsibility, it is the responsibility of the incident commander 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 incident commander should remove any individual exhibiting these signs and symptoms from the operation and seek emergency medical support immediately. Additionally, the incident commander should be alert to environmental conditions that may exacerbate dehydration.

Pre-Hydration: The goal of pre-hydrating is to start the work day **euhydrated** (properly hydrated) and with normal plasma electrolyte levels. Pre-hydrating should begin at least several hours before the work day to enable fluid absorption and allow urine output to maintain normal levels. Prior to strenuous activity, firefighters should slowly drink one ounce of water for every ten pounds of body weight at least four hours before the work day. The student should slowly drink an additional one ounce of water for every 20 pounds of body weight about two hours before strenuous activity. Do not substitute beverages with alcohol or caffeine for water. Caffeine and alcohol act as diuretics and can exacerbate dehydration. Firefighters should not attempt to hyperhydrate prior to an incident 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 incident 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, firefighters should create a customized fluid replacement plan based on pre and post incident 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 activity. If the total body weight lost during activity is unknown, firefighters should drink 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

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

TABLE B

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 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