

MAINE ASSOCIATION FOR SEARCH AND RESCUE

Search Team Member Certification Standard **Appendix A**

Aerobic Fitness Evaluation

I. Introduction

- A. General good health and physical fitness is necessary for a participant in search and rescue in the State of Maine. Although there are several factors which determine an individual's overall physical condition, MASAR considers the measurement of aerobic fitness the most important indicator of an individual's suitability to be a Search Team Member.
- B. As part of an individual's certification as a Search Team Member, therefore, MASAR requires proof that the individual has achieved a minimum level of aerobic conditioning.
- C. The indicator of this minimum level is a predicted VO₂ max that falls in or above the Moderate range for that person's age and gender. This level may be predicted using one of the tests outlined below or by an equivalent test provided by the unit or its designated representative.

II. Tests for Measurement of Aerobic Fitness

- A. Three tests are included for use by units to evaluate their members' aerobic fitness:
 - 1. 1-1/2 Mile Run¹
 - 2. 1 Mile Rockport Walk Test²
 - 3. U.S. Forest Service "Field Test" for Moderate Duty³
- B. Any one of these tests may be used for evaluating a person's aerobic fitness. The test used should be noted on the test form along with the individual's predicted VO₂ level (if calculated) and whether that person passed or failed the test.
- C. A unit may use an alternative test as long as it provides an equivalent measurement of an individual's predicted VO₂ level. However, alternate tests will be considered, in advance by the MASAR Standards Committee.

¹ The Aerobics Program for Total Well Being, by Kenneth H. Cooper, M.D. Copyright 1982, by Kenneth H. Cooper <http://canmedia.mcgrawhill.ca/college/olcsupport/inse/1ce/AdditionalBoxes/CH06_The%201.5-Mile%20Run-Walk%20Test.pdf>

² "Estimation of VO₂ max from a One-Mile Track Walk, Gender, Age, and Body Weight", Medicine and Science in Sports and Exercise, Volume 19, No. 3, Kline, Porcari, Hintermeister, Freedson, Ward, McCarron, Ross, and Rippe, 1987

³ NWCG PMS-307 - Work Capacity Test Administrator's Guide, 2003

- D. None of the tests in this standard may be performed on a treadmill, or by using other exercise equipment.

III. **Recommended Minimum Aerobic Fitness Test Conditions**

- A. It is the unit's responsibility to both ensure that a test is administered properly and that individuals to be tested are physically prepared for the test.
- B. The test subject should have a medical examination and/or a doctor's approval before testing.
- C. In order to assure accuracy and standardization, a test administrator shall conduct all tests.
- D. When possible, an emergency medical technician (EMT) should be present during testing. If an EMT is not available, the test administrator must be currently certified in CPR.
- E. Each subject should be screened before testing and should be questioned to determine his or her work capacity and general state of health, including any history of chest pain, shortness of breath, and/or drug usage. No individual should be tested who reports circulatory, heart or respiratory problems, hypertension, acute infectious disease, fever, or other problems that require medical attention.
- F. Testing may be deferred if an individual is under medical attention which would influence such testing. Neuromuscular or skeletal disorders, such as bad knees, do not automatically preclude testing, however. A case-by-case evaluation shall be done by the test administrator.
- G. All tests should take place in reasonable weather. These tests are intended to get an accurate picture of a subject's health and fitness, not to jeopardize him or her by testing in excessive heat, cold, wind, or humidity.
- H. Tests should not be conducted if the actual course temperature is below 32 degrees, or above 90 degrees, Fahrenheit.

IV. **Aerobic Fitness Tests**

- A. 1.5 Mile Run/Walk
 - 1. Preparation
 - a. Inactive individuals should begin training for the test at least four to six weeks beforehand.
 - b. The individual taking the test shall wear comfortable and protective shoes or boots.
 - c. The individual taking the test shall wear comfortable clothing.
 - d. The course shall be smooth, level, and accurately measured.
 - e. The subject should be well rested before the test.
 - f. The subject should warm-up prior to the start of the test, including flexibility and stretching exercises.
 - 2. Procedures

- a. Before beginning, the test administrator shall prepare an "Aerobic Fitness Evaluation Form" for the subject. The subject's age and sex are required entries.
 - b. The test shall be administered by another individual; self-test results will not be accepted.
 - c. During the test the test administrator shall advise the subject of the distance covered and the time elapsed.
 - d. The test administrator shall count laps for each runner if on a lap course.
 - e. The test administrator shall call out the time when the subject finishes.
3. Evaluation
- a. The maximum times⁴ indicating an acceptable predicted VO₂ max, adjusted for age and gender, are:

AGE	WOMEN	MEN
20-29	14:07	11:58
30-39	14:34	12:25
40-49	15:24	13:11
50-59	17:13	14:16
60-69	18:52	15:56
70-79	20:11	17:47

B. 1 Mile Walk

1. Preparation
 - a. Inactive individuals should begin training for the test at least four to six weeks beforehand.
 - b. The individual taking the test shall wear comfortable and protective shoes or boots.
 - c. The individual taking the test shall wear comfortable clothing.
 - d. The course should be smooth, level, and accurately measured.
 - e. The subject should be well rested before the test.
 - f. The subject should warm-up prior to the test, including flexibility and stretching exercises.
2. Procedures
 - a. Before beginning, the test administrator shall prepare an "Aerobic Fitness Evaluation Form" for the subject. The subject's sex, age, and weight are required entries.
 - b. The subject should walk the course as fast as possible, but at a

⁴ *The Aerobics Program for Total Well Being*, by Kenneth H. Cooper, M.D. Copyright 1982 by Kenneth H. Cooper http://canmedia.mcgrawhill.ca/college/olcsupport/inse/1ce/AdditionalBoxes/CH06_The%201.5-Mile%20Run-Walk%20Test.pdf Revised per an email from the Cooper Institute dated 23 July 2019 (2019-07-23 0920 Proposed revisions to the fitness standard)

- steady pace. No jogging or running is allowed.
- c. During the walk, the test administrator shall inform the subject of the distance covered.
 - d. The test administrator should call out the time when the subject finishes.
 - e. The test administrator shall measure the test subject's heart rate immediately upon completion of the course.
3. Evaluation
- a. Based on the data from the test, the test subject's predicted VO₂ max shall be calculated:
 - i. By formula⁵:

$$\text{VO}_2 \text{ max (mL/kg/min)} = 132.853 - (0.0769 \times \mathbf{W}) - (0.3877 \times \mathbf{A}) + (6.315 \times \mathbf{S}) - (3.2649 \times \mathbf{T}) - (0.1565 \times \mathbf{R})$$
 where:
 \mathbf{W} = weight in pounds
 \mathbf{A} = age in years
 \mathbf{S} = 1 for males; 0 for females
 \mathbf{T} = walk time in minutes
 \mathbf{R} = heart rate in beats per minute
 - ii. Using any Rockport 1-Mile Walk Test calculator found on-line.
 - b. The minimum acceptable predicted VO₂ max values for the male and female Moderate Fitness Level Classes⁶ are listed below:

<u>AGE</u>	<u>WOMEN</u>	<u>MEN</u>
20-24	37	44
25-29	36	43
30-34	34	41
35-39	32	39
40-44	30	36
45-49	28	35
50-54	26	33
55-59	24	31
60-65	19	29

C. U.S. Forest Service "Field Test"

1. Applicability

- a. The Field Test is a work capacity test used by the US Forest Service to qualify an individual for moderate firefighting duty.

⁵ "The 1-Mile Walk Test is a Valid Predictor of VO₂ max and is a Reliable Alternative Fitness Test to the 1.5-Mile Run in U.S. Air Force Males", Weiglein, Herrick, Kirk, and Kirk, Military Medicine, 176, 6:669, 2011

⁶ Polar M450 Fitness Manual, 2016

< https://support.polar.com/e_manuals/M450/Polar_M450_user_manual_English/manual.pdf >

Minimum values only are shown.

- b. This level of duty roughly corresponds to the anticipated work load for a Search Team Member in Maine.
2. Preparation
- a. Inactive individuals should begin training for the test at least four to six weeks beforehand.
 - b. The subject shall wear comfortable shoes or boots.
 - c. The subject shall wear comfortable clothing.
 - d. The subject shall bring his or her own pack, or the test administrator shall provide one, with a gross weight of 25 pounds.
 - e. The course shall be 2 miles long, smooth, level, and accurately measured.
 - f. Before beginning, the test administrator shall prepare an "Aerobic Fitness Evaluation Form" for the subject. The pack weight and name of the person who weighed the pack are required entries.
 - g. The subject should warm-up prior to the test, including flexibility and stretching exercises.
3. Procedures
- a. The pack must be weighed by the test administrator before the test.
 - b. The subject shall walk the course. No jogging or running is allowed.
 - c. The test administrator shall call out the time as the subject finishes.
 - d. The test is Pass/Fail only.
 - e. The pack shall be weighed by the test administrator when the test has been completed.
4. Evaluation
- a. To pass, the subject must complete the course in 30 minutes or less, while wearing a 25-pound pack.