NFPA®

1583

Standard on Health-Related Fitness Programs for Fire Department Members

2022

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2022 Edition

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NFPA® 1583

Standard on

Health-Related Fitness Programs for Fire Department Members

2022 Edition

This edition of NFPA 1583, *Standard on Health-Related Fitness Programs for Fire Department Members*, was prepared by the Technical Committee on Fire Service Occupational Safety. It was issued by the Standards Council on March 18, 2021, with an effective date of April 8, 2021, and supersedes all previous editions.

This edition of NFPA 1583 was approved as an American National Standard on April 8, 2021.

Origin and Development of NFPA 1583

The initial edition of NFPA 1500, *Standard on Fire Department Occupational Safety and Health Program*, contained language requiring that the fire department develop a physical fitness program for its members. In the early 1990s, the technical committee responsible for NFPA 1500 began the development of a specific document to support that requirement. A recommended practice was prepared by the committee and processed through the standards system but never issued.

In June 1997, a new Technical Committee on Fire Service Occupational Medical and Health revived the project, but with a new focus. That focus was to provide a fire fighter with a comprehensive document focused on maintaining a healthy lifestyle, with a fitness component. The first edition was issued in 2000 as NFPA 1583, *Standard on Health-Related Fitness Programs for Fire Fighters*.

The multiple stress factors and rigors of their profession require fire fighters to be medically and physically fit in order to perform required tasks. The committee considers this standard to be a companion document to NFPA 1582, *Standard on Comprehensive Occupational Medical Program for Fire Departments*, and a tool to be used in conjunction with the Joint Labor Management Wellness-Fitness Initiative, developed by the International Association of Fire Fighters (IAFF) and the International Association of Fire Chiefs (IAFC).

The 2008 edition of the document was updated to reflect current practices in health-related fitness programs for fire department members and to editorially conform to the *Manual of Style for NFPA Technical Committee Documents*. The title was being changed to *Standard on Health-Related Fitness Programs for Fire Department Members*.

The revisions introduced the concept that, while a health and fitness program should require mandatory participation, it should be nonpunitive. The section on peer fitness trainers was expanded to include requirements for their qualifications and responsibilities. The relationship between the health and fitness coordinator (HFC) and the fire department physician was clarified.

A requirement was added that the health and fitness coordinator design an individualized exercise and fitness training program for a member returning to full duty from a debilitating injury, illness, or any other extended leave.

Annex materials were reorganized to focus on the fire department providing an adequate facility rather than a prescriptive list of equipment. Included were a suggestion that the HFC have a background in functional anatomy, exercise physiology, exercise testing and prescription, exercise supervision, and leadership rather than a long list of qualifications, and a self-assessment tool for use by members to monitor their individual fitness levels.

For the 2015 edition, the committee updated several requirements to reflect changes in accepted practices in the health-related fitness programs currently being used. Some changes involved cardiovascular risk reduction, nutritional requirements, and inclusion of the fire department physician as part of the health and fitness consultation. The committee also added the reference to the IAFF/IAFC/ACE Peer Fitness Trainer certification in order to provide the end users of this

document with a nationally established certification that can be used by fire departments to establish a minimum certification for fitness trainers.

The 2022 edition features improved alignment with the *Fire Service Joint Labor Management Wellness-Fitness Initiative (WFI)*. In addition, it includes updated and expanded responsibilities for both peer fitness trainers and health and fitness coordinators. To better evaluate the effectiveness of the health-related fitness program, the program data collection requirements have been expanded.

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Committee Scope: This Committee shall have primary responsibility for documents on occupational safety and incident command in the working environment of the fire service, not including hazardous materials or cross functional events. The committee shall also have responsibility for documents related to medical requirements for firefighters, and the professional qualifications for fire department safety officer. It shall coordinate its work with NFPA technical committees dealing with emergency responder safety and wellness.

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Standard on

Health-Related Fitness Programs for Fire Department Members

2022 Edition

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A reference in brackets [ ] following a section or paragraph indicates material that has been extracted from another NFPA document. Extracted text may be edited for consistency and style and may include the revision of internal paragraph references and other references as appropriate. Requests for interpretations or revisions of extracted text shall be sent to the technical committee responsible for the source document.

Information on referenced and extracted publications can be found in Chapter 2 and Annex D.

Chapter 1 Administration

1.1* Scope. This standard establishes the minimum requirements for the development, implementation, and management of a health-related fitness program (HRFP) for members of the fire department involved in emergency operations.

1.2 Purpose.

1.2.1 The purpose of this standard is to provide the minimum requirements for a health-related fitness program for fire department members that enhances the members' ability to perform occupational activities efficiently and safely and reduces the risk of injury, disease, and premature death.

1.2.2* This document is intended to help fire departments develop a health-related fitness program for fire department members that requires mandatory participation but is nonpunitive.

1.2.3 This document is not intended to establish physical performance criteria.

1.3 Application.

1.3.1 The requirements of this standard apply to organizations providing rescue, fire suppression, emergency medical services, hazardous materials mitigation, special operations, and other emergency services, including public, military, private, and industrial fire departments.

1.3.2 This standard does not apply to industrial fire brigades that might also be known as emergency brigades, emergency response teams, fire teams, plant emergency organizations, or mine emergency response teams.

Chapter 2 Referenced Publications

2.1 General. The documents or portions thereof listed in this chapter are referenced within this standard and shall be considered part of the requirements of this document.

2.2 NFPA Publications. National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471.

NFPA 1500™, *Standard on Fire Department Occupational Safety, Health, and Wellness Program,* 2021 edition.

NFPA 1582, *Standard on Comprehensive Occupational Medical Program for Fire Departments,* 2022 edition.

2.3 Other Publications.

Merriam-Webster's Collegiate Dictionary, 11th edition, Merriam-Webster, Inc., Springfield, MA, 2003.

Δ 2.4 References for Extracts in Mandatory Sections.

NFPA 600, *Standard on Facility Fire Brigades,* 2020 edition.

NFPA 1451, *Standard for a Fire and Emergency Service Vehicle Operations Training Program,* 2018 edition.

NFPA 1500™, *Standard on Fire Department Occupational Safety, Health, and Wellness Program,* 2021 edition.

NFPA 1561, *Standard on Emergency Services Incident Management System and Command Safety,* 2020 edition.

NFPA 1582, *Standard on Comprehensive Occupational Medical Program for Fire Departments,* 2022 edition.

Chapter 3 Definitions

3.1 General. The definitions contained in this chapter shall apply to the terms used in this standard. Where terms are not defined in this chapter or within another chapter, they shall be defined using their ordinarily accepted meanings within the context in which they are used. *Merriam-Webster's Collegiate Dictionary,* 11th edition, shall be the source for the ordinarily accepted meaning.

3.2 NFPA Official Definitions.

3.2.1* Approved. Acceptable to the authority having jurisdiction.

3.2.2* Authority Having Jurisdiction (AHJ). An organization, office, or individual responsible for enforcing the requirements of a code or standard, or for approving equipment, materials, an installation, or a procedure.

3.2.3 Shall. Indicates a mandatory requirement.

3.2.4 Should. Indicates a recommendation or that which is advised but not required.

N **3.2.5 Standard.** An NFPA Standard, the main text of which contains only mandatory provisions using the word "shall" to indicate requirements and that is in a form generally suitable for mandatory reference by another standard or code or for adoption into law. Non-mandatory provisions are not to be considered a part of the requirements of a standard and shall be located in an appendix, annex, footnote, informational note, or other means as permitted in the NFPA Manuals of Style. When used in a generic sense, such as in the phrase "standards development process" or "standards development activities," the term "standards" includes all NFPA Standards, including Codes, Standards, Recommended Practices, and Guides.

3.3 General Definitions.

3.3.1 Debilitating Illness or Injury. A condition that temporarily or permanently prevents a member of the fire department from engaging in normal duties and activities as a result of illness or injury. [**1500,** 2021]

3.3.2 Emergency Operations. Activities of the fire department relating to rescue, fire suppression, emergency medical care, and special operations, including response to the scene of the incident and all functions performed at the scene. **[1500,** 2021]

Δ **3.3.3 Facility Fire Brigade.** An organized group of employees at a facility who are knowledgeable, trained, and skilled in at least basic fire-fighting operations, and whose full-time occupation might be the provision of fire suppression and related activities for their employer. [**600,** 2020]

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3.3.4* Fire Department. An organization providing rescue, fire suppression, emergency medical care, special operations, and related services.

3.3.5 Fire Department Member. See 3.3.16, Member.

3.3.6 Fire Department Physician. A licensed doctor of medicine or osteopathy who has been designated by the fire department to provide professional expertise in the areas of occupational safety and health as they relate to emergency services. [**1582,** 2022]

3.3.7* Fire Suppression. The activities involved in controlling and extinguishing fires. [**1500,** 2021]

3.3.8* Hazard. A condition that presents the potential for harm or damage to people, property, or the environment.

3.3.9 Health and Fitness Coordinator. The person who, under the supervision of the fire department physician, has been designated by the department to coordinate and be responsible for the health and fitness programs of the department. [**1500,** 2021]

3.3.10* Health and Safety Officer. The member of the fire department assigned and authorized by the fire chief as the manager of the safety, health, and wellness program. [**1500,** 2021]

3.3.11 Health Promotion. Preventive activities that identify real and potential health risks in the work environment and that inform, motivate, and otherwise help people to adopt and maintain healthy practices and lifestyles.

3.3.12* Health-Related Fitness Program (HRFP). A comprehensive program designed to promote the member's capacity to perform occupational activities and to reduce or eliminate injuries and premature death.

3.3.13 Infectious Disease. An illness or disease resulting from invasion of a host by disease-producing organisms such as bacteria, viruses, fungi, or parasites. [**1500,** 2021]

3.3.14 Medical Evaluation. The analysis of information for the purpose of making a determination of medical certification. Medical evaluation includes a medical examination. [**1582,** 2022]

3.3.15 Medical Examination. An examination performed or directed by the fire department physician. [**1582,** 2022]

3.3.16* Member. A person involved in performing the duties and responsibilities of a fire department under the auspices of the organization. [**1500,** 2021]

3.3.17 Member Assistance Program (MAP). A generic term used to describe the various methods used in the fire department for the control of alcohol and other substance abuse, stress, and personal problems that adversely affect member performance. [**1500,** 2021]

3.3.18* Morbidity. The state of being diseased.

3.3.19 Occupational Injury. An injury sustained during the performance of the duties, responsibilities, and functions of a fire department member. [**1500,** 2021]

N **3.3.20 Peer Fitness Trainer (PFT).** A member with the background knowledge and practical expertise to share wellness- and fitness-related information with department members.

3.3.21 Procedure. An organizational directive issued by the authority having jurisdiction or by the department that establishes a specific policy that must be followed. [**1561,** 2020]

3.3.22 Punitive. Inflicting or aiming to inflict punishment or sanctions.

3.3.23 Qualified Person. A person who, by possession of a recognized degree, certificate, professional standing, or skill, and who, by knowledge, training, and experience, has demonstrated the ability to deal with problems related to the subject matter, the work, or the project. [**1451,** 2018]

3.3.24 Risk. A measure of the probability and severity of adverse effects that result from exposure to a hazard. [**1451,** 2018]

3.3.25* Standard Operating Procedure. A written organizational directive that establishes or prescribes specific operational or administrative methods to be followed routinely for the performance of designated operations or actions.

Chapter 4 Organization

4.1 Program Overview.

4.1.1* The fire department shall establish and provide a health-related fitness program (HRFP) that enables members to develop and maintain a level of health and fitness to safely perform their assigned functions.

4.1.2 The fire chief shall have the ultimate responsibility for the fire departments health-related fitness program as required by NFPA 1500.

4.1.3 When this standard is adopted by a jurisdiction, the authority having jurisdiction shall set a date or dates for achieving compliance with the requirements of this standard and

shall be permitted to establish a phase-in schedule for compliance with specific requirements of this standard.

4.1.4 Nothing in this standard shall restrict any jurisdiction from exceeding the requirements set forth herein.

4.1.5 The fire department shall incorporate the requirements of this standard in its risk management plan.

4.2 Program Components. The health-related fitness program shall include the following components:

(1) Assignment of a qualified health and fitness coordinator
(2) Annual fitness assessment for all members
(3) Exercise training program that is available to all members
(4) Education and counseling regarding health promotion for all members
(5) Process for collecting and maintaining health-related fitness program data

4.3 Roles and Responsibilities.

4.3.1 Each member of the fire department shall cooperate with, participate in, and comply with the provisions of the health-related fitness program.

4.3.2 The fire department shall require the structured participation of all members in the health-related fitness program.

4.4 Logistics.

4.4.1 The fire department shall be responsible for providing the opportunity and means for implementation of the health-related fitness program.

4.4.2* The fire department shall provide the opportunity and means for regular exercise training.

4.4.2.1* Fire departments with assigned work shifts shall allow members to participate during scheduled work times.

4.4.2.2 Fire departments without assigned work shifts shall provide members with the opportunity to participate at times that do not conflict with other commitments.

4.5 Program Referrals.

4.5.1 The fire department shall be responsible for providing educational resources and professional referrals as needed.

4.5.2 The fire department shall be financially responsible for fees associated with referrals only to the extent departmental policy, procedures, standard guidelines, or statutory obligations dictate.

Chapter 5 Health and Fitness Coordinator and Peer Fitness Trainers

5.1 Assignment.

5.1.1 The fire chief shall appoint a health and fitness coordinator (HFC).

5.1.2* The health and fitness coordinator shall be either a member of the fire department or a qualified outside agent.

5.1.3* The health and fitness coordinator shall have access to the fire department physician and other subject matter experts for consultation.

5.1.4 The health and fitness coordinator shall be the administrator of all components of the health-related fitness program.

5.1.5* The health and fitness coordinator shall act as a direct liaison between the fire department physician or other subject matter expert and the fire department.

5.1.6* The health and fitness coordinator shall act as a direct liaison to the fire department's health and safety officer.

5.2* Qualifications for Health and Fitness Coordinator.

5.2.1* The health and fitness coordinator shall have access to appropriate educational materials and formal certification from a professional organization, relevant educational experience, appropriate academic degrees, completion of course work relevant to the program components, or attendance at workshops related to health and fitness.

5.2.2 The health and fitness coordinator shall maintain the continuing education requirements dictated by the coordinator's certifying body or as described in the fire department's job description, whichever sets forth the higher standard.

5.3 Peer Fitness Trainers.

5.3.1 Peer fitness trainers shall work under the direction of the health and fitness coordinator to oversee safe participation in health-related fitness programs.

5.3.2 Peer fitness trainers shall implement and oversee fitness programs for academy recruits as directed by the department health and fitness coordinator.

5.3.3* Peer fitness trainers shall have the level of training and certification required by the fire department and shall maintain their recertification requirements as prescribed by the certifying organization.

Chapter 6 Fitness Assessment

6.1 General.

6.1.1 All members shall participate in an annual fitness assessment under supervision of the fire department health and fitness coordinator.

6.1.1.1 Members shall discuss any physical limitations or concerns regarding the annual fitness assessment with the health and fitness coordinator or their peer fitness trainer prior to participation.

Δ **6.1.1.2** Any medical condition that can limit a member's ability to safely participate in the annual fitness assessment should be addressed by the fire department physician or the member's treating physician, as appropriate.

6.1.1.3 The member's medical confidentiality shall be respected by the health and fitness coordinator and their peer fitness trainer.

6.1.2 The fitness assessment shall be conducted at least annually.

6.2 Fitness Assessment.

6.2.1 All members shall be cleared annually for participation in the fitness assessment by the fire department physician as directed by NFPA 1582.

6.2.2* If a member has an acute medical problem or a newly acquired chronic medical condition, the fitness assessment

shall be postponed until that person has recovered from this condition and is cleared as required by 6.2.1.

6.3 Pre-assessment Questionnaire. All members shall complete a pre-assessment questionnaire that seeks to identify contraindications for participation in the fitness assessment and department exercise training program.

Δ **6.4* Fitness Assessment Components.** The annual fitness assessments shall consist of the following components:

(1) Body composition
(2) Aerobic capacity
(3) Speed and power
(4) Muscular strength
(5) Muscular endurance
(6) Mobility and flexibility

Chapter 7 Exercise and Fitness Training Program

Δ **7.1* Program Components.** The fire department's exercise and fitness training program, administered by the department health and fitness coordinator and their peer fitness trainer, shall consist of the following components at a minimum:

(1) Educational program that describes the components and the benefits of exercise on performance and health
(2) Individualized exercise programming based on the results of the fitness assessment
(3) Warm-up and cool-down exercise guidelines
(4) Metabolic conditioning program to include aerobic and anaerobic fitness
(5) Muscular resistance (strength, endurance) exercise programming
(6) Flexibility and mobility program
(7) Injury prevention program with focus on the back, knees, and shoulders

7.2 Program Participation.

7.2.1 The fire department physician shall clear all members for participation in the exercise and fitness training program as directed by NFPA 1582.

Δ **7.2.2** After a member returns to full duty from a debilitating injury, illness, or any other extended leave, a peer fitness trainer or the health and fitness coordinator shall design an individualized exercise program under direction of the department physician or other attending health care professional.

N **7.2.3** A peer fitness trainer or health and fitness coordinator shall design an individualized exercise and fitness training program, under direction of the department physician or other attending health care professional, to maintain the member's fitness while on restricted duty.

Chapter 8 Health Promotion Education

8.1* General Requirements. The fire department shall provide health promotion education as an integral part of the health-related fitness program.

8.1.1* The fire department shall provide for the education of members regarding health risk reduction, cardiovascular risk reduction, general health maintenance, fitness, nutrition, sleep, and the prevention of occupational injuries, illnesses, accidents, or fatalities.

8.1.2* The fire department, under the direction of the fire department physician and the health and fitness coordinator, shall provide education regarding all of the topics in 8.1.1.

8.1.3 Materials on the matters in 8.1.1 shall be made available to all members on an ongoing basis, with resource materials updated annually to ensure current information.

8.1.4 The fire department shall provide education and guidance regarding access to the department's member assistance program (MAP) as required by NFPA 1500.

8.1.5 The fire department shall encourage all members to obtain ongoing health care from their primary care providers.

Chapter 9 Data Collection

9.1* General. A confidential health and fitness program file shall be established and maintained for each member.

9.2 Statistical Summary. Group statistical data shall be permitted to be used for administrative purposes as long as it is coded so as not to reveal any member's personal information.

9.3* Data Collected. The individual health-related fitness program file shall record the following:

(1) Demographic information
(2) Pre-assessment questionnaire
(3) Fitness assessment
(4) Program participation rates
(5) Member satisfaction
(6) Compensation costs
(7) Injury rates
(8) Injury cost

Annex A Explanatory Material

Annex A is not a part of the requirements of this NFPA document but is included for informational purposes only. This annex contains explanatory material, numbered to correspond with the applicable text paragraphs.

A.1.1 Although this standard is intended primarily for members involved in emergency operations, fire departments are encouraged to apply the components of the health-related fitness program to all employees.

A.1.2.2 The intent of this program is to promote health and fitness in a "mandatory, nonpunitive" manner. "Mandatory, nonpunitive" implies a program with universal participation; however, failure to achieve defined or individual fitness objectives should not be the basis for any employment sanctions, discipline, or other punitive actions.

A.3.2.1 Approved. The National Fire Protection Association does not approve, inspect, or certify any installations, procedures, equipment, or materials; nor does it approve or evaluate testing laboratories. In determining the acceptability of installations, procedures, equipment, or materials, the authority having jurisdiction may base acceptance on compliance with NFPA or other appropriate standards. In the absence of such standards, said authority may require evidence of proper installation, procedure, or use. The authority having jurisdiction may also refer to the listings or labeling practices of an organization that is concerned with product evaluations and is thus in a position to determine compliance with appropriate standards for the current production of listed items.

A.3.2.2 Authority Having Jurisdiction (AHJ). The phrase "authority having jurisdiction," or its acronym AHJ, is used in NFPA documents in a broad manner, since jurisdictions and approval agencies vary, as do their responsibilities. Where public safety is primary, the authority having jurisdiction may be a federal, state, local, or other regional department or individual such as a fire chief; fire marshal; chief of a fire prevention bureau, labor department, or health department; building official; electrical inspector; or others having statutory authority. For insurance purposes, an insurance inspection department, rating bureau, or other insurance company representative may be the authority having jurisdiction. In many circumstances, the property owner or his or her designated agent assumes the role of the authority having jurisdiction; at government installations, the commanding officer or departmental official may be the authority having jurisdiction.

A.3.3.4 Fire Department. The term *fire department* includes any public, governmental, private, industrial, or military organization providing these services.

A.3.3.7 Fire Suppression. Fire suppression includes all activities performed at the scene of a fire incident or training exercise that expose fire department members to the dangers of heat, flame, smoke, and other products of combustion, explosion, or structural collapse. [**1500,** 2021]

A.3.3.8 Hazard. Hazards include the characteristics of facilities, equipment, systems, property, hardware, or other objects and the actions and inactions of people that create such hazards.

A.3.3.10 Health and Safety Officer. This individual can also be the incident safety officer or that role can be assigned to another individual as a separate function.

A.3.3.12 Health-Related Fitness Program (HRFP). The health-related fitness program includes fitness assessment, exercise training, and health promotion activities.

A.3.3.16 Member. A fire department member can be a full-time or part-time employee, can be a paid or unpaid volunteer, can occupy any position or rank within the fire department, and might or might not engage in emergency operations.

A.3.3.18 Morbidity. Morbidity refers to the number of sick persons or cases of disease in relationship to a specific population.

A.3.3.25 Standard Operating Procedure. The intent of standard operating procedures is to establish directives that must be followed. Standard operating guidelines allow flexibility in application.

Δ **A.4.1.1** The fire department needs to recognize that its members are its most valuable resource. The occupational safety and health program has provided direction on performing assigned functions in a safe manner. The health-related fitness program allows members to enhance and maintain their health and fitness throughout their tenure with the fire department. Education, one provision of a health-related fitness program, is a necessary component for improving health and fitness throughout the organization. The organization needs to provide the recognition and support to ensure the promotion and success of this program. Health and fitness are critical to maintaining the safety of every member.

Data suggest a positive correlation between the following:

(1) A proactive approach to health and fitness and a decrease in debilitating occupational injuries
(2) A reduction in workers' compensation claims and a decrease in acute and chronic health problems of firefighters

Combining a proactive health-related fitness program with an occupational safety and health program provides a fire department with the level of quality needed for its members.

The purpose of the health-related fitness program is consistent with the medical requirements and occupational safety and health standards, which is to improve the health fitness and overall well-being of firefighting personnel. Compliance with the standards of NFPA 1500 has demonstrated that, even in the fire service, benefits will ultimately be manifested in cost savings, decreased sick times, and reduced workers' compensation and disability expenses.

A commitment of time and financial resources is necessary to fulfill requirements of this standard. The fire department should afford individual firefighters the means, the facility, and the time, as part of their work-time function, to pursue the health-related goals. Data show that the initial investment of the fire service on behalf of its most valuable resource, the firefighter, will pay significant dividends in the future.

Δ **A.4.4.2** The fire department should provide an adequate facility to improve body mechanics, aerobic capacity, speed and power, muscular strength and endurance, and mobility and flexibility, where exercise equipment is centrally located. Such a facility can be developed from the following:

(1) Use of a gym in a commercial facility, high school, university, or other educational institution or private or governmental agency (e.g., military base)
(2) In-house facility equipped through purchased or donated exercise equipment, which can include equipment obtained from the following:
    (a) Made in local apprenticeship programs (e.g., welders or pipefitters)
    (b) Made at and donated by correctional or educational institutions
    (c) Donated by gyms or rehabilitation facilities
    (d) Purchased on a shared cost agreement with the governing city, based on a reduced industrial insurance cost for a fitness program

The fire department should maintain equipment owned or leased by the fire department.

A.4.4.2.1 The fire department should allocate time on duty for physical fitness training. Scheduling of this time can vary due to emergency calls, training, and other activities.

Δ **A.5.1.2** The fire department can choose to acquire the services of an outside agent to serve as the health and fitness coordinator. This health and fitness coordinator should meet or exceed the training and educational background listed in A.5.2.1. The fire department should ensure that such an outside agent is familiar with the unique stresses present on the fireground.

Appropriate outside agents can be found at local colleges or universities in the exercise science, kinesiology, physical fitness, or fire technology departments. The private sector can also provide qualified personnel to serve as health and fitness coordinators. Such sources include hospital-based fitness programs, medical facilities, or private companies that provide fitness assessment and wellness programs.

A.5.1.3 Examples of subject matter experts for consultation are exercise physiologists, athletic trainers, and representatives of university health and wellness programs and executive wellness programs.

A.5.1.5 The data generated through the health-related fitness program will illustrate the relationship between firefighter fitness and occupational safety and health. Nonidentifying data can be shared between departments to establish this relationship. The health and fitness coordinator should confer with the health and safety officer regarding health-related fitness policies and procedures, fitness safety, accident and injury prevention, health promotion, and injury rehabilitation.

A.5.1.6 Communication between the health and fitness coordinator and the department's health and safety officer will ensure that data collection and other requirements of the occupational safety and health program are maintained.

A.5.2 There are no broadly accepted educational standards for health and fitness personnel in the United States. While it would be an unrealistic and unattainable goal to require that all health and fitness coordinators have a baccalaureate or graduate degree in a related discipline, it is important to note the level of formal training such a degree connotes.

A.5.2.1 A number of professional organizations, including those listed in Table A.5.2.1, provide training and educational experiences as well as certification programs for interested persons. It is in the best interests of fire departments to avail themselves of these professional services as time and resources allow.

The health and fitness coordinator should have a background in functional anatomy, exercise physiology, biomechanics, movement observation and assessment, fitness testing, exercise programming, coaching, and leadership.

A.5.3.3 A minimal level of certification [IAFF/IAFC/ACE Peer Fitness Trainer (PFT)] can be obtained from American Council on Exercise (ACE) as recommended by the IAFF/IAFC *Wellness-Fitness Initiative*.

A.6.2.2 This requirement is consistent with NFPA 1582 regarding postponement of medical evaluation for acute medical problems.

Δ **A.6.4** The IAFF in conjunction with the IAFC has developed a *Wellness-Fitness Initiative* for the fire service. The initiative gives a department a template for developing a comprehensive fitness program. (Annex C provides a self-assessment tool for determining fitness levels.) The following examples are from the IAFF/IAFC *Wellness-Fitness Initiative* as well as other fitness assessment protocols, which vary in terms of ease of administration, safety, cost, and predictive value:

(1) Body composition, including the following:
   (a) Skinfold (various)
   (b) Circumference (various)
   (c) Bioimpedance (BIA)
   (d) Hydrostatic weighing
   (e) Body mass index
   (f) Waist-to-hip ratio

(2) Aerobic capacity, including the following:
   (a) 1 mile (1.6 km) walk
   (b) 1.5 mile (2.4 km) run/walk
   (c) 12-minute run
   (d) Step test (various)
   (e) Stepmill
   (f) Cycle ergometer (various)
   (g) Treadmill (various)

(3) Speed and power, including the following:
   (a) Vertical jump
   (b) Broad jump
   (c) Jump squat
   (d) Plyometric push-up
   (e) Plyometric pull-up
   (f) Medicine ball throw

(4) Muscular strength and endurance, including the following:
   (a) Squat (1 rep maximum, percent of body weight)
   (b) Bench press (1 rep maximum or percent of body weight)
   (c) Push-ups (maximum repetitions)
   (d) Inverted row (maximum repetitions)
   (e) Side plank (maximum time)

(5) Mobility and flexibility, including the following:
   (a) Weight bearing lunge (ankle mobility)
   (b) Straight leg raise (hip mobility)
   (c) Shoulder reach (shoulder mobility)

Δ **Table A.5.2.1 Professional Organizations Providing Training**

Organization	Training Program
American College of Sports Medicine (ACSM)	Personal Trainer, Health and Fitness Instructor, Exercise Specialist
American Council on Exercise (ACE)	Personal Trainer
International Association of Fire Fighters (IAFF)/ International Association of Fire Chiefs (IAFC)/ American Council on Exercise (ACE)	Peer Fitness Trainer (PFT)
National Strength and Conditioning Association (NSCA)	Certified Strength and Conditioning Specialist (CSCS), Certified Personal Trainer (CPT), or Tactical Strength and Conditioning (TSAC) Facilitator
National Academy of Sports Medicine (NASM)	Personal Trainer

A.7.1 Annex B provides further information about each component of the fire department's exercise and fitness training program to assist the health and fitness coordinator in setting up and administering such a program.

A.8.1 Health education is now the driving force of health promotion and disease prevention. In the fall of 1993, the

Centers for Disease Control (CDC) formally added "and Prevention" to its name. At that time the CDC director announced that prevention's time had come in America. Coincident with this, third-party payers had begun to recognize the value of education about prevention and began to reimburse for preventive services and risk-reduction counseling. Organizations that establish health care guidelines in this country, such as the US Preventive Services Task Force and American Academy of Family Physicians, unanimously agree that most clinical evaluation time for the average nonpregnant adult should be spent on counseling. It is in that spirit that this technical committee is promoting health education as a major part of the health-related fitness program.

A.8.1.1 It is understood that the number and type of available resources vary greatly between fire departments. Despite such differences, adequate low-cost resources are universally available to satisfy this standard.

The fire department is encouraged to use an opportunistic team approach in the dissemination of informational materials, fostering, for example, collaboration between the fire department physician, the health and safety officer, and the health and fitness coordinator. Information obtained from the physician could be complemented by that supplied by guest speakers at fire department meetings. The balance of information could be available in the form of pamphlet materials kept in an accessible display case at the firehouse. Most materials are available free of charge through public medical organizations, public health agencies, professional organizations such as the IAFF, NVFC, or IAFC, or private advocacy groups, or can be found on the Internet and downloaded free of charge.

A.8.1.2 Educational materials can be in print or electronic form and administered in a formal or informal manner on the following topics:

(1) Behavioral health, alcohol and substance abuse prevention, suicide prevention, PTSD
(2) Pap smears, annual gynecological exams, colonoscopies, mammograms, and prostate-specific antigen (PSA) tests
(3) Tobacco cessation programs
(4) Cancer risks, including skin cancer (the most common form of cancer), colon cancer, prostate cancer, breast cancer, and lung cancer
(5) Nutrition education, including lipids, weight management, diabetes, metabolic syndrome, and effects of obesity
(6) Hypertension
(7) Infectious diseases, including recommendations for the prevention of influenza, hepatitis, tetanus, pneumonia, tuberculosis, varicella (chicken pox), measles, and rubella, as well as immunization recommendations for given age groups
(8) Sexually transmitted diseases, including recommendations for prevention, diagnosis, and treatment of HIV, hepatitis, herpes, and chlamydia
(9) Cardiovascular risk reduction
(10) Sleep hygiene and fatigue management
(11) Self-care, including safe body mechanics and low back injury prevention

Δ **A.9.1** The primary purpose for maintaining a health-related fitness program file for each participant is to inform exercise programming decisions and facilitate annual comparisons with previous results. Comparison of new data to previous results will show an individual's progress in maintaining or improving their level of fitness. Consequently, from analysis and comparison of data, an individual's exercise program can be modified. In addition to measuring a participant's progress and providing information for modification of their exercise program, analysis of the organization's set of files, or database, will provide information about organizational progress in developing a health-related fitness program and the need for program modification. Along with providing valuable information about the success of the health-related fitness program, maintenance of the database and its subsequent analysis will provide evidence to justify the cost of the program.

Electronic data processing is often employed to facilitate management of such a database. BSDI has been recognized by the IAFF/IAFC *Wellness-Fitness Initiative* as the publisher of appropriate software for documenting health-related fitness information.

Δ **A.9.3** It is recommended that the health-related fitness program file contain demographic information such as age, gender, ethnicity, years of service, and job assignment, as well as information regarding physical capacity such as aerobic capacity, heart rate recovery, strength and endurance, mobility and flexibility, and control of knees and lower back. To ensure consistency and continuity of the process, data should be collected on a standard form such as that shown in Figure A.9.3.

PERSONAL AND DEMOGRAPHIC INFORMATION

Date of submission (mm/dd/yy): _____

Fire department confidential identification code: _____

Firefighter confidential identification code: _____

Ethnicity ❑ African American ❑ Asian ❑ Hispanic ❑ Native American ❑ Filipino ❑ Caucasian ❑ Other

Job assignment: ❑ Emergency response ❑ Nonemergency response

Years of service: _____

Age: _____ Height (inches): _____ Weight (pounds): _____

Gender: ❑ Male ❑ Female ❑ Other

FITNESS ASSESSMENT

Body Composition	Measurements	Observations
1. Body mass index (BMI)		
2. Waist circumference (inches)		
3. Hip circumference (inches)		
4. Waist-to-hip circumference ratio (W/H)		

Mobility and Flexibility	Measurements	Observations
5. Shoulder flexion reach (shoulder score)	L: _____ R: _____	
6. Shoulder extension reach (shoulder score)	L: _____ R: _____	
7. Straight leg raise (hip score)	L: _____ R: _____	
8. Weight-bearing lunge (ankle score)	L: _____ R: _____	

Speed and Power	Measurements	Observations
9. Vertical jump (inches)		

Aerobic Capacity and Recovery	Measurements	Observations
10. Pre-exercise heart rate (bpm)		
11. Pre-exercise blood pressure (mmHg)		
12. Submaximal treadmill run (time, max HR)	Time: _____ HR: _____	
13. Recovery treadmill walk (2-min HR)		
14. Post-exercise blood pressure (mmHg)		

Muscular Strength and Endurance	Measurements	Observations
15. Maximum push-ups (reps)		
16. Maximum inverted rows (reps)		
17. Maximum side plank time (seconds)	L: _____ R: _____	

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Δ **FIGURE A.9.3 Sample Health-Related Fitness Program Form Showing Demographic and Assessment Information.**

Annex B Sample Fitness Plan

This annex is not a part of the requirements of this NFPA document but is included for informational purposes only.

N B.1 Benefits of Exercise. The benefits of exercise extend from physical and mental health to performance and quality of life. The emphasis of an exercise program should be placed on maintaining or increasing an individual's fitness, creating positive lifestyle changes, and enhancing job performance (i.e., work life and play).

N B.2 Individualized Exercise Program. Every exercise program should consider the four components of the F.I.T.T. principle.

Frequency. How frequent is the exercise exposure? Periodic stress or repeated exposures are needed to elicit physiological adaptations and ingrain new movement and fitness behaviors. The individual must find the balance between too little and too much to meet the exercise objective. Frequency is commonly described by repetitions and sets or exposures per week.

Intensity. How challenging is the exercise exposure? The body must be sufficiently stressed or overloaded to adapt. The individual must find a balance between too little and too much to meet the exercise objective. Intensity is commonly described by load, tempo (speed), heart rate, and rate of perceived exertion (RPE).

Time. How long is the exercise exposure? Certain physiological adaptations require the body to be stressed for specific durations or periods of rest and recovery. The individual must find a balance between too little and too much to meet the exercise objective. Time is commonly described by the periods of work and rest or the length of the session.

Type. What type of exercise exposure? While there are many forms of exercise and physical activity, the body will adapt to the type of stress imposed. The type of exercise(s) should be considered when outlining the training objective. Type is commonly described by the modality, contraction type, or movement pattern.

General principles to consider when designing any exercise program include the following:

(1) *Performance = Fitness and Movement.* Being physically fit does not equate to being physically prepared for a particular job, sport, or activity of daily living. Fitness is essential, but alone it is not sufficient to ensure peak performance and long-term durability; it simply reflects an individual's potential. Good fitness in the presence of poor body mechanics or good mechanics in the presence of poor fitness will limit performance and increase a firefighter's chances of sustaining a musculoskeletal injury.

(2) *Progression.* The demand imposed must be progressively increased to see further adaptations. However, an individual's body mechanics should be used to guide the progression of their exercise program. Only after they have displayed the capacity to perform (i.e., ability, awareness) should an individual modify an activity's frequency, intensity, and time to make it more challenging. Advancing too quickly could compromise the firefighter's safety and limit the potential benefits of the program.

(3) *Movement Matters.* Every movement is the result of the muscular system acting on the skeletal system. Muscles produce force through concentric (shortening), eccentric (lengthening), and isometric (no length change) actions and provide us with an opportunity to perform any number of physical activities. If sufficient force cannot be produced to perform a particular activity today, muscles have the unique ability to grow and become stronger in response to applied stimuli or demands imposed on the muscular system. However, accurately describing the muscles that are responsible for a given action is not possible. Therefore the decision to use a particular exercise or make a session more demanding should be based largely on the individual's movement patterns and observations made while exercising.

(4) *Exercises Are Tools.* An individual's capacity will not be improved with just one modality, exercise, or exercise program; there are countless options that provide an effective training stimulus. Exercises are simply tools that can help to achieve a particular objective. There is also no reason to include any specific exercise in every program given that almost every individual will perform differently, have a different background, and have varying personal interests and objectives.

(5) *Long-Term Adherence.* Enhancing capacity is a process. Firefighters need to be physically prepared to perform safely and effectively today, tomorrow, and five years from now. There is no date after which time their capacity to perform becomes more or less important, nor is there opportunity to take advantage of an "off-season." Much consideration should be given to the design of any training program so that it serves to enhance capacity in a manner that is sustainable over an extended period of time. Short- and long-term objectives are needed to effect sustainable change.

(6) *Goal Setting.* Exercise can be used to prevent injuries, improve performance, and enhance quality of life. But everyone is different, both with regard to their physical demands and their capacity to perform. Without acknowledging these differences and establishing a purpose for training, any exercise-related initiatives to become better physically prepared might be misdirected. This process will require simple, yet sustainable, strategies that keep individuals motivated and engaged.

(7) *Emphasize Transfer.* Improving job performance does not require that a specific task be replicated in the gym. Many factors can influence the way an individual moves (e.g., perception of risk, awareness, strength), and thus a range of physiological, mechanical, and behavioral adaptations could, theoretically, be exhibited in response to subtle task differences. Placing an emphasis on key features (e.g., control of spine motion) of an activity while exercising will help to alter the habitual patterns of complex firefighting skills without having to replicate the exact task.

(8) *Prioritize Health and Fitness.* Programs designed to improve health will not necessarily improve fitness. However, any properly designed exercise training program designed to improve fitness will also have a positive impact on overall health. The *Surgeon General's Report on Physical Activity and Health* states that physical activity need not be strenuous to improve health, although greater health and fitness benefits can be achieved by increasing the time spent physically active.

N B.3 Components of an Exercise Program. A comprehensive exercise program should be structured to address health, fitness, and performance. Areas of emphasis include the following:

(1) Aerobic capacity

(2) Recovery
(3) Speed and power
(4) Muscular strength
(5) Muscular endurance
(6) Mobility and flexibility
(7) Balance
(8) Coordination and joint stability

N B.4 Warm-Up and Recovery.

N B.4.1 Warm-Up (Pre-Exercise). When possible, an exercise session should include a brief (e.g., 5 to 10 minutes) warm-up period to prepare the performer for the upcoming bout of physical activity. Although the length, intensity, and type can vary, well-structured activities improve readiness through changes to physiological characteristics such as heart rate, ventilation, and muscle temperature and psychological factors such as focus and mental arousal. Warm-up activities also provide an opportunity to rehearse and refine both general and specific movement patterns (or skills) that will be used during the upcoming bout of activity.

When structuring a warm-up, the demands of the chosen activities should progress gradually so that when finished, the individual is prepared for the exercise session. Many warm-up sessions include modified or less demanding variations of the exercises to be performed and can be viewed as "movement preparation" sessions that provide an opportunity to challenge the control of any joint motions needed during the upcoming activity.

N B.4.2 Recovery (Post-Exercise). When possible, an exercise session should include a brief (e.g., 5 to 10 minutes) recovery period, characterized by a gradual tapering of exercise intensity and can include active or passive stretching. The recovery activity assists in the return of blood to the heart, thereby reducing cardiac stress. Stretching can be used to improve or maintain flexibility and mobility, reduce muscle soreness, and lower mental arousal.

N B.5 Cardiorespiratory Fitness.

N B.5.1 Significance. The *Surgeon General's Report on Physical Activity and Health* states that inactivity is hazardous to health. Physical activity that imposes a demand on the cardiovascular and respiratory systems will help to improve heart and lung function, while reducing the risk of heart disease, lung cancer, type 2 diabetes, stroke, and other chronic conditions.

N B.5.2 Terms.

N B.5.2.1 Cardiorespiratory Fitness. The ability of the circulatory and respiratory systems to supply oxygen to skeletal muscles during sustained physical activity.

N B.5.2.2 American College of Sports Medicine (ACSM). An association of sports medicine, exercise science, and health and fitness professionals who are dedicated to helping people worldwide live longer, healthier lives. Their mission is to advance and integrate scientific research to provide educational and practical applications of exercise science and sports medicine to the community.

N B.5.2.3 Interval Training. A type of exercise in which periods of high-intensity effort (i.e., work intervals) are alternated with periods of lower intensity or rest (i.e., rest intervals). These intervals are performed repeatedly for a given number of sets — for example, a 1-minute jog (work interval) followed by a 1-minute walk (rest interval), performed a total of 10 times (10 sets).

N B.5.2.4 Karvonen's Formula. A formula used to predict the heart rates that represent approximately 60 to 85 percent of VO_2 max. This rate is considered an appropriate range to promote cardiorespiratory fitness improvements. To predict training heart rate, use the following formula [Source: *ACSM's Guidelines for Exercise Testing and Prescription* (Chapter 7)]:

[B.5.2.4]

$$HR_{trn} = HR_{max} - HR_{rest} \times \% \text{ intensity} + HR_{rest}$$

where:
HR_{trn} = training heart rate
HR_{max} = maximum heart rate = 220 – age
HR_{rest} = resting heart rate

N B.5.2.5 Aerobic Capacity (VO_2 max). The maximal amount of oxygen that can be consumed and used per minute. It is measured in milliliters per kilogram of body weight per minute. Direct or gas exchange VO_2 measurement is considered the best indicator of aerobic capacity. Indirect VO_2 testing is a more common method of assessing aerobic capacity, which typically uses a formula to predict VO_2 from time and workload.

N B.5.3 Cardiorespiratory Fitness Programs. The *Physical Activity Guidelines for Americans* state that for substantial health benefits, adults should do at least 150 minutes of moderate-intensity activity or 75 minutes of high-intensity aerobic activity per week. Additional health benefits are gained by engaging in physical activity beyond these recommendations.

N B.5.3.1 Frequency. How often someone should or will be able to exercise is related to the intensity and duration of previous sessions, as well as individual time constraints and goals. Individuals with poor fitness or limited experience might benefit by breaking up their physical activity into multiple short duration bouts throughout the day (3 × 5 minutes). Performing some form of physical activity that challenges the cardiovascular and the respiratory systems on most days of the week is recommended.

N B.5.3.2 Intensity. The intensity of an exercise session can be determined by the heart rate or the rate of perceived exertion (RPE). The American College of Sports Medicine (ACSM) recommends exercising at a heart rate between 70 and 90 percent of maximal heart rate or 60 to 85 percent of VO_2 max, as determined by Karvonen's formula *(see B.5.2.4)*. If the maximal heart rate is unknown, it can be predicted by subtracting age from 220.

Studies evaluating firefighters' heart rate response to fireground activities find that heart rates range from 80 to 90 percent of maximal heart rate or 70 to 80 percent of VO_2 max. Therefore, a firefighter should consider an exercise program that includes some high-intensity efforts.

N B.5.3.3 Time. The duration of an exercise session will depend largely on the exercise intensity, goals of the performance and time available. The combination of time and intensity will influence an individual's RPE and the total number of calories burned. Although the ACSM recommends 20 to 60 minutes of continuous activity, shorter bouts of high-intensity activity (e.g.,

5 minutes) have been shown to elicit similar health benefits to longer duration, low-intensity activity.

N **B.5.3.4 Type.** An infinite number of options can be chosen to elicit cardiorespiratory benefits. Activities that involve large muscle groups (e.g., running, swimming, weight training circuit) are recommended, but consideration should also be given to the following:

(1) Individual preferences
(2) Availability of proper equipment or facilities
(3) Risk of injury versus benefit of activity
(4) Specificity to occupational demands

Since firefighters need to support their own body weight and the additional load of protective clothing and breathing apparatus, the most job-specific activities will be those that are weight-bearing such as walking or stair stepping, in contrast to non-weight-bearing activities such as cycling.

N **B.5.4 Weekly Caloric Expenditure.** The total weekly caloric expenditure, which is determined by exercise frequency, intensity, time, and type can also be used to inform recommendations and monitor progress, particularly when the aim is weight loss. The ACSM recommends a minimal caloric expenditure of 300 calories per exercise session performed three times a week or 200 calories per session performed four times a week. The *Surgeon General's Report on Physical Activity and Health* recommends an accumulated exercise expenditure of 1000 calories per week for health.

N **B.5.5 Progression.** According to the ACSM, the following considerations should be made when determining how to progress an individual's exercise program:

(1) Medical, health, and coronary risk status
(2) Functional capacity
(3) Musculoskeletal conditions
(4) Age
(5) Individual goals and preferences
(6) Specificity to occupational demands

Progression can come in the form of a change to the frequency, intensity, time, and/or type of activity but should be gradual to avoid injury.

N **B.6 Musculoskeletal Fitness.**

N **B.6.1 Significance.** The *Surgeon General's Report on Physical Activity and Health* states that inactivity is hazardous to health. Physical activity that imposes a demand on the muscular and skeletal systems will help to increase bone mineral density (reduced risk of osteoporosis), enhance mobility and flexibility, improve glucose tolerance, reduce coronary risk factors, and make it easier to perform activities of daily living.

N **B.6.2 Terms.**

N **B.6.2.1 Muscular Endurance.** The ability to perform an activity that imposes a demand on the musculoskeletal system for a prolonged period of time.

N **B.6.2.2 Muscular Strength.** The ability to generate muscular force with the coordinated contraction of one or multiple muscle groups.

N **B.6.2.3 National Strength and Conditioning Association (NSCA).** An association of researchers, educators, strength coaches, personal trainers, and other professionals devoted to helping others discover and maximize their strengths. The NSCA disseminates research-based knowledge and its practical application by offering industry-leading certifications, research journals, career development services, and continuing education opportunities.

N **B.6.2.4 Repetition.** One complete movement of a particular exercise that can involve the eccentric (i.e., lengthening), concentric (i.e., shortening), or isometric (i.e., no motion) contraction of one or more muscle groups.

N **B.6.2.5 Set.** A series of repetitions completed.

N **B.6.2.6 Load.** The resistance provided to challenge the musculoskeletal system. Typical loads include weight, elastic tension, pneumatic resistance, and friction.

N **B.6.2.7 Tempo.** The movement speed used to perform the activity. It can be used to describe a specific pace or cadence for part or all of the movement.

N **B.6.2.8 Work Duration.** The length of time that work is being done by the musculoskeletal system before rest is permitted.

N **B.6.2.9 Rest Duration.** The period of time between consecutive repetitions or consecutive sets. It can be passive (i.e., no activity) or active (i.e., alternate activity).

N **B.6.2.10 Repetition Maximum (RM).** The maximum load that can be lifted for a given number of repetitions. For example, a 10 RM is the load that could be used to perform 10 repetitions, and a 1 RM is the load that could be used to perform a single repetition.

N **B.6.3 Musculoskeletal Fitness Exercise Program.** The *Physical Activity Guidelines for Americans* states that for substantial health benefits, adults should do at least 150 minutes of moderate-intensity activity or 75 minutes of high-intensity activity per week. At a minimum, adults should integrate muscle-strengthening activities that involve all major muscle groups on 2 days per week to experience the associated health benefits.

N **B.6.3.1 Frequency.** According to the NSCA, changes in musculoskeletal health or performance can be achieved in as little as 2 days per week. However, the ideal frequency of training will also depend on factors such as the performers' physical capacity, goals, health status, intensity and duration of exercise sessions, and the type of activities being performed.

In general, when designing strength-oriented exercise sessions, higher loads and lower rep ranges are recommended. Because fewer reps are performed, the number of sets used can also be increased. In contrast, when designing endurance-oriented training sessions, lighter loads and higher rep ranges are recommended. If more reps are performed, the number of sets will typically be reduced.

N **B.6.3.2 Intensity.** In general, increasing strength requires progressive overload, or continual increases in load. As the load increases relative to the performer's maximal strength, the movement speed (i.e., tempo) at which it can be moved decreases. High loads and moderate-to-slow tempos are recommended to increase strength. In contrast, to improve muscular endurance and perform an activity for an extended period of time requires a submaximal load. Because it is more challenging to sustain high-speed movements for long durations, slow to moderate tempos are also recommended.

N **B.6.3.3 Time.** Exercise frequency, intensity, and type will influence the total exercise duration. In general, when designing strength-oriented exercise sessions, fatigue should be avoided; thus longer rest periods will be needed. Submaximal strength objectives require less rest. Because the primary objective for most endurance applications is to perform for an extended period of time, long durations are required to impose the desired stimulus. Shorter rest periods and higher work to rest ratios (i.e., work duration lasts longer than rest period) are recommended.

With regard to the rest period between consecutive bouts of activity, both passive and active recovery are necessary to enhance or maintain capacity. Passive recovery refers to time off from physical activity, whereas active recovery is typically characterized by modifying the demands (F.I.T.T. and RPE) of the exercise sessions. Immediately following an exercise session, an individual's capacity declines. With adequate rest, their capacity returns to and surpasses their baseline scores. A second training session can then be administered. If adequate rest is not provided because of the number, volume, or intensity of training sessions, the performer can experience excess fatigue, soreness, or a decrease in performance and continue to regress over time.

N **B.6.3.4 Type.** Barbells, dumbbells, kettlebells, elastic bands, ropes, machines, body weight, and tools and equipment from the fireground (e.g., hose, ladder, bundles) can be used to load the musculoskeletal system. Resistance that the muscles have to overcome can be used to improve muscle fitness. A combination of all modalities listed can be the most beneficial for a firefighter who would like to improve health, fitness, and job performance, but enjoys diversity. Regardless of the modality used, an exercise program should incorporate all five general movement patterns and challenge the seven key movement features to maximize the transference to relevant activities at work or otherwise.

The five movement patterns are as follows:

(1) Push pattern (asymmetrical and symmetrical shoulder flexion and extension in horizontal and vertical plane)
(2) Pull pattern (asymmetrical and symmetrical shoulder flexion and extension in horizontal and vertical plane)
(3) Squat pattern (combination of ankle dorsiflexion, knee flexion, and hip flexion)
(4) Hinge pattern (hip flexion)
(5) Lunge pattern (asymmetrical ankle dorsiflexion and plantar flexion, and hip flexion and extension)

N **B.6.3.5 Progression.** The same considerations described previously for cardiorespiratory fitness programs should be made when designing musculoskeletal fitness programs (e.g., medical history, physical capacity, goals). Depending on the training objectives, any of the following F.I.T.T. variables can also be manipulated to impose a greater demand: repetitions, sets, load, tempo, work period, rest period, exercise, and modality.

N **B.7 Mobility and Flexibility.**

N **B.7.1 Significance.** On any given day, the way we walk, get out of bed, put on our pants, and so forth, will be influenced by how much joint range of motion we have (passive) and access (active) through the coordinated contraction of our muscles. Despite vast differences in our population's physical activity and lifestyle habits, and thus the physical capacity (e.g., strength, aerobic capacity) required to perform safely and effectively, we all need mobility. The ability to move our joints and position our body segments so that we can sit on a toilet, wash our hair, walk upstairs, or tie our shoes transcends any differences that might exist in our physical demands.

N **B.7.2 Terms.**

N **B.7.2.1 Mobility.** The extent to which a joint can be moved through a range of motion. Mobility can be influenced by functional (i.e., muscles, tendons) and structural constraints.

Passive mobility refers to the motion observed at a joint when a body segment is moved by an external force, such as the actions of a peer fitness trainer, thus removing any involvement from the muscles. When a segment is moved passively in the direction of interest, the tissues spanning the joint will be lengthened until reaching their physiological limit, at which point no further motion can be achieved — the passive limit has been reached.

Active mobility refers to motion observed at a joint when a body segment is moved by muscular contraction (i.e., internal forces). Active mobility can be isolated to a single joint or observed in the context of a multi-joint movement, but in either case additional factors such as strength, awareness, and coordination, along with the passive extensibility of the muscles, influences the motion observed about the joint of interest.

N **B.7.2.2 Flexibility.** The extent to which a joint's range of motion is constrained by the muscles and tendons that span it. An individual's flexibility (e.g., muscle compliance) influences joint mobility.

N **B.7.2.3 Passive Stretching.** Activities whereby gravity, a piece of equipment (e.g., rope), or a second individual moves the performer through a particular range while their muscles are relaxed.

N **B.7.2.4 Active Stretching.** Activities whereby the performer actively uses their muscles to move through a particular range of motion.

N **B.7.2.5 Static Stretching.** Activities whereby a particular position (e.g., hip flexion with knee extension) is held for an extended period of time (e.g., 15 to 60 seconds).

N **B.7.2.6 Dynamic Stretching.** Activities whereby the end range of a particular motion is gradually increased by performing multiple repetitions without holding the stretch for an extended period of time. Two commonly used quasi-dynamic stretching strategies are proprioceptive neuromuscular facilitation (PNF) and active isolated stretching (AIS).

N **B.7.2.6.1 Proprioceptive Neuromuscular Facilitation Stretching (PNF).** PNF techniques are said to enhance active and passive range of motion and involve the contraction of opposing muscle groups (to actively move limbs through a range) and isometric contractions of the target muscle groups against resistance. This process is repeated numerous times, holding each contraction between 3 and 15 seconds. The contraction of opposing muscle groups is thought to elicit "reciprocal inhibition," which implies that when one muscle contracts, the muscles opposing the motion (the muscle being stretched) will not.

N **B.7.2.6.2 Active Isolated Stretching (AIS).** Active isolated stretching also relies on the performer to actively move their limbs to initiate motion but does not involve a contraction of the target muscle, nor does it include a stretch of any duration. Performers are encouraged to hold for just 1 to 2 seconds, and a greater stretch can be achieved by using a rope or partner.

N **B.7.3 Mobility and Flexibility Exercise Program.**

N **B.7.3.1 Frequency.** Mobility and flexibility can be emphasized daily. Whether integrated into a formal exercise program or an activity of daily living by using a large range of motion, firefighters should make every attempt to maintain their mobility and flexibility. Although most commonly used before and after training as part of a warm-up or cool-down, mobility and flexibility exercise can also be integrated into any type of training session to enhance a particular objective.

N **B.7.3.2 Intensity.** Individuals should stretch to the point of tension, not pain. "No pain, no gain" definitely does not apply here. The stretch should be felt in the belly of the muscle and not at the joint. If resistance is felt in the joint (e.g., impingement in front of the hip while doing a straight leg raise), mobility is likely being limited by a structural constraint and a mobilization activity will be needed.

N **B.7.3.3 Time.** In general, performance will not suffer unless a stretch is held beyond 60 seconds. Whether performing a static or dynamic stretch actively or passively, a minimum of 30 seconds is recommended to influence the compliance of the tissues being targeted.

N **B.7.3.4 Type.** If the reason for stretching is clearly defined, both static and dynamic stretching could be appropriate to elicit a particular response before, during, or after a training session. However, in general, dynamic stretching is more appropriate than static stretching before and during the session; in addition to increasing range of motion, it helps to elevate or maintain the performer's physiological status (e.g., heart rate, blood flow, body temperature) and offers an opportunity to rehearse and ingrain the relevant movement patterns. In contrast, static stretching might be more appropriate post-training when the emphasis is recovery and regeneration, although the effectiveness of either method will largely depend on the preferences and abilities of the performer.

N **B.7.3.5 Progression.** Performers who have passive mobility needs should seek to increase their available joint range of motion through static or dynamic stretching or joint mobilization activities. If physically unable to adopt specific body positions because they lack the passive mobility, they might not be able to take advantage of their experience, awareness, motivation, fitness, and so forth. Performers who have active mobility needs should learn how to access the joint range of motion currently available. Performers who have sufficient active mobility should seek to integrate their accessible joint range of motion into a variety of relevant activities. Having the awareness, motivation, and physical ability to move within a range of contexts (e.g., patterns, environments) will improve the extent to which behaviors persist over time. Musculoskeletal fitness training activities using a full range of motion will also help to maintain mobility and flexibility.

N **B.7.3.6 Stretching Considerations.** The following tips can be helpful in making mobility and flexibility exercise safe and effective:

(1) Gradually increase the range of motion being accessed so that the target muscle temperature has an opportunity to be elevated.
(2) Changes can be acute (elastic) rather than permanent (plastic), which implies that changes made in one session might not persist.
(3) The breath should not be held while stretching. Relaxed and slow breathing should be encouraged.
(4) All tissues should not be stretched. Know which tissues are limiting range of motion so that a targeted intervention can be created.
(5) Proper technique and posture/body alignment should be used when stretching. To elicit a performance benefit, stretching must influence the individual's motion patterns with a change in control or coordination so they are better able to express a particular ability.
(6) Stretching a muscle should be discontinued if a dull ache or burning sensation that could indicate a tissue tear is experienced.

N **B.8 Spine Health.**

N **B.8.1 Significance.** Approximately 80 percent of Americans will suffer from acute or chronic back pain at some point in their lives, while one quarter will have had to deal with a painful episode in the last 3 months. Data also shows that low back injuries are the most common and costly musculoskeletal injury sustained by firefighters. The physical demands of firefighting elevate firefighters' risk of injury, especially if they are not adequately prepared.

Common causes of lower back pain and injury include the following:

(1) *Poor fitness.* Without the physical fitness (e.g., strength, endurance, aerobic capacity) to lift relevant loads, hold specific postures for extended periods of time, or control spine motion while moving quickly, the demands on the low back will increase. High loads applied to the low back over a short time, or low loads applied over a long time can lead to acute and chronic injuries, respectively.
(2) *Limited mobility.* Individuals who do not have access (passive mobility) or cannot access (active mobility) sufficient range of motion in their ankles, hips, and shoulders to perform all relevant tasks might be forced to compromise the position and control of their lower back.
(3) *Poor body mechanics.* The lumbar spine can handle high forces (i.e., applied tissue loads) with limited risk when in a neutral position, and large ranges of motion with limited risk when the forces are low (e.g., walking). However, the combination of large ranges of motion and high forces is an established mechanism for injury (e.g., a neutral spine is a strong spine). For this reason, firefighters must develop the ability to maintain a neutral spine posture (i.e., control flexion, extension, lateral bend and twist) while squatting, lunging, hinging, pushing, and pulling.

N **B.8.2 Healthy Back Program.** To ingrain and enhance control and coordination of spine motion to prevent low back injuries and improve performance, a healthy back program should be designed to reflect the performer's physical demands. For example, if the performer is frequently tasked with lifting heavy loads (i.e., high intensity) or working for extended periods of time (i.e., long duration), the frequency, intensity, and time of their healthy back program should reflect this. If the demands of the healthy back program do not progress to reflect those

relevant to the performer, they will lack the mobility and fitness to adopt the postures and movement patterns (i.e., body mechanics) required to maintain low back health.

N **B.8.2.1 Frequency.** With few exceptions, every exercise will challenge the "core," or trunk (e.g., squats challenge performers' ability to resist spine flexion, a one-arm overhead press challenges performers' control of lateral bend); therefore, every exercise session will likely require that the performer makes a concerted effort to maintain a neutral spine curvature. Further, when choosing an appropriate number of repetitions or sets, the secondary training objectives should be considered (e.g., speed, strength, endurance), so that a relevant core challenge can be imposed.

N **B.8.2.2 Intensity.** Because the low back will play a critical role in all squatting, lunging, hinging, pushing, and pulling movements, the intensities chosen to challenge the core should reflect the relevant demands of training. This could imply that high-intensity (load or speed) short-duration activities or low-intensity long-duration activities need to be included. However, it is important to use an intensity that is appropriate for the performer's current ability. Their movement patterns can then be used to establish their readiness to progress.

N **B.8.2.3 Time.** The work and rest periods in a healthy back program should also reflect the demands and needs of the performer; however, the length of time that specific spine motions are targeted should be considered. For example, resisting spine flexion while squatting will impose a different challenge than resisting spine extension while performing a push-up. Short-, moderate-, and long-duration activities with corresponding rest periods would each be appropriate for a healthy back program if relevant to the performer's demands.

N **B.8.2.4 Type.** Core training should not be constrained to dynamic spine motion and static activities. The key to choosing suitable exercises is recognizing the trunk's role so emphasis can be placed on appropriate features (i.e., spine flexion, extension, lateral bend or twist). For example, a front plank and push-up impose a similar trunk challenge (i.e., resist spine extension), albeit with varying degrees of limb movement. Similarly, a side plank and one-arm overhead press both challenge a performer to resist lateral bend.

N **B.8.2.5 Progression.** In general, the frequency, intensity, and time of a healthy back program should be progressed using the same principles described for cardiorespiratory and musculoskeletal fitness. However, because it is more challenging to control spine motion in the frontal plane (i.e., lateral bend) than in the sagittal plane (i.e., flexion and extension), and even more challenging in the transverse plane (i.e., twist), exercises should be progressed by plane of motion (flexion/extension–lateral bend–twist). Firefighters should arguably be able to exhibit control of flexion and extension before being challenged with lateral bend or twist.

As an exercise becomes more dynamic it also becomes more challenging to control and coordinate the spine motions of interest. For this reason, the program can also be progressed by the extent to which upper and lower extremity motion is involved in the exercises (i.e., static–upper limbs–lower limbs). For example, it is more challenging to control spine motion in a push-up than a front plank because the arms are moving, but even more challenging to control spine motion if the push-up or plank includes hip flexion, as in mountain climbing or performing a burpee.

N **B.8.2.6 Considerations for the Design of a Healthy Back Program.** Resisting spine motion is important. All spine motion does not impose risk; however, flexion, extension, lateral bending, and twisting under load will increase the possibility or progression of a disc herniation or vertebral fracture. Because the forces applied to the spine's tissues comprise loads from the external environment (e.g., holding a weight in your hands) and the internal environment (e.g., contracting muscles), exercises that require dynamic spine motion with high levels of muscle activity (e.g., weighted crunch) could impose as much risk as performing a deadlift with a flexed spine.

Unstable training might not improve spine health. Training on an unstable surface can provide an appropriate training stimulus to improve whole-body balance; however, it is not necessarily an appropriate strategy to improve control of spine motion. Faced with the choice of sacrificing a neutral spine posture or losing balance, performers will be forced to adopt a movement strategy that allows them to remain upright. When placing an unstable load in the hands (e.g., cable) or on the back (e.g., barbell with bands) or pushing/pulling against an unstable surface (e.g., suspended handles), the control and coordination required to perform the activity will be elevated in comparison to a stable variation of the same pattern with an equivalent load. Because additional effort will be needed, the frequency, intensity, and time of the exercise might need to be adjusted so that the demands of the activity do not exceed the performer's capacity. Using an unstable load can be an excellent way to improve a client's control and coordination.

Static and dynamic activities can provide benefit. Although links have been made between the incidence of low back problems and trunk extensor endurance times, trunk extensor endurance is not a mechanism of low back injury. Superior endurance provides the opportunity to maintain spine-sparing postures for extended periods of time by delaying the onset of fatigue. But, if individuals do not adopt these postures for any number of reasons, muscular endurance becomes secondary and will have little bearing on the risk of injury. From an injury perspective, evidence suggests that trunk extensor strength and endurance or symmetry between the front, back, and sides could be more important than flexor endurance, which is commonly achieved through exercises such as the static front plank. However, limiting the progression of a spine health exercise to extended durations is unlikely to provide the most favorable long-term adaptations given that many of the sport-, occupation- and life-related activities relevant to firefighters are highly dynamic and comprise a range of frequencies, intensities, and times.

Use the hips to rotate. To emphasize rotation while exercising does not imply that the act of rotating or twisting be included, particularly when seeking to improve an individual's control, coordination, and general body awareness. Developing the capacity to resist rotation should be viewed as a prerequisite for the inclusion of more dynamic movements that involve actual rotation. In situations where rotation is the priority, motion should come largely from the hips since they are better suited to generate power (i.e., high forces and large ranges of motion in short durations) in comparison to the spine.

N **B.8.2.7 Using Weight Belts.** Considerations for weight belt use are as follows:

(1) For exercises that do not impose a demand on the back, a belt should not be worn.

(2) For exercises that do impose a demand on the back (risk placing the back in a compromised position), a belt should only be worn during near maximal and maximal efforts.
(3) A weight belt will not afford protection against improper body mechanics and exercise technique.

N **B.9 Safety and Injury Prevention.** The following are general guidelines for the prevention of injuries while exercising:

(1) When possible, include a warm-up activity. The intensity should be increased gradually to match the demands of the exercise session.
(2) Scale the frequency, intensity, and time of the exercise session and the complexity of the exercises to suit each individual's needs. Place an emphasis on long-term sustainable improvements.
(3) Place an emphasis on using proper body mechanics, including the seven key movement features while performing any type of exercise. Injuries are influenced by load, repetition, and posture.
(4) Work within the joint ranges of motion that can be accessed without compromising stability at an adjacent joint.
(5) Integrate passive and active recovery activities within and between exercise sessions. Chronic muscle soreness and fatigue are signs of overtraining.
(6) Maintain equipment and ensure the exercise space/facilities are cleaned regularly.

Annex C Self-Assessment Tool

This annex is not a part of the requirements of this NFPA document but is included for informational purposes only.

N **C.1 General.** A self-assessment gives the member valuable feedback on their individual fitness level, ability to recover from exertion, and overall physical capacity. It is an evaluation that the member can safely perform in private to gain insight regarding their current fitness, recent improvement, and areas to pursue further change.

The self-assessment described in this annex can be performed with minimal equipment. It can be customized for and by each member to ensure that it accommodates their current abilities. The information collected from the assessment is valuable because it can be used to track progress and identify specific areas that could be targeted with an exercise program. The results can also shed light on specific aspects of the member's capacity that will influence their safety on the fireground (e.g., ability to recover).

A personalized exercise program is a major component of the wellness program. It should accommodate the member's current level of fitness as determined with information from the periodic assessments completed throughout the year, in addition to relevant job duties, barriers to activity, physical capabilities, dietary status, sleep habits, motivation, and mindset.

N **C.2 Example Self-Assessment.** The example self-assessment described in this section is just one of many options that can be used to track progress and identify areas for further improvement. It is structured in two parts — mobility and flexibility followed by strength and endurance — and accommodates the interests, abilities, and needs of each member. Prior to participating in the self-assessment, every member should be medically cleared by the department physician. Additionally, the member should properly complete a brief warm-up before carrying out the following protocol:

(1) Prior to performing the self-assessment, assemble the following equipment:
   (a) Heart rate monitor
   (b) Wooden dowel
   (c) Measuring tape
   (d) Rope or resistance band
   (e) Treadmill (capable of 9.5 mph and 15 percent grade) or stepmill (capable of 118 steps per minute)
   (f) Wall or equivalent object to lean against (minimum 8 ft in height)
   (g) Bar to hang from (adjustable from 3 to 8 ft off the floor)
   (h) Dumbbells (if applicable; choice load)
(2) Place the equipment conveniently close to the treadmill (or stepmill) as you will be returning to this piece of equipment throughout the assessment.
(3) Wet the heart receiver and put it on your chest. Tighten it to a comfortable setting. Turn on the watch and be sure it is receiving your heart rate.

Now you are ready to begin the assessment. For the second part of the assessment, you will be recording both your time and your heart rate. Therefore, you should move at as brisk a pace as you can comfortably between exercises.

Get your self-assessment worksheet *(see Figure C.2)*, mark the date, and check each of the boxes that you will include in the assessment. Keep this sheet with you as you proceed so you can note the specific assessment criteria that are met (part 1) and document your heart rate, rating of perceived exertion (RPE) and load (part 2). Once the assessment has begun, attempt to move from one exercise to the next with no more than 30 seconds between each. For each of the squat, lunge, hinge, push, and pull exercises performed in part 2, try to use a consistent range of motion throughout the activity so future comparisons can be made.

The components of the self-assessment are as follows:

Part 1 — Mobility and Flexibility. Choose one or both of the following activities for each joint:

(1) With shoes off, stand with your feet about hip width apart and flat on the floor. Hold the wooden dowel in both hands, approximately shoulder width apart, using an overhand grip. Place the dowel at shoulder height, and in one slow and controlled motion, press the dowel overhead. Repeat 3 times. To pass this activity (i.e., meet the mobility criteria), the dowel must be positioned directly overhead (i.e., upper arm aligned with torso) when the arms are fully extended, while the shoulders remain down and away from the ears. These criteria only need to be met on one of the three repetitions.
(2) With shoes off, stand with your feet about hip width apart and flat on the floor. Hold the wooden dowel in both hands, approximately shoulder width apart, using an overhand grip. In one slow and controlled motion, lower the dowel toward the ground while attempting to keep your back straight. Stand back up. Repeat 3 times. To pass this activity (i.e., meet the mobility criteria), the dowel must reach mid-shin height, while the back remains in a neutral position (i.e., same curvature as when standing).

You can bend your knees as much as necessary. These criteria only need to be met on one of the three repetitions.

(3) With shoes off, stand in a staggered stance with your feet about hip width apart (right foot forward). Hold the wooden dowel in your right hand and place it vertically on the floor (as if using for balance) aligned with the tip of your longest toe. In one slow and controlled motion, lower your back knee toward the floor without raising the front heel. Descend to a front knee angle of approximately 90 degrees without resting the back knee on the floor. Repeat 3 times. To pass this activity (i.e., meet the mobility criteria), the bony prominence on the lateral side of your knee must pass the dowel, while the heel stays on the floor and your knee, hip, and foot remain aligned if viewed from the front. Repeat with the left leg. These criteria only need to be met on one of the three repetitions but must be met on the left and right side.

(4) While standing, make a fist (thumb inside) with your right hand. In one slow and controlled motion, raise your arm overhead. From this overhead position, reach down behind your head with the closed fist. Once at end range, press lightly on your elbow with the left hand to see if you can achieve any further range. Repeat 3 times. To pass this activity (i.e., meet the mobility criteria), any part of the fist must pass the 7th cervical vertebrae. This can be found by bending your head forward and feeling for the boniest part of your neck. Repeat with the left arm. This criterion only needs to be met on one of the three repetitions but must be met on the left and right side.

(5) Lie flat on the ground with a natural curve in your lower back and your legs straight. Wrap one end of the rope or resistance band around your right foot. Hold the other end of the rope or band in your hands. In one slow and controlled motion, raise your right leg off the floor. Once at end range, pull lightly on the rope or band to see if you can achieve any further range without the left leg being raised or losing the natural curve of your back. To pass this activity (i.e., meet the mobility criteria), the right ankle must travel past mid-thigh on your left leg. Repeat with the left leg. This criterion only needs to be met on one of the three repetitions but must be met on the left and right side.

(6) With shoes off, stand in a staggered stance with your right toes touching the wall and right heel flat on the floor. Place your hands on the wall. In one slow and controlled motion, lean forward and attempt to touch your right knee to the wall. If successful, move your right foot back slightly (off the wall) and repeat. Continue moving the foot backward until the knee can no longer touch. Note the distance between the wall and your toes when you could last touch your knee to the wall. To pass this activity (i.e., meet the mobility criteria), the right toes must be at least 4 in. away from the wall, while the heel stays on the floor and your knee, hip, and foot remain aligned if viewed from the front. Repeat with the left leg. This criterion only needs to be met on one of the three repetitions but must be met on the left and right side.

Part 2 — Strength and Endurance. From the following lists, choose one cardiorespiratory activity and one musculoskeletal activity, each, of the squat, push, lunge, pull, and hinge pattern exercises:

Cardiorespiratory Options

(1) Treadmill at 9.5 mph and 5 percent grade. Straddle the treadmill and start the belt. Set the speed at 2 mph while you increase the incline to 5 percent. As soon as the belt reaches 2 mph, you can step on the treadmill. Once the incline reaches 5 percent, increase the speed to 9.5 mph. As soon as the speed hits 9.5 mph the assessment will begin. Run on the treadmill at 9.5 mph and 5 percent grade for 1 minute. At the end of the minute record your heart rate and rating of perceived exertion (RPE) on a scale of 1 to 10 (10 being the most challenging thing you have ever done) and transition to the next exercise in the circuit.

(2) Treadmill at 6.5 mph and 10 percent grade. Straddle the treadmill and start the belt. Set the speed at 2 mph while you increase the incline to 10 percent. As soon as the belt reaches 2 mph you can step on the treadmill. Once the incline reaches 10 percent, increase the speed to 6.5 mph. As soon as the speed hits 6.5 mph, the assessment will begin. Run on the treadmill at 6.5 mph and 10 percent grade for 1 minute. At the end of the minute record your heart rate and RPE on a scale of 1 to 10 and transition to the next exercise in the circuit.

(3) Treadmill at 3.5 mph and 15 percent grade. Straddle the treadmill and start the belt. Set the speed at 2 mph while you increase the incline to 15 percent. As soon as the belt reaches 2 mph you can step on the treadmill. Once the incline reaches 15 percent, increase the speed to 3.5 mph. As soon as the speed hits 3.5 mph, the assessment will begin. Walk on the treadmill at 3.5 mph and 15 percent grade for 1 minute. At the end of the minute record your heart rate and RPE on a scale of 1 to 10 and transition to the next exercise in the circuit.

(4) Stepmill at level 14 (118 steps per minute). Step on the stepmill. Set the speed at level 4 (46 steps per minute) for 20 seconds. After 20 seconds, increase the speed to level 14 (118 steps per minute). As soon as the speed hits level 14, the assessment will begin. Climb stairs on the stepmill at level 14 for 1 minute. At the end of the minute record your heart rate and RPE on a scale of 1 to 10 and transition to the next exercise in the circuit.

(5) Stepmill at level 10 (89 steps per minute) with a 20 lb weighted vest. Secure the weighted vest and step on the stepmill. Set the speed at level 4 (46 steps per minute) for 20 seconds. After 20 seconds, increase the speed to level 10 (89 steps per minute). As soon as the speed hits level 10, the assessment will begin. At the end of the minute record your heart rate and RPE on a scale of 1 to 10 and transition to the next exercise in the circuit.

(6) Stepmill at level 6 (60 steps per minute) with a 40 lb weighted vest. Secure the weighted vest and step on the stepmill. Set the speed at level 4 (46 steps per minute) for 20 seconds. After 20 seconds, increase the speed to level 6 (60 steps per minute). As soon as the speed hits level 6, the assessment will begin. Climb stairs on the stepmill at level 6 for 1 minute. At the end of the minute record your heart rate and RPE on a scale of 1 to 10 and transition to the next exercise in the circuit.