NFPA 1582

Standard on

Comprehensive Occupational Medical Program for Fire Departments

2003 Edition

This edition of NFPA 1582, *Standard on Comprehensive Occupational Medical Program for Fire Departments*, was prepared by the Technical Committee on Fire Service Occupational Safety and Health and acted on by NFPA at its May Association Technical Meeting held May 18–21, 2003, in Dallas, TX. It was issued by the Standards Council on July 18, 2003, with an effective date of August 7, 2003, and supersedes all previous editions.

This edition of NFPA 1582 was approved as an American National Standard on July 18, 2003.

Origin and Development of NFPA 1582

The issues of medical care and evaluation of both candidates and incumbents within a fire department have been discussed in numerous NFPA standards. The initial discussion and mandatory medical requirements were contained in NFPA 1001. In the late 1980s, respective members of the 1001 and 1500 technical committees formed a working subcommittee to develop a new standard, NFPA 1582.

The first edition of NFPA 1582 was issued in 1992, and subsequent editions were issued in 1997 and 2000.

The initial development of this edition was begun by members of the Technical Committee on Fire Service Occupational Medical and Health, including Kimberly S. Bevins, Paul “Shon” Blake, Anthony L. Clark, John F. Folan, Richard D. Gerkin, Jr., Juan Gonzalez, W. Larry Kenney, Sandra Kirkwood, Deborah L. Pritchett, Gordon M. Sachs, James Sewell, Robert M. Stratman, Kathy Tinios, and Decker Williams. This technical committee later was combined with the current Technical Committee on Fire Service Occupational Safety and Health. This committee completed the work on this edition of the standard.

Members of both committees have broken significant ground in providing a standard that the user — the fire department physician — can understand. The physicians on the committee have developed physician guidance text that provides a link between the essential job tasks of a fire fighter doing manual fire suppression and the medical requirements in the standard. This will assist the user in determining, based on medical evaluations, if someone can do the essential job tasks.

In addition, the standard has delineated the document to address those medical issues of a candidate seeking to become a fire fighter, and those incumbents currently performing the tasks of firefighting. This standard does not differentiate between volunteer, paid-on-call, part-time, or career fire fighters — the tasks are the same.

Since the committee has changed the title of the standard to reflect a comprehensive occupational medical program, it has included references to the IAFC-IAFF *Joint Wellness Initiative*, and to NFPA 1583. These two documents outline a health-related fitness program that is medically validated against this edition of NFPA 1582.

While some may say that the cost of medical exams is too high, one must measure that against long-term job related illnesses, injuries, and fatality costs. Fire departments spend a lot of money on preventive apparatus and equipment maintenance; however, that is an inefficient use of resources if they do not have medically qualified personnel to operate them and to respond to emergency incidents.

Work on this edition of the standard was done by a dedicated group of committee members who have the best interests of the fire service and its members in their deliberations. Without their knowledge, hard work, and due diligence to the occupation of firefighting, the completion of this edition could not have been accomplished. Many thanks to them, and especially to the physicians who gave their expertise and time to make this standard one that their profession can use.

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This list represents the membership at the time the Committee was balloted on the final text of this edition. Since that time, changes in the membership may have occurred. A key to classifications is found at the back of the document.

NOTE: Membership on a committee shall not in and of itself constitute an endorsement of the Association or any document developed by the committee on which the member serves.

Committee Scope: This Committee shall have primary responsibility for documents on occupational safety in the working environment of the fire service; and safety in the proper use of fire department vehicles, tools, equipment, protective clothing, and protective breathing apparatus.

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NOTICE: An asterisk (*) following the number or letter designating a paragraph indicates that explanatory material on the paragraph can be found in Annex A.

A reference in brackets [ ] following a section or paragraph indicates material that has been extracted from another NFPA document. As an aid to the user, Annex D lists the complete title and edition of the source documents for both mandatory and nonmandatory extracts. Editorial changes to extracted material consist of revising references to an appropriate division in this document or the inclusion of the document number with the division number when the reference is to the original document. Requests for interpretations or revisions of extracted text shall be sent to the technical committee responsible for the source document.

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

NEXT CHAPTER

Administration

1.1 Scope.

This standard contains descriptive requirements for a comprehensive occupational medical program for fire departments.

1.1.1* The medical requirements in this standard are applicable to candidates and members whose essential job tasks, as defined by the authority having jurisdiction (AHJ), are described in NFPA 1001, NFPA 1002, NFPA 1003, NFPA 1006, NFPA 1021, and NFPA 1051.

1.1.2 This standard provides information for physicians and other health care providers responsible for fire department occupational medical programs.

1.1.3 These requirements are applicable to public, governmental, military, private, and industrial fire department organizations providing rescue, fire suppression, emergency medical services, hazardous materials mitigation, special operations, and other emergency services.

1.1.4 This standard shall not apply to industrial fire brigades that also can be known as emergency brigades, emergency response teams, fire teams, plant emergency organizations, or mine emergency response teams.

1.2 Purpose.

The purpose of this standard is to reduce the risk and burden of fire service occupational morbidity and mortality while improving the safety and effectiveness of fire fighters operating to protect civilian life and property.

1.2.1 Accordingly, the standard specifies the following information:

(1) Minimal medical requirements for candidates as delineated in Chapter 6

(2) Occupational medical and fitness evaluations for members as delineated in Chapter 7 and Chapter 8

(3) Information regarding fire department activities and essential job tasks that assist the department physician in providing proper medical support for members

(4) Methods and types of data that must be collected to sustain comprehensive occupational medical programs for fire departments

1.2.2* The implementation of the medical requirements outlined in this standard ensures that candidates and current members are medically capable of performing their required duties and will reduce the risk of occupational injuries and illnesses.

1.2.3 Nothing herein is intended to restrict any jurisdiction from exceeding these minimum requirements.

1.3 Implementation.

1.3.1 For candidates, the medical requirements of this standard shall be implemented when this standard is adopted by an AHJ, on an effective date specified by the AHJ.

1.3.2* When this standard is adopted by a jurisdiction, date(s) shall be set for members to achieve compliance by establishing a phase-in schedule for compliance with specific requirements, if needed.

1.3.3* The fire department shall incorporate the comprehensive occupational medical program's risk management plan as required by NFPA 1500. The risk management plan shall include a written plan for compliance with this standard.

NEXT CHAPTER

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, P.O. Box 9101, Quincy, MA 02269-9101.

NFPA 1001, *Standard for Fire Fighter Professional Qualifications*, 2002 edition.

NFPA 1002, *Standard for Fire Apparatus Driver/Operator Professional Qualifications*, 2003 edition.

NFPA 1003, *Standard for Airport Fire Fighter Professional Qualifications*, 2000 edition.

NFPA 1006, *Standard for Rescue Technician Professional Qualifications*, 2003 edition.

NFPA 1021, *Standard for Fire Officer Professional Qualifications*, 2003 edition.

NFPA 1051, *Standard for Wildland Fire Fighter Professional Qualifications*, 2002 edition.

NFPA 1500, *Standard on Fire Department Occupational Safety and Health Program*, 2002 edition.

NFPA 1561, *Standard on Emergency Services Incident Management System*, 2002 edition.

NFPA 1581, *Standard on Fire Department Infection Control Program*, 2000 edition.

NFPA 1583, *Standard on Health-Related Fitness Programs for Fire Fighters*, 2000 edition.

2.3 Other Publications.

2.3.1 ANSI Publication.

American National Standards Institute, Inc., 1819 L St. NW, 6th floor, Washington, DC 20036.

ANSI Z24.5, *Audiometric Device Testing*, 1951.

2.3.2 Spirometry Publications.

American College of Occupational and Environmental Medicine Position Statement on Occupational Spirometry in the Occupational Setting. Townsend MC and the Occupational and Environmental Lung Disorder Committee. *J Occup Envir Med* 2000; 42:228-245.

American Thoracic Society. Standardization of spirometry. *Am J Respir Crit Care Med* 1994; 152:1107-36.

Knudson R. J., Lebowitz M.D., Holberg, C. J., Burrows B. Changes in the normal maximal expiratory flow-volume curve with growth and aging. *Am Rev Respir Dis* 1983; 127:725-734.

2.3.3 U.S. Government Publications.

U.S. Government Printing Office, Washington, DC 20401.

Title 29, *Code of Federal Regulations*, Part 1910.95, “Occupational Noise Exposure,” 1980.

Title 29, *Code of Federal Regulations*, Part 1910.120, “Access to Employee Exposure and Medical Records.” 1980.
Title 29, *Code of Federal Regulations*, Part 1910.120, “Hazardous Waste Operations and Emergency Response,” 1986.
Title 29, *Code of Federal Regulations*, Part 1910.134, “Respiratory Protection,” 1998.
Title 29, *Code of Federal Regulations*, Part 1910.1030, “Bloodborne Pathogens,” 1995.

NEXT CHAPTER

Definitions

3.1 General.

The definitions contained in this chapter shall apply to the terms used in this standard. Where terms are not included, common usage of the terms shall apply.

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.

3.3 General Definitions.

3.3.1* Candidate. A person who has made application to commence performance as a member of the fire department.

3.3.2 Category A Medical Condition. See 3.3.15, Medical Condition Classifications.

3.3.3 Category B Medical Condition. See 3.3.15, Medical Condition Classifications.

3.3.4 Emergency Medical Services. The provision of treatment, such as first aid, cardiopulmonary resuscitation, basic life support, advanced life support, and other pre-hospital procedures including ambulance transportation, to patients.

3.3.5 Essential Job Task. Task or assigned duty that is critical to successful performance of the job. *(See Chapter 5 and Section 9.1.)*

3.3.6 Evaluation. See 3.3.16, Medical Evaluation.

3.3.7 Exposure Incident. A specific eye, mouth, or other mucous membrane, nonintact skin, or parenteral contact with blood, body fluids, or other potentially infectious materials, or inhalation of airborne pathogens or ingestion of foodborne pathogens or toxins.

3.3.8 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.

3.3.9 Functional Capacity Evaluation. An assessment of the correlation between that individual's capabilities and the essential job tasks.

3.3.10 Health and Fitness Coordinator. A 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.

3.3.11 Health and Safety Committee. A representative group of individuals who serve along with the fire department physician and health and fitness coordinator, and is chaired by the fire department health and safety officer who oversee the implementation of the fire department occupational safety and health program.

3.3.12 Health and Safety Officer. The member of the fire department assigned and authorized by the fire chief as the manager of the safety and health program and who performs the duties and responsibilities specified in this standard.

3.3.13 Health-Related Fitness Programs (HRFP). A comprehensive program designed to promote the member's ability to perform occupational activities with vigor and to assist the member in the attainment and maintenance of the premature development of injury, morbidity, and mortality.

3.3.14 Infection Control Program. This program includes, but is not limited to, implementation of written policies and standard operating procedures regarding exposure follow-up measures, immunizations, members' health screening programs, and educational programs.

3.3.15 Medical Condition Classifications.

3.3.15.1 ***Category A Medical Condition.*** A medical condition that would preclude a person from performing as a member in a training or emergency operational environment by presenting a significant risk to the safety and health of the person or others.

3.3.15.2 ***Category B Medical Condition.*** A medical condition that, based on its severity or degree, could preclude a person from performing as a member in a training or emergency operational environment by presenting a significant risk to the safety and health of the person or others.

3.3.16 Medical Evaluation. The analysis of information for the purpose of making a determination of medical certification. Medical evaluation includes a medical examination.

3.3.17 Medical Examination. An examination performed or directed by the fire department physician.

3.3.18 Medically Certified. A determination by the fire department physician that the candidate or current member meets the medical requirements of this standard.

3.3.19 Member. A person involved in performing the duties and responsibilities of a fire department under the auspices of the organization. A fire department member can be a full-time or part-time employee or a paid or unpaid volunteer, can occupy any position or rank within the fire department, and can engage in emergency operations.

3.3.20 Occupational Safety and Health Program. An occupation specific program, implemented to reduce the risks associated with the occupation, that outlines the components of a program and the roles and responsibilities of the fire department and its members.

3.3.21 Performance. Those criteria that are required by members to safely and efficiently do the required essential job tasks.

NEXT CHAPTER

Chapter 4 Roles and Responsibilities

4.1 Fire Department Responsibilities.

4.1.1* The fire department shall establish a medical program that includes medical evaluations for candidates and members.

4.1.2 The medical evaluations and any additional medical tests ordered by the fire department physician shall be provided at no cost to the members.

4.1.2.1* This obligation shall not extend to medical tests beyond the basic medical evaluation for candidates.

4.1.3 The fire department shall have an officially designated physician who shall be responsible for guiding, directing, and advising the members with regard to their health, fitness, and suitability for duty as required by NFPA 1500.

4.1.4* The fire department shall ensure that the fire department physician is a licensed doctor of medicine or osteopathy who has completed residency training in an accredited medical training program and/or is American Boards of Medical Specialties (ABMS) or American Osteopathic Association (AOA) board certified or international equivalent.

4.1.5 The fire department shall provide the fire department physician with a fire service overview, current job descriptions, and the essential job tasks required for all fire department positions and ranks.

4.1.6 The fire department shall provide the fire department physician with the department's organizational statement that outlines types and levels of services provided by the department, in accordance with NFPA 1500.

4.1.7* The types and levels of services provided by the fire department shall dictate for candidates and members the essential job tasks that pertain to its members and shall therefore be correlated to the medical requirements outlined in this standard.

4.1.8 For the purpose of conducting medical evaluations, the fire department shall assist the fire department physician to understand the physiological and psychological demands placed on members as well as the environmental conditions under which they must perform and the personal protective ensembles they must wear during various types of emergency operations.

4.1.9 The fire department shall ensure member access to evaluation by medical specialists, medical and/or surgical treatment, rehabilitation, and any other intervention prescribed by a medical provider, in consultation with the fire department physician, following an injury or illness resulting from a member's participation in fire department functions.

4.1.10 The fire department shall require that the fire department health and safety officer and the health and fitness coordinator maintain a liaison relationship with the fire department physician to ensure that all aspects of the comprehensive occupational medical program are actively engaged.

4.1.11 The fire department shall ensure employee privacy and confidentiality regarding medical conditions identified during the medical evaluation except as required by law.

4.1.12 Where possible, the fire department shall provide alternate duty position for members with temporary work restrictions as recommended by the fire department physician.

4.1.13* The fire department comprehensive occupational medical program shall include collection and maintenance of a confidential medical and health information system for

members. All medical record keeping shall comply with the requirements of 29 CFR 1910.120, “Access to Employee Exposure and Medical Records,” and other applicable regulations and laws.

4.1.14 The provisions of 4.1.13 shall apply to all health and medical records regarding individual members and to all methods of communicating or transferring the information contained in these records, including written, oral, electronic and any other means of communication.

4.2 Fire Department Physician Responsibilities.

4.2.1 The fire department physician shall fulfill the following responsibilities:

(1) Understand the physiological, psychological, and environmental demands placed on fire fighters.

(2) Evaluate fire department candidates and members to identify medical conditions that could affect their ability to safely respond to emergency operations.

(3) Utilize the essential job task descriptions, supplied by the fire department, to determine a candidate's or a member's medical certification.

(4) Identify and report the presence of Category A or disqualifying Category B medical conditions if present in candidates.

(5) Inform the fire department chief or designee whether or not the candidate or current member is medically certified to safely perform the essential job tasks. Specific information concerning medical diagnosis shall be released only with written permission from the candidate or member. **Physician Guidance (Confidentiality):** Confidentiality of all medical data is critical to the success of the program. Members need to feel assured that the information provided to the physician will not be inappropriately shared. No fire department supervisor or manager shall have access to medical records without the express written consent of the member. There are occasions, however, when specific medical information is needed to make a decision about placement, return to work, and so forth, and a fire department manager shall have more medical information for decision making. In that situation, written medical consent shall be obtained from the member to release the specific information necessary for that decision.

(6) Report the results of the medical evaluation to the candidate or current member, including any medical condition(s) identified during the medical evaluation, and the recommendation as to whether the candidate or current member is medically certified to safely perform the essential job tasks.

(7) Forward copies of any abnormal results along with patient instructions regarding primary care follow-up to candidates or current members who were instructed to seek (as appropriate) medical follow-up to address any medical conditions, or lab abnormalities, identified during the medical evaluation.

(8) Review results of the annual fitness evaluation as described in Chapter 8.

(9) Provide or arrange for a prescriptive rehabilitation and/or fitness program when indicated to aid a member's recovery from illness or injury and enhance his/her ability to safely perform essential job tasks.

4.2.2 When medical evaluations are conducted by a physician or medical provider other than the fire department physician, the evaluation shall be reviewed and approved by the fire department physician.

4.2.3 The fire department physician shall review individual medical evaluations and aggregate data from member evaluations in order to detect evidence of occupational exposure(s) or clusters of occupational disease.

4.2.4 The fire department physician shall be a member of the Fire Department Occupational Safety and Health Committee chaired by the health and safety officer as required by NFPA 1500.

4.2.5 The fire department physician shall provide medical supervision for the fire department fitness, return-to-duty rehabilitation, and physical conditioning programs as required by NFPA 1583.

4.2.6* The fire department physician shall ensure adequate on-scene medical support at incident scene rehabilitation sector for members during emergency operations as required by NFPA 1500 and NFPA 1561.

4.2.7 The fire department physician shall provide supervision for the fire department infection control program as required by NFPA 1581.

4.3 Candidate and Member Responsibilities.

Each candidate or member shall adhere to the following requirements:

(1) Cooperate, participate, and comply with the medical evaluation process

(2) Provide complete and accurate information to the fire department physician and other authorized medical care provider(s)

(3) Report any occupational exposure such as exposures to hazardous materials or toxic substances and exposure to infectious or contagious diseases

(4) Report to the fire department physician any medical condition that could interfere with the ability of the individual to safely perform essential job tasks, such as illness or injury, use of prescription or nonprescription drugs, and pregnancy

NEXT CHAPTER

Chapter 5 Essential Job Tasks

5.1 Essential Job Tasks and Descriptions.

5.1.1 The types and levels of emergency services provided to the local community by the fire department, together with a consideration of the structures and occupancies comprising the community, and the configuration of the fire department shall dictate the essential job tasks of fire department members.

5.1.2 Medical requirements for candidates and members shall be correlated with their essential job tasks as determined by the fire department and AHJ.

5.1.3 The essential job tasks shall reflect the physical, physiological, intellectual, and psychological demands of the occupation.

5.1.3.1 Physician Guidance: Before this list is used in any jurisdiction, the fire department shall provide the fire department physician with the essential job tasks, listed below, which are applicable:

(1) Performing fire-fighting tasks (e.g., hoseline operations, extensive crawling, lifting and carrying heavy objects, ventilating roofs or walls using power or hand tools, forcible entry), rescue operations, and other emergency response actions under stressful conditions while wearing personal protective ensembles (PPE) and self-contained breathing apparatus (SCBA), including working in extremely hot or cold environments for prolonged time periods.

(2) Wearing an SCBA, which includes a demand valve-type positive pressure facepiece or HEPA filter masks, which requires the ability to tolerate increased respiratory workloads.

(3) Exposure to toxic fumes, irritants, particulates, biological (infectious) and nonbiological hazards, and/or heated gases, despite the use of PPE including SCBA.

(4) Depending on the local jurisdiction, climbing 6 or more flights of stairs while wearing fire protective ensemble weighing at least 50 lb or more and carrying equipment/tools weighing an additional 20 to 40 lb.

(5) Wearing fire protective ensemble that is encapsulating and insulated. Wearing this clothing will result in significant fluid loss that frequently progresses to clinical dehydration and can elevate core temperature to levels exceeding 102.2°F (39°C).

(6) Searching, finding, and rescue-dragging or carrying victims ranging from newborns up to adults weighing over 200 lb to safety despite hazardous conditions and low visibility.

(7) Advancing water-filled hoselines up to 2.5 in. in diameter from fire apparatus to occupancy (approximately 150 ft); can involve negotiating multiple flights of stairs, ladders, and other obstacles.

(8) Climbing ladders, operating from heights, walking or crawling in the dark along narrow and uneven surfaces, and operating in proximity to electrical power lines and/or other hazards.

(9) Unpredictable emergency requirements for prolonged periods of extreme physical exertion without benefit of warm-up, scheduled rest periods, meals, access to medication(s), or hydration.

(10) Operating fire apparatus or other vehicles in an emergency mode with emergency lights and sirens.

(11) Critical, time-sensitive, complex problem solving during physical exertion in stressful, hazardous environments (including hot, dark, tightly enclosed spaces), further aggravated by fatigue, flashing lights, sirens, and other distractions.

(12) Ability to communicate (give and comprehend verbal orders) while wearing PPE and SCBA under conditions of high background noise, poor visibility, and drenching from hoselines and/or fixed protection systems (sprinklers).

(13) Functioning as an integral component of a team, where sudden incapacitation of a member can result in mission failure or in risk of injury or death to civilians or other team members (e.g., two in, two out as described in NFPA 1500).

5.1.4 In addition to general fire-fighting duties, members of specialized teams such as hazardous materials units, self-contained underwater breathing apparatus (SCUBA) teams, Technical Rescue Teams, EMS teams, or units supporting tactical law enforcement operations shall be required to perform additional tasks not specified in 5.1.3.1(1) through 5.1.3.1(13). These tasks shall require members to wear or utilize specialized PPE that can increase weight, environmental isolation, sensory deprivation, and/or dehydration potential above levels experienced with standard fire suppression PPE. They also can include additional medical and/or physical requirements that shall not all be enumerated in this standard.

NEXT CHAPTER

Evaluations of Candidates

6.1* Medical Evaluation.

Medical evaluations of candidates shall be conducted prior to training programs or participation in departmental emergency response activities.

6.1.1* Medical evaluation of candidates including history, examination, and laboratory tests as indicated shall be performed on each candidate in order to detect any physical or medical condition(s) that could adversely affect the candidate's ability to safely perform all essential job tasks under emergency conditions.

6.1.2 If a candidate presents with a condition that temporarily interferes with his/her ability to safely perform essential job tasks, the pre-placement medical evaluation shall be postponed until the candidate has recovered from that condition.

6.2 Medical Conditions Affecting Ability to Safely Perform Essential Job Tasks.

6.2.1 Medical conditions that can affect a candidate's ability to safely perform essential job tasks shall be designated either Category A or Category B.

6.2.2 Candidates with Category A medical conditions shall not be certified as meeting the medical requirements of this standard.

6.2.3 Candidates with Category B medical conditions shall be certified as meeting the medical requirements of this standard only if they can perform the essential job tasks without posing a significant safety and health risk to themselves, members, or civilians.

6.3 Head and Neck.

6.3.1 Head.

6.3.1.1 Category A medical conditions shall include the following:

(1) Defect of skull preventing helmet use or leaving underlying brain unprotected from trauma

(2) Any skull or facial deformity that would not allow for a successful respiratory facepiece fit test

(3) Any head condition that results in a person not being able to safely perform essential job tasks

6.3.1.2 Category B medical conditions shall include the following:

(1)* Deformities of the skull such as depressions or exostoses

(2)* Deformities of the skull associated with evidence of disease of the brain, spinal cord, or peripheral nerves

(3)* Loss or congenital absence of the bony substance of the skull

6.3.2 Neck.

6.3.2.1 Category A medical conditions shall include the following:

(1) Any neck condition that results in a person not being able to safely perform essential job tasks

(2) Reserved

6.3.2.2 Category B medical conditions shall include the following:

(1)* Thoracic outlet syndrome

(2)* Congenital cysts, chronic draining fistulas, or similar lesions

(3)* Contraction of neck muscles

6.4 Eyes and Vision.

6.4.1 Category A medical conditions shall include the following:

(1)* Far visual acuity. Far visual acuity less than 20/40 binocular, corrected with contact lenses or spectacles. Far visual acuity less than 20/100 binocular for wearers of hard contacts or spectacles, uncorrected.

(2)* Color perception. Monochromatic vision resulting in inability to use imaging devices.

(3)* Monocular vision.

(4) Any eye condition that results in a person not being able to safely perform essential job tasks.

6.4.2 Category B medical conditions shall include the following:

(1)* Diseases of the eye such as retinal detachment, progressive retinopathy, or optic neuritis

(2)* Ophthalmological procedures such as radial keratotomy, Lasik procedure, or repair of retinal detachment

(3) Peripheral vision in the horizontal meridian of less than 110 degrees in the better eye or any condition that significantly affects peripheral vision in *both* eyes

6.5* Ears and Hearing.

6.5.1 Category A medical conditions shall include the following:

(1) Chronic vertigo or impaired balance as demonstrated by the inability to tandem gait walk.

(2) On audiometric testing, average hearing loss in the unaided better ear greater than 40 decibels (dB) at 500 Hz, 1000 Hz, and 2000 Hz when the audiometric device is calibrated to ANSI Z24.5.

(3) Any ear condition (or hearing impairment) that results in a person not being able to safely perform essential job tasks.

6.5.2 Category B medical conditions shall include the following:

(1)* Unequal hearing loss

(2) Average uncorrected hearing deficit at the test frequencies 500 Hz, 1000 Hz, 2000 Hz, and 3000 Hz greater than 40 dB in *either* ear

(3) Atresia, stenosis, or tumor of the auditory canal

(4)* External otitis

(5)* Agenesis or traumatic deformity of the auricle

(6)* Mastoiditis or surgical deformity of the mastoid

(7)* Ménière's syndrome, labyrinthitis, or tinnitus

(8)* Otitis media

6.6 Dental.

6.6.1 Category A medical conditions shall include the following:

(1) Any dental condition that results in a person not being able to safely perform essential job tasks

(2) Reserved

6.6.2 Category B medical conditions shall include the following:

(1)* Diseases of the jaws or associated tissues

(2)* Orthodontic appliances

(3)* Oral tissues, extensive loss

(4)* Relationship between the mandible and maxilla that interferes with satisfactory postorthodontic replacement or ability to use protective equipment

6.7 Nose, Oropharynx, Trachea, Esophagus, and Larynx.

6.7.1 Category A medical conditions shall include the following:

(1)* Tracheostomy

(2)* Aphonia

(3) Any nasal, oropharyngeal, tracheal, esophageal, or laryngeal condition that results in not being able to safely perform essential job tasks

6.7.2 Category B medical conditions shall include the following:

(1)* Congenital or acquired deformity

(2)* Allergic rhinitis

(3) Epistaxis, recurrent

(4)* Sinusitis, recurrent

(5)* Dysphonia

(6) Anosmia

(7) Tracheal stenosis

(8) Naso-pharyngeal polyposis

6.8 Lungs and Chest Wall.

6.8.1 Category A medical conditions shall include the following:

(1) Active hemoptysis.

(2) Empyema.

(3) Pulmonary hypertension.

(4) Active tuberculosis.

(5)* Obstructive lung diseases (e.g., emphysema, chronic bronchitis, asthma, etc.) with an FEV_1/FVC <0.75, with both FEV_1 and FVC below normal (<0.80%) as defined by the American Thoracic Society *(see references in Annex D)*.

(6)* Hypoxemia — Oxygen saturation <90% at rest or exercise desaturation to <90% (exercise testing indicated when resting oxygen is <94% but >90%). Evaluate V_{O2max} as described by American College of Sports Medicine (ACSM).

(7)* Asthma — Reactive airways disease requiring bronchodilator or corticosteroid therapy in the previous 2 years. A candidate who has required these medications but who does not believe he/she has asthma shall demonstrate a normal response to cold air or methacholine (PC20 greater than 16 mg/ml). To be safely administered, this test shall be performed by a qualified specialist and to be valid

the candidate shall be off all anti-inflammatory medications for at least 4 weeks and off bronchodilators the day of testing. A negative challenge test [as described by American Thoraic Society (ATS)], along with no recent episode of bronchospasm off medication shall be considered evidence that the candidate does not have clinically significant airways hyperactivity or asthma.

(8) Any pulmonary condition that results in a person not being able to safely perform essential job tasks.

6.8.2 Category B medical conditions shall include the following:

(1)* Pulmonary resectional surgery, chest wall surgery, and pneumothorax

(2) Pleural effusion

(3)* Fibrothorax, chest wall deformity, and diaphragm abnormalities

(4)* Interstitial lung diseases

(5)* Pulmonary vascular diseases or history of pulmonary embolism

(6)* Bronchiectasis

(7) Infectious diseases of the lung or pleural space

(8) Cystic fibrosis

(9) Central or obstructive apnea

(10) Any other pulmonary condition that results in a person not being able to safely perform as a member

6.9 Heart and Vascular System.

6.9.1 Heart.

6.9.1.1 Category A medical conditions shall include the following:

(1)* Coronary artery disease, including history of myocardial infarction, angina pectoris, coronary artery bypass surgery, coronary angioplasty, and similar procedures

(2)* Cardiomyopathy or congestive heart failure, including signs or symptoms of compromised left or right ventricular function, including dyspnea, S3 gallop, peripheral edema, enlarged ventricle, abnormal ejection fraction, and/or inability to increase cardiac output with exercise

(3)* Acute pericarditis, endocarditis, or myocarditis

(4)* Syncope, recurrent

(5)* A medical condition requiring an automatic implantable cardiac defibrillator or history of ventricular tachycardia or ventricular fibrillation due to ischemic or valvular heart disease, or cardiomyopathy

(6) Third-degree atrioventricular block

(7)* Cardiac pacemaker

(8) Idiopathic hypertrophic subaortic stenosis

(9) Any cardiac condition that results in a person not being able to safely perform essential job tasks

6.9.1.2 Category B medical conditions shall include the following:

(1)* Valvular lesions of the heart, including prosthetic valves

(2)* Recurrent supraventricular or atrial tachycardia, flutter, or fibrillation

(3)* Left bundle branch block
(4) Second-degree atrioventricular block in the absence of structural heart disease
(5) Sinus pause >3 seconds
(6)* Ventricular arrhythmia (history or presence of multi-focal PVCs or nonsustained ventricular tachycardia on resting EKG with or without symptoms; history or presence of sustained ventricular tachycardia with or without symptoms)
(7)* Cardiac hypertrophy or hypertrophic cardiomyopathy
(8)* History of a congenital abnormality
(9)* Chronic pericarditis, endocarditis, or myocarditis

6.9.2 Vascular System.

6.9.2.1 Category A medical conditions shall include the following:

(1)* Hypertension with evidence of end organ damage or not controlled by approved medications
(2)* Thoracic or abdominal aortic aneurysm
(3) Carotid artery stenosis or obstruction resulting in ≥50 percent reduction in blood flow
(4)* Peripheral vascular disease resulting in symptomatic claudication
(5) Any other vascular condition that results in a person not being able to safely perform essential job tasks

6.9.2.2 Category B medical conditions shall include the following:

(1) Vasospastic phenomena such as Raynaud's phenomenon
(2)* Thrombophlebitis and varicosities
(3)* Chronic lymphedema due to lymphadenopathy or venous valvular incompetency
(4)* Congenital or acquired lesions of the aorta or major vessels
(5)* Circulatory instability as indicated by orthostatic hypotension, persistent tachycardia, and peripheral vasomotor disturbances
(6) History of surgical repair of aneurysm of the heart or major vessel

6.10 Abdominal Organs and Gastrointestinal System.

6.10.1 Category A medical conditions shall include the following:

(1) Presence of uncorrected inguinal/femoral hernia regardless of symptoms
(2) Any gastrointestinal condition that results in a person not being able to safely perform essential job tasks

6.10.2 Category B medical conditions shall include the following:

(1)* Cholecystitis
(2)* Gastritis
(3)* GI bleeding
(4)* Acute hepatitis
(5) Hernia including the following:

(a) Uncorrected umbilical, ventral, or incisional hernia if significant risk exists for infection or strangulation

(b) Significant symptomatic hiatal hernia if associated with asthma, recurrent pneumonia, chronic pain, or chronic ulcers

(c)* Surgically corrected hernia >3 months after surgical correction

(6)* Inflammatory bowel disease or irritable bowel syndrome

(7)* Intestinal obstruction

(8)* Pancreatitis

(9) Diverticulitis

(10)* History of gastrointestinal surgery

(11)* Peptic or duodenal ulcer or Zollinger-Ellison syndrome

(12)* Asplenia

(13)* Cirrhosis, hepatic or biliary

(14)* Chronic active hepatitis

6.11* Reproductive System.

6.11.1 Category A medical conditions shall include the following:

(1) Any genital condition that results in a person not being able to safely perform essential job tasks

(2) Reserved

6.11.2 Category B medical conditions shall include the following:

(1) Pregnancy, for its duration

(2) Dysmenorrhea

(3) Endometriosis, ovarian cysts, or other gynecologic conditions

(4) Testicular or epididymal mass

6.12 Urinary System.

6.12.1 Category A medical conditions shall include the following:

(1) Renal failure or insufficiency requiring continuous ambulatory peritoneal dialysis (CAPD) or hemodialysis

(2) Any urinary condition that results in a person not being able to safely perform essential job tasks

6.12.2 Category B medical conditions shall include the following:

(1) Diseases of the kidney

(2) Diseases of the ureter, bladder, or prostate

6.13 Spine and Axial Skeleton.

6.13.1 Category A medical conditions shall include the following:

(1) Scoliosis of thoracic or lumbar spine with angle ≥40 degrees

(2) History of multiple spinal surgeries or spinal surgery involving fusion of more than 2 vertebrae, diskectomy or laminectomy, or rods that are still in place

(3) Any spinal or skeletal condition producing sensory or motor deficit(s) or pain due to radiculopathy or nerve root compression

(4) Any spinal or skeletal condition causing pain that frequently or recurrently requires narcotic analgesic medication

(5) Cervical vertebral fractures with multiple vertebral body compression greater than 25 percent; evidence of posterior element involvement, nerve root damage,

disc involvement, dislocation (partial, moderate, severe), abnormal exam, ligament instability, symptomatic, and/or less than 6 months post injury or 1 year since surgery

(6) Thoracic vertebral fractures with vertebral body compression greater than 50 percent; evidence of posterior element involvement, nerve root damage, disc involvement, dislocation (severe — with or without surgery), abnormal exam, ligament instability, symptomatic, and/or less than 6 months post injury or 1 year since surgery

(7) Lumbosacral vertebral fractures with vertebral body compression greater than 50 percent; evidence of posterior element involvement, nerve root damage, disc involvement, dislocation (partial, moderate, severe), fragmentation abnormal exam, ligament instability, symptomatic, and/or less than 6 months post injury or 1 year since surgery

(8) Any spinal or skeletal condition that results in a person not being able to safely perform essential job tasks

6.13.2 Category B medical conditions shall include the following:

(1) Congenital or developmental malformations of the back, particularly those that can cause instability, neurological deficits, pain, or limit flexibility

(2) Scoliosis with angle <40 degrees

(3) Arthritis of the cervical, thoracic, or lumbosacral spine

(4) Facet atrophism, high lumbosacral angle, hyperlordosis, Schmorl's nodes, Scheuermann's disease, spina bifida occulta, spondylolisthesis, spondylolysis, or transitional vertebrae

(5) History of infections or infarcts in the spinal cord, epidural space, vertebrae, or axial skeletal joints

6.14 Extremities.

6.14.1 Category A medical conditions shall include the following:

(1) Bone hardware such as metal plates or rods supporting bone during healing

(2) History of total joint replacement

(3) Amputation or congenital absence of upper extremity limb (hand or higher)

(4) Amputation of either thumb proximal to the mid-proximal phalanx

(5) Amputation or congenital absence of lower extremity limb (foot or above)

(6) Chronic nonhealing or recent bone grafts

(7) History of more than one dislocation of shoulder without surgical repair or with history of recurrent shoulder disorders within the last 5 years with pain or loss of motion, and with or without radiographic deviations from normal

(8) Any extremity condition that results in a person not being able to safely perform essential job tasks

6.14.2 Category B medical conditions shall include the following:

(1)* History of shoulder dislocation with surgical repair

(2) Significant limitation of function of shoulder, elbow, wrist, hand, or finger, due to weakness, reduced range of motion, atrophy, unequal length, absence, or partial amputation

(3) Significant lack of full function of hip, knee, ankle, foot, or toes due to weakness, reduced range of motion, atrophy, unequal length, absence, or partial amputation

(4)* History of meniscectomy or ligamentous repair of knee

(5)* History of intra-articular, malunited, or nonunion of upper or lower extremity fracture

(6)* History of osteomyelitis, septic, or rheumatoid arthritis

6.15 Neurological Disorders.

6.15.1 Category A medical conditions shall include the following:

(1) Ataxias of heredo-degenerative type.

(2) Cerebral arteriosclerosis as evidenced by a history of transient ischemic attack, reversible ischemic neurological deficit, or ischemic stroke.

(3) Hemiparalysis or paralysis of a limb.

(4)* Multiple sclerosis with activity or evidence of progression within previous 3 years.

(5)* Myasthenia gravis with activity or evidence of progression within previous 3 years.

(6) Progressive muscular dystrophy or atrophy.

(7) Uncorrected cerebral aneurysm.

(8) All epileptic conditions to include simple partial, complex partial, generalized, and psychomotor seizure disorders other than those with complete control during previous 5 years. A candidate shall also have normal neurological examination without structural abnormality on brain imaging, normal awake and asleep EEG with photic stimulation and hyperventilation, as well as a definitive statement from qualified neurological specialist. A candidate with epilepsy shall not be cleared for fire-fighting duty until he or she has completed 5 years without a seizure on a stable medical regimen or 1 year without a seizure after discontinuing all anti-epileptic drugs.

(9) Dementia (Alzheimer's and other neuro-degenerative diseases) with symptomatic loss of function or cognitive impairment (e.g., ≤28 on Mini-Mental Status Exam).

(10) Parkinson's disease and other movement disorders resulting in uncontrolled movements, bradykinesia, or cognitive impairment (e.g., ≤28 on Mini-Mental Status Exam).

(11) Any neurological condition that results in a person not being able to safely perform essential job tasks.

6.15.2 Category B medical conditions shall include the following:

(1) Congenital malformations

(2)* Migraine

(3) Clinical disorders with paresis, dyscoordination, deformity, abnormal motor activity, abnormality of sensation, or complaint of pain

(4) History of subarachnoid or intraparenchymal hemorrhage

(5) Abnormalities from recent head injury such as severe cerebral contusion or concussion

6.16 Skin.

6.16.1 Category A medical conditions shall include the following:

(1) Metastatic or locally extensive basal or squamous cell carcinoma or melanoma

(2) Any dermatologic condition that would not allow for a successful respiratory facepiece fit test

(3) Any dermatologic condition that results in the person not being able to safely perform essential job tasks

6.16.2 Category B medical conditions shall include the following:

(1)* Skin conditions of a chronic or recurrent nature (eczema, cystic acne, psoriasis) that cause skin openings or inflammation or irritation of the skin surface

(2)* Surgery or skin grafting

(3)* Mycosis fungoides

(4)* Cutaneous lupus erythematosus

(5)* Raynaud's phenomenon

(6)* Scleroderma (skin)

(7)* Vasculitic skin lesions

(8)* Atopic dermatitis/eczema

(9)* Contact or seborrheic dermatitis

(10)* Stasis dermatitis

(11)* Albinism Dariers Disease, Ichthyosis Marfan's Syndrome, Neurofibromatosis, and other genetic conditions

(12)* Folliculitis, Pseudo-folliculitis, Miliaria, Keloid folliculitis

(13)* Hidradenitis suppurativa, Furuncles, Carbuncles, or Grade IV acne (cystic)

(14)* Mechano-Bullous Disorders (Epidermolysis Bullosa, Hailey Pemphigus, Porphyria, Pemphigoid)

(15)* Urticaria or Angioedema

6.17 Blood and Blood-Forming Organs.

6.17.1 Category A medical conditions shall include the following:

(1) Hemorrhagic states requiring replacement therapy

(2) Sickle cell disease (homozygous)

(3) Clotting disorders

(4) Any hematological condition that results in a person not being able to safely perform essential job tasks

6.17.2 Category B medical conditions shall include the following:

(1) Anemia

(2) Leukopenia

(3) Polycythemia vera

(4) Splenomegaly

(5) History of thromboembolic disease

(6) Any other hematological condition that results in a person not being able to safely perform essential job tasks

6.18 Endocrine and Metabolic Disorders.

6.18.1 Category A medical conditions shall include the following:

(1) Diabetes mellitus, which is treated with insulin

(2)* Diabetes not treated by insulin, which is not controlled as evidenced by Hemoglobin A1C (Hb A1C) measurement

(3) Any endocrine or metabolic condition that results in a person not being able to safely perform essential job tasks

6.18.2 Category B medical conditions shall include the following:

(1)* Diseases of the adrenal gland, pituitary gland, parathyroid gland, or thyroid gland of clinical significance

(2) Nutritional deficiency diseases or other metabolic disorder

(3) Diabetes mellitus that is well controlled on diet, exercise, and/or oral hypoglycemic agents

6.19 Systemic Diseases and Miscellaneous Conditions.

6.19.1 Category A medical conditions shall include the following:

(1) Any systemic condition that results in a person not being able to safely perform essential job tasks

(2) Reserved

6.19.2 Category B medical conditions shall include the following:

(1) Connective tissue disease, such as dermatomyositis, systemic lupus erythematosus, scleroderma, and rheumatoid arthritis

(2)* History of thermal, chemical, or electrical burn injury with residual functional deficit

(3) Documented evidence of a predisposition to heat stress with recurrent episodes or resulting residual injury

6.20 Tumors and Malignant Diseases.

6.20.1 Category A medical conditions shall include the following:

(1) Malignant disease that is newly diagnosed, untreated, or currently being treated

(2) Any tumor or similar condition that results in a person not being able to safely perform essential job tasks

6.20.2 Category B medical conditions shall be evaluated on the basis of an individual's current physical condition and on the staging and prognosis of the malignancy (i.e., likelihood that the disease will recur or progress), and include the following:

(1)* Benign tumors

(2)* History of CNS tumor or malignancy

(3)* History of head and neck malignancy

(4)* History of lung cancer

(5)* History of GI or GU malignancy

(6)* History of bone or soft tissue tumors or malignancies

(7)* History of hematological malignancy

6.21 Psychiatric Conditions.

6.21.1 Category A medical conditions shall include the following:

(1) Any psychiatric condition that results in a person not being able to safely perform essential job tasks

(2) Reserved

6.21.2 Category B medical conditions shall include the following:

(1) A history of psychiatric condition or substance abuse problem

(2) Requirement for medications that increase an individual's risk of heat stress, or other interference with the ability to safely perform essential job tasks

6.22 Chemicals, Drugs, and Medications.

6.22.1 Category A medical conditions shall include those that require chronic or frequent treatment with any of the following medications or classes of medications:

(1) Narcotics, including methadone

(2) Sedative-hypnotics

(3) Drugs that prolong Prothrombin Time, Partial Thromboplastin Time, or INR

(4) Beta-adrenergic blocking agents

(5) Respiratory medications: Inhaled bronchodilators, inhaled corticosteroids, systemic corticosteroids, theophylline, and leukotriene receptor blockers/antagonists

(6) Any chemical, drug, or medication that results in a person not being able to safely perform essential job tasks

6.22.1.1 Tobacco use shall be a Category A medical condition.

6.22.1.2 Evidence of illegal drug use detected through testing, conducted in accordance with Substance Abuse and Mental Health Service Administration (SAMHSA), shall be a Category A medical condition.

6.22.1.3 Evidence of clinical intoxication or a measured blood alcohol level that exceeds the legal definition of intoxication according to the AHJ at the time of medical evaluation shall be a Category A medical condition.

6.22.2* Category B medical conditions shall include the use of the following:

(1) Cardiovascular agents

(2) Stimulants

(3) Psychoactive agents

(4) Corticosteroids

(5) Antihistamines

(6) Muscle relaxants

NEXT CHAPTER

Chapter 7 Occupational Medical Evaluation of Members

7.1 General.

7.1.1 The fire department shall establish and maintain a confidential medical evaluation program for members.

7.1.2 Medical evaluations shall be conducted as a baseline for surveillance and annually thereafter.

7.1.3* Medical evaluations shall be performed following occupational exposure, illness, injury, or protracted absence from the job. The scope of that evaluation shall be determined by the fire department physician reviewing the type and severity of the condition.

7.1.4 The components of the medical evaluations shall conform to all applicable OSHA standards, including 29 CFR 1910.120, “Hazardous Waste Operations and Emergency Response,” 29 CFR 1910.134, “Respiratory Protection,” 29 CFR 1910.95, “Occupational Noise Exposure,” and 29 CFR 1910.1030, “Bloodborne Pathogens.”

7.2 Member Education Regarding Medical Evaluation Program.

7.2.1 The fire department, the fire department physician, and member organizations where they exist shall be responsible to convey the purposes and importance of the annual occupational medical evaluation to members and to the AHJ.

7.2.2 The purpose of the annual occupational medical evaluation of members shall include but cannot be limited to the following:

(1) Identifying conditions that interfere with a member's physical or mental ability to safely perform essential job tasks without undue risk of harm to self or others

(2) Monitoring the effects of exposure to specific biological, physical, or chemical agents on individual members

(3) Detecting changes in a member's health that can be related to harmful working conditions

(4) Detecting patterns of disease or injury occurrence in the workforce that could indicate underlying work-related problems

(5)* Providing members with information about their current health, promoting wellness, and referring them for appropriate further evaluation and treatment

(6) Providing members with information and education about occupational hazards

(7) Providing a cost-effective investment in work-related disease prevention, early detection, and health promotion for members

(8) Complying with federal, state, provincial, local, and/or other jurisdictional requirements

7.3 Timing of the Annual Occupational Medical Evaluation of Members.

7.3.1 All members shall receive a baseline medical evaluation after hiring and prior to performing fire fighter emergency functions and at least annually thereafter.

7.3.2 The baseline medical evaluation shall include the components of the annual occupational medical evaluation not performed as part of the candidate medical evaluation, provided the candidate medical evaluation was performed within the past 12 months.

7.3.3 The annual evaluation shall be completed every 12 months (±3 months).

7.3.4 Annual medical evaluations shall be compared to baseline and subsequent evaluations to identify clinically relevant changes.

7.3.5 The interval requirements for performance of the annual occupational medical evaluation (as listed in Section 7.4) shall not preclude more frequent medical evaluations of members for new or recurring conditions when requested by the member, fire department physician, or AHJ.

7.4 Components of the Annual Occupational Medical Evaluation of Members.

7.4.1 All components listed in Section 7.4 shall be included in the baseline and annual occupational medical evaluations of members.

7.4.2 It shall be acceptable for certain components of the annual occupational medical evaluation to be performed by a member's private physician provided full results are forwarded in the required time frame to the fire department physician.

7.4.3 Each medical evaluation shall include a medical history (including exposure history), physical examination, blood tests, urinalysis, vision tests, audiograms, spirometry, chest X-ray (as indicated), electrocardiogram, cancer screening (as indicated), and immunizations and infectious disease screening (as indicated).

7.4.4 Tests for illegal drugs shall not be performed as part of the annual medical evaluation.

7.5 Medical History.

7.5.1 A medical history questionnaire shall be completed by each member to provide baseline information with which to compare future medical concerns.

7.5.2 An annual medical history questionnaire shall be completed to provide follow-up information, which includes changes in health status and known occupational exposures since the previous annual evaluation.

7.5.3 Information on the questionnaire and interval concerns shall be reviewed with each member by the fire department physician or designated medical evaluator.

7.6 Physical Examination.

7.6.1 The annual physical examination shall include each of the following components:

(1) Vital signs
(2) Head, eyes, ears, nose, and throat (HEENT)
(3) Neck
(4) Cardiovascular
(5) Pulmonary
(6) Breast
(7) Gastrointestinal (includes rectal exam for mass, occult blood)
(8) Genitourinary (includes pap smear, testicular exam, rectal exam for prostate mass)
(9) Hernia
(10) Lymph nodes
(11) Neurological
(12) Musculoskeletal
(13) Skin (includes screening for cancers)
(14) Vision

7.6.2* The laboratory tests in 7.6.3 through Section 7.13 shall be performed annually for each member.

7.6.3 Blood Tests. The blood tests required shall include the following:

(1) CBC with differential, RBC indices and morphology, and platelet count
(2) Electrolytes (Na, K, Cl, HCO_3, or CO_2)
(3) Renal function (BUN, creatinine)
(4) Glucose
(5) Liver function tests (ALT, AST, direct and indirect bilirubin, alkaline phosphatase)
(6) Total cholesterol, HDL, LDL, clinically useful lipid ratios (e.g., percent LDL), and triglycerides
(7) Prostate Specific Antigen (PSA) after age 40 for positive family history, African American, or if otherwise clinically indicated; after age 50 for all other male members

7.6.4 Urine Laboratory Tests. The urine laboratory tests required shall include the following:

(1) Dipstick analysis for glucose, ketones, leukocyte esterase, protein, blood, and bilirubin
(2) Microscopic analysis for RBC, WBC, casts, and crystals if indicated by results of dipstick analysis
(3) Analysis for occupational chemical exposure if indicated

7.6.5 Audiology. Hearing thresholds shall be assessed in each ear at each of the following frequencies:

(1) 500 Hz
(2) 1000 Hz
(3) 2000 Hz
(4) 3000 Hz
(5) 4000 Hz
(6) 6000 Hz
(7) 8000 Hz

7.6.5.1 The fire department physician or other qualified medical evaluator shall compare audiogram results obtained during yearly evaluations with baseline and subsequent test results.

7.6.5.2 Standard threshold shifts shall be corrected for age as permitted by OSHA.

7.7 Spirometry.

7.7.1* Pulmonary function testing (spirometry) shall be conducted to measure the member's forced vital capacity (FVC), forced expiratory volume in 1 second (FEV_1), and the FEV_1/FVC ratio.

7.7.2 The fire department physician or other qualified medical evaluator shall compare spirometry results obtained during yearly evaluations with baseline and subsequent test results.

7.7.3* Results shall be corrected according to American Thoracic Society (ATS) guidelines and normative equations found in Knudson et al. (1983) and the American College of Occupational and Environmental Medicine (2000).

7.8 Chest Radiographs.

7.8.1 Chest X-rays shall include an initial baseline and shall be repeated every 5 years or as medically indicated.

7.8.2 The fire department physician or other qualified medical evaluator shall compare any chest radiographs with baseline and subsequent radiographs.

7.9 Electrocardiograms (EKG).

7.9.1* A resting EKG shall be performed as part of the baseline medical evaluation and shall be obtained annually thereafter.

7.9.2 The fire department physician or other qualified medical evaluator shall compare EKGs obtained during yearly evaluations with baseline and subsequent EKGs.

7.9.3* Stress EKG with or without echocardiography or radionuclide scanning shall be performed as clinically indicated by history or symptoms.

7.10 Mammography.

7.10.1 Mammography shall be performed annually on each female member over the age of 40.

7.10.2 A qualified radiologist shall compare mammograms to prior mammograms. The fire department physician shall compare mammography reports to prior reports.

7.11 Immunizations and Infectious Disease Screening.

The following infectious disease immunizations or infectious disease screening shall be provided, as indicated:

(1)* Tuberculosis screen (PPD) (annually or more frequently according to CDC guidelines) unless member has a history of positive PPD. If positive by history, CDC guidelines for management and subsequent chest radiographic surveillance shall be followed.

(2) Hepatitis C virus screen (baseline and following occupational exposure).

(3) Hepatitis B virus vaccinations and titers (as specified in CDC guidelines).

(4) Tetanus/diphtheria vaccine (booster every 10 years).

(5) Measles, mumps, rubella vaccine (MMR).

(6) Polio vaccine.

(7) Hepatitis A vaccine. Vaccine shall be offered to high risk (HazMat, USAR, and SCUBA) and other personnel with frequent or expected exposures to contaminated water.

(8) Varicella vaccine. Vaccine shall be offered to all non-immune personnel.

(9) Influenza vaccine. Vaccine shall be offered to all personnel annually.

(10) HIV screening. Screening shall be available to all personnel.

(11)* HIV testing shall be offered on a confidential basis as part of post-exposure protocols and as requested by the physician or member. All results from HIV tests are provided directly to the member and will be maintained by the physician as confidential documents, and shall not be forwarded to any local, state, provincial, national, or international database unless mandated by public health statute.

(12)* All members shall be immunized against infectious diseases as required by the authority having jurisdiction and by 29 CFR 1910.1030, “Bloodborne Pathogens.” The fire department physician shall ensure that all members are offered currently recommended immunizations.

7.12 Heavy Metal Evaluation.

7.12.1 Baseline testing for heavy metals shall be required when indicated.

7.12.2 Evaluations shall be performed following known exposures, for recurrent exposures, or where required under federal, state, or provincial regulations.

7.13 Screening Colonoscopy Services.

Screening colonoscopy services shall be provided to all members above the age of 50 or earlier if clinically indicated.

NEXT CHAPTER

Chapter 8 Annual Occupational Fitness Evaluation of Members

8.1 Weight and Body Composition.

8.1.1* Body weight shall be measured and recorded annually.

8.1.2 A body composition evaluation including the following shall be conducted on personnel solely for the purpose of departmental health surveillance:

(1)* Circumferential measurements

(2) Hydrostatic weighing or Bod-Pod

(3)* Skinfold measurements

(4) Bio impedance analysis

8.2 Annual Fitness Evaluation.

8.2.1* The fitness evaluation shall be conducted on an annual basis. It shall include a mandatory pre-evaluation procedure and the components in 8.2.1.1 through 8.2.1.4. *(For additional information, see Annex C.)*

8.2.1.1* An evaluation of aerobic capacity shall be conducted using either a stairmill or a treadmill protocol.

8.2.1.2 An evaluation of muscular strength shall be conducted using each of the following protocols:

(1)* Grip strength evaluation

(2)* Leg strength evaluation

(3)* Arm strength evaluation

8.2.1.3 An evaluation of muscular endurance shall be conducted using each of the following protocols:

(1)* Push-up evaluation

(2)* Curl-up evaluation

8.2.1.4* An evaluation of flexibility shall be conducted using the sit-and-reach protocol.

NEXT CHAPTER

Tasks — Specific Evaluation of Medical Conditions in Members

9.1 Essential Job Tasks.

A representative list of essential job tasks was enumerated in Chapter 5 and shall be reproduced here for ease of use. Throughout this chapter, each task (1 through 13) shall be referred to by number only.

(1)* Performing fire-fighting tasks (e.g., hoseline operations, extensive crawling, lifting and carrying heavy objects, ventilating roofs or walls using power or hand tools, forcible entry, etc.), rescue operations, and other emergency response actions under stressful conditions while wearing PPE and SCBA, including working in extremely hot or cold environments for prolonged time periods.

(2) Wearing an SCBA, which includes a demand valve-type positive pressure facepiece or HEPA filter masks, which requires the ability to tolerate increased respiratory workloads.

(3) Exposure to toxic fumes, irritants, particulates, biological (infectious) and nonbiological hazards, and/or heated gases, despite the use of PPE including SCBA.

(4) Depending on the local jurisdiction, climbing 6 or more flights of stairs while wearing fire protective ensemble weighing at least 50 lb or more and carrying equipment/tools weighing an additional 20 to 40 lb.

(5) Wearing fire protective ensemble that is encapsulating and insulated. Wearing this clothing will result in significant fluid loss that frequently progresses to clinical dehydration and can elevate core temperature to levels exceeding 102.2°F (39°C).

(6) Searching, finding, and rescue-dragging or carrying victims ranging from newborns up to adults weighing over 200 lb to safety despite hazardous conditions and low visibility.

(7) Advancing water-filled hoselines up to 2.5 in. in diameter from fire apparatus to occupancy (approximately 150 ft); can involve negotiating multiple flights of stairs, ladders, and other obstacles.

(8) Climbing ladders, operating from heights, walking or crawling in the dark along narrow and uneven surfaces, and operating in proximity to electrical power lines and/or other hazards.

(9) Unpredictable emergency requirements for prolonged periods of extreme physical exertion without benefit of warm-up, scheduled rest periods, meals, access to medication(s), or hydration.

(10) Operating fire apparatus or other vehicles in an emergency mode with emergency lights and sirens.

(11) Critical, time-sensitive, complex problem solving during physical exertion in stressful, hazardous environments (including hot, dark, tightly enclosed spaces), further aggravated by fatigue, flashing lights, sirens, and other distractions.

(12) Ability to communicate (give and comprehend verbal orders) while wearing PPE and SCBA under conditions of high background noise, poor visibility, and drenching from hoselines and/or fixed protection systems (sprinklers).

(13) Functioning as an integral component of a team, where sudden incapacitation of a member can result in mission failure or in risk of injury or death to civilians or other team members (e.g., two in, two out as described in NFPA 1500).

9.1.1 In addition to general fire-fighting duties, members of specialized teams such as hazardous materials units, SCUBA teams, Technical Rescue Teams, EMS teams, or units supporting tactical law enforcement operations shall be required to perform additional tasks not specified in 9.1(1) through 9.1(13). These tasks shall require members to wear or utilize specialized PPE that can increase weight, environmental isolation, sensory deprivation, and/or dehydration potential above levels experienced with standard fire suppression PPE. They also can include additional medical and/or physical requirements that shall not all be enumerated in this standard.

9.2 Medical Conditions.

9.2.1 Medical conditions that potentially interfere with a member's ability to safely perform essential job tasks shall be listed by organ system.

9.2.2 The relevant task(s) shall be identified by number.

9.3 Fire Department Physician Roles.

The fire department physician shall recommend restricting members from performing only those specific essential job tasks that cannot be safely performed by the member given his/her medical condition.

9.3.1 If an illness, injury, or other debilitating condition has altered a member's ability to safely perform an essential job task, the fire department physician shall notify the fire department that the member is restricted from performing that task while on duty.

9.3.2* The fire department shall determine possible accommodations for members restricted from certain job tasks.

9.4* Cardiovascular Disorders.

9.4.1 Cardiovascular disorders shall include any disorder of the cardiovascular system including but not limited to supraventricular or ventricular arrhythmias (abnormal heart beats), coronary artery disease, and cardiac muscle disease or valve disease.

9.4.2 For potential interference with essential job tasks, the member shall be evaluated for the following:

(1) Coronary artery disease including history of myocardial infarction, coronary artery bypass surgery, coronary angioplasty with stent placement, or similar procedures. **Physician Guidance:** Evaluation of coronary artery disease requires a coronary angiogram and some assessment of left ventricular function. Following a myocardial infarction or a coronary revascularization procedure, a radionuclide stress test must be performed to evaluate exercise tolerance and the presence of exercise-induced myocardial ischemia or ventricular arrhythmias. The following clinical conditions referable to coronary artery disease compromise a member's ability to safely perform essential job tasks 1, 2, 4, 5, 6, 7, 9, and 13:

(a) Current angina pectoris even if relieved by medication.

(b) Persistent significant stenosis in any coronary artery (>70 percent lumen diameter narrowing) following treatment.

(c) Lower than normal left ventricular ejection fraction as measured by radionuclide scan, contrast ventriculography, or echocardiography. **Physician Guidance:** Reports of left ventricular ejection fraction should include "normal" values for the lab performing the test and formal interpretation by a cardiologist.

(d) Maximal exercise tolerance of <42 ml O_2/min/kg or <12 metabolic equivalents (METS). **Physician Guidance:** Workload demands of fire fighting have been shown to exceed these levels.

(e) Exercise-induced ischemia or ventricular arrhythmias at ≤12-METS workload by radionuclide stress test.

(f) History of myocardial infarction (MI), angina, or coronary artery disease with persistence of modifiable risk factor(s) for acute coronary plaque rupture (e.g., tobacco use, hypertension despite treatment or hypercholesterolemia with cholesterol ≥180 or low density lipoproteins ≥ 100 despite treatment, or glycosylated hemoglobin >6.5 despite exercise and/or weight reduction).

(2) Congestive heart failure due to any etiology. Any disease leading to a lower than normal left or right ventricular ejection fraction, even if corrected by medication, compromises a member's ability to safely perform essential job tasks 1, 2, 4, 7, 9, and 13. **Physician Guidance:** If the heart failure is due to a reversible process that ultimately results in no abnormality in cardiac performance off all cardiac medications (e.g., hyperthyroidism, anemia), then a history of congestive heart failure does not permanently prevent a member from safely performing the essential job tasks.

(3) Restrictive cardiomyopathy and constrictive pericarditis. When these conditions result in heart failure, they compromise a member's ability to safely perform essential job tasks 1, 2, 4, 7, and 9.

(4) Acute pericarditis, acute endocarditis, and acute myocarditis. These conditions compromise a member's ability to safely perform essential job tasks 1, 4, 5, 6, 7, 9, and 13.

(5) Chronic pericarditis, endocarditis, or myocarditis can result in the inability to safely perform essential job tasks 1, 4, 5, 6, 7, and 13 due to limitations of endurance. **Physician Guidance:** In such members, cardiac function, rhythm, and valvular competence needs to be carefully and regularly assessed at least annually by cardiac echo or other noninvasive or invasive monitoring in consultation with a cardiologist.

(6) Hypertrophic obstructive cardiomyopathy (idiopathic hypertrophic subaortic stenosis). This condition is associated with sudden cardiac death without previous symptoms of heart failure. This condition compromises a member's ability to safely perform essential job task 13.

(7)* Recurrent syncope. This condition compromises a member's ability to safely perform essential job task 13.

(8)* Medical condition requiring a pacemaker or automatic implantable defibrillator. This condition compromises a member's ability to safely perform essential job task 13.

(9) Moderate to severe mitral valve stenosis defined as valve area ≤1.5 cm^2 or pulmonary artery systolic pressure >35 mm Hg. This condition compromises a member's ability to safely perform essential job tasks 1, 4, 5, 7, and 9.

(10) Moderate to severe mitral valve insufficiency defined as the presence of left ventricular dysfunction. This condition compromises a member's ability to safely perform essential job tasks 1, 4, 5, 7, and 9. **Physician Guidance:** Mitral valve prolapse only interferes with safe performance of critical job tasks if associated with arrhythmias or if moderate to severe mitral regurgitation is present.

(11) Moderate to severe aortic valve stenosis defined as mean aortic valvular gradient ≥20 mm Hg and/or valve area ≤1.0 cm^2. This condition compromises a member's ability to safely perform essential job tasks 1, 4, 5, 6, 7, 9, and 13.

(12) Moderate to severe aortic valve insufficiency if the cause of left ventricular dysfunction. This condition compromises a member's ability to safely perform essential job tasks 1, 4, 7, and 9.

(13) Prosthetic cardiac valves if full dose anticoagulation is required or if left ventricular dysfunction is present. This condition compromises a member's ability to safely perform essential job task 8 if full dose anticoagulation is required and essential job tasks 1, 4, 6, 7, and 9 if left ventricular dysfunction is present.

(14)* Wolff-Parkinson-White (WPW) syndrome with a history of supraventricular tachycardia (SVT). This condition compromises a member's ability to safely perform essential job task 13.

(15)* Other supraventricular arrhythmias, atrial fibrillation, or atrial flutter that is persistent or if full dose anticoagulation is required. This condition compromises a member's ability to safely perform essential job task 13 and essential job task 8 if full-dose anticoagulation is required. **Physician Guidance:** If the atrial fibrillation is recurrent but self-limited off cardiac medications, there is no evidence of ischemia, and the echocardiogram reveals both a normal mitral valve and a normal sized left atrium, then the member can continue to safely perform full duties. Paroxysmal atrial tachycardia can sometimes be resolved with modification of diet or treatment of other underlying noncardiac conditions.

(16) History of ventricular ectopy (e.g., ventricular tachycardia, ventricular fibrillation, and premature ventricular contractions). This condition compromises a member's ability to safely perform essential job task 13. **Physician Guidance:** History of ventricular ectopy or ventricular arrhythmias other than ventricular tachycardia or ventricular fibrillation poses significant risk for life-threatening sudden incapacitation in the presence of either structural abnormalities, functional abnormalities, or ectopy that occurs during exercise. Echocardiograph must show no evidence of structural abnormalities. Stress testing off cardiac medications must show no evidence for ischemia, ventricular

tachycardia, ventricular fibrillation, and premature ventricular contractions (PVCs) should resolve with increasing levels of exercise up to 12 METS.

(17) Third-degree or complete atrioventricular block or any type of atrioventricular block with sinus pause >3 seconds, left bundle branch block, right bundle branch block, and second degree Type I atrioventricular block. These blocks interfere with safe performance of essential job task 13 if cardiac structural (i.e., coronary arteries, valves, myocardium) abnormalities are present, if left ventricular function is abnormal, or if heart rate does not increase with exercise in the absence of a mechanical pacemaker.

(18)* Severe uncontrolled hypertension [defined as systolic pressure >180 mm Hg, diastolic pressure >100 mm Hg, or mean systolic blood pressure (⅓ systolic + ⅔ diastolic) >120 mm Hg] or malignant hypertension (defined as hypertension with the presence of target organ damage). These conditions compromise a member's ability to safely perform essential job tasks 1, 5, 7, 9, and 13.

(19) History of a congenital abnormality that has been treated by surgery but with residual complications or that has not been treated by surgery, leaving residuals or complications. Evaluate for ability to safely perform essential job tasks 1, 4, 5, 6, 7, 9, and 13.

(20) Cardiac hypertrophy. Nonphysiological hypertrophy when not in normal response to exercise of the heart can result in the potential for sudden incapacitation and the inability to safely perform essential job task 13 and other job functions due to limitations of endurance.

9.5 Vascular Disorders.

9.5.1 Vascular disorders shall refer to any disorder of the vascular (arterial or venous) system including but not limited to aneurysm, peripheral vascular insufficiency, and thromboembolic disease. **Physician Guidance:** Heart rate, blood pressure, and shear forces on vessel walls are increased when performing many of the essential job tasks, increasing the risk of acute dissection, rupture, and/or embolic phenomena that even in a normal environment can result in life-threatening sudden incapacitation.

9.5.2 For potential interference with essential job tasks, the member shall be evaluated for the following:

(1) Aortic aneurysm (thoracic aortic aneurysm of any size or abdominal aortic aneurysm ≥4 cm) compromises a member's ability to safely perform essential job tasks 1, 4, 6, 7, and 13. **Physician Guidance:** Abdominal aortic aneurysm <4 cm requires careful control of blood pressure. A minimum of 6 months post-surgical repair of any aortic aneurysm is required before the member can be evaluated for return-to-duty status.

(2) Carotid artery disease. If symptomatic and reduction in blood flow of greater than 70 percent on the clinically relevant side. This condition compromises a member's ability to safely perform essential job task 13.

(3) Thoracic outlet syndrome (symptomatic). This condition compromises a member's ability to safely perform essential job tasks 1 and 13.

(4) Peripheral vascular disease (arterial or venous) if symptomatic (claudication) or severe peripheral edema. This condition compromises a member's ability to safely perform essential job tasks 1, 4, 5, 7, and 9.

(5) Thrombophlebitis and/or deep venous thrombosis if recurrent, persistent, or requires full dose anticoagulation. This condition compromises a member's ability to safely perform essential job tasks 1, 4, 5, 7, and 9. Full-dose anticoagulation compromises a member's ability to safely perform essential job task 8.

(6) Circulatory instability as indicated by orthostatic hypotension or persistent tachycardia. This condition compromises a member's ability to safely perform essential job tasks 1, 5, 9, and 13.

(7) Peripheral vascular disease, such as severe Raynaud's phenomenon, interferes with a member's ability to safely perform essential job tasks (e.g., under certain conditions, including cold weather).

(8) Chronic, severe lymphedema or massive edema of any type due to lymphadenopathy, severe venous valvular incompetency, endocrine abnormalities, or low flow states can result in the inability to safely perform essential job tasks 1, 4, 5, and 8.

(9) Congenital or acquired lesions of aorta or major vessels can interfere with circulation and prevent the safe performance of essential job tasks 1, 4, and 7 due to limitations of endurance and the potential for life-threatening sudden incapacitation (essential job task 13).

9.6* Endocrine and Metabolic Disorders.

9.6.1 Endocrine and metabolic disorders shall include disorders of the hypothalamic-pituitary-thyroid-adrenal axis.

9.6.2 For potential interference with essential job tasks, the member shall be evaluated for the following:

(1)* Diabetes mellitus that is poorly controlled or requires insulin therapy compromises a member's ability to safely perform essential job tasks 5, 9, and 13.

(2) Nutritional deficiencies, including those caused by congenital or acquired disorders of metabolism, potentially interfere with a member's ability to safely perform essential job tasks 1, 5, and 9.

(3) Diseases of the adrenal gland, pituitary gland, parathyroid gland, or thyroid gland of clinical significance. If untreated or inadequately controlled, compromise a member's ability to safely perform essential job tasks 1, 5, and 9.

9.7* Lung, Chest Wall, and Respiratory Disorders.

9.7.1 Lung, chest wall, and respiratory disorders shall include disorders of breathing and the exchange of respiratory gases (oxygen and carbon dioxide), central neurologic control of respiratory drive, nose, sinuses, throat, pharynx, larynx, trachea, airways, lungs, pleura, and chest wall. **Physician Guidance:** Efficient breathing and respiratory gas exchange is required for essential job tasks 1, 2, 4, 5, 7, 9, and 13. Wearing protective clothing increases the oxygen consumption required to safely perform these tasks and, therefore, increases the respiratory workload. SCBA is a positive pressure demand valve respirator that provides a barrier against the inhalation of noxious/toxic gases and particulate matter but at increased metabolic cost due to its weight and increased respiratory workload (resistance and dead space). If respiratory function or gas exchange is already compromised (increased work of breathing from structural or

functional abnormalities, hypoxia, and/or hypercapnia) prior to the performance of essential job tasks, then the increased oxygen demand of strenuous physical exertion, while wearing PPE and/or SCBA, leads to early onset of fatigue or respiratory insufficiency.

9.7.2 For potential interference with essential job tasks, the member shall be evaluated for the following:

(1) Tracheostomy compromises the ability to safely wear SCBA (essential job task 2), communicate effectively due to oropharyngeal dysfunction (essential job task 12), and effectively clear secretions or inhaled particulate matter (essential job task 3). **Physician Guidance:** History of tracheostomy now sealed and without persistent respiratory disease or dysfunction does not prevent safe performance of essential job tasks.

(2) Chronic cough with or without hemoptysis compromises the ability to safely wear SCBA (essential job task 2). **Physician Guidance:** Need to evaluate the cause of chronic cough and/or hemoptysis, as the underlying conditions can also produce increased work of breathing, gas exchange abnormalities, or airway hyperreactivity.

(3)* Asthma compromises a member's ability to safely perform essential job tasks 1, 2, 3, 4, 5, 7, 9, and 13. **Physician Guidance:** Exposures to exertion, temperature extremes, combustion by-products, irritants, and particulate matter are all potent provokers of asthma attacks. Bronchodilator or anti-inflammatory medications are not adequate maintenance therapy to control symptoms in the irritant environment of the fire ground or hazardous materials incident scene. Acute hyperreactivity in this environment can induce immediate or progressive clinical asthma (bronchospasm and wheeze) that can lead to sudden incapacitation from status asthmaticus and/or cardiac ischemia.

(4)* Allergic lower respiratory disorders compromise a member's ability to safely perform essential job tasks 1, 2, 3, 4, 5, 7, 9, and 13. **Physician Guidance:** Allergic respiratory disorder is a term used to define asthma (clinical reversible bronchospasm) triggered by a known allergic insult. Once triggered, these patients have demonstrable airway hyperreactivity for weeks to months and can be recurrent and/or permanent.

(5)* Chronic obstructive airways disease (chronic bronchitis, emphysema), if moderate to severe (FEV_1/FVC ratio ≤0.59), compromises a member's ability to safely perform essential job tasks 1, 2, 3, 4, 5, 7, 9, and 13.

(6) Hypoxemic disorders when moderate to severe (oxygen saturation ≤90 percent or a P_{O2} ≤65 mm Hg, corrected to sea level) or the presence of significant exercise desaturation compromises a member's ability to safely perform essential job tasks 1, 2, 3, 4, 7, and 13. **Physician Guidance:** A resting oxygen saturation of 91 to 93 percent corrected to sea level requires measurement at exercise to determine if desaturation occurs (decrease in oxygen saturation by ≥4 percent from baseline). Hypoxia can be the result of central regulatory disturbances, obstructive sleep apnea, asthma, chronic obstructive airways diseases, interstitial lung disease, pulmonary hypertension, chronic pulmonary embolism, etc. In this environment, gas exchange abnormalities and respiratory insufficiency no

matter the cause has the potential for life-threatening sudden incapacitation from cardiopulmonary insufficiency.

(7) Hypercapnic disorders (elevated carbon dioxide with serum P_{CO2} ≥45 mm Hg) can be found during evaluation of respiratory complaints or disease. If present, hypercapnia compromises a member's ability to safely perform essential job tasks 1, 2, 3, 4, 5, 7, and 13. **Physician Guidance:** Hypercapnia can be the result of central regulatory disturbance, medications, obstructive sleep apnea, severe asthma, end-stage chronic obstructive airways diseases, or end-stage interstitial lung disease. In this environment, gas exchange abnormalities and respiratory insufficiency no matter the cause has the potential for life-threatening sudden incapacitation from cardiopulmonary insufficiency.

(8) Pulmonary hypertension compromises a member's ability to safely perform essential job tasks 1, 3, 4, 7, and 13. For further details see sections on hypoxia and cardiac valve dysfunction.

(9) Tracheal stenosis can prevent the successful and safe performance of essential job tasks 1, 2, 3, 4, 5, 7, and 12 if pulmonary dysfunction is reduced below certifiable limits or if the underlying cause of the stenosis prevents the successful and safe performance of the essential job tasks.

(10) Pulmonary resection surgery, chest wall surgery, and/or traumatic pneumothorax. Evaluate for full recovery from surgery with pulmonary function testing (PFT). Abnormal PFTs or decreased oxygenation compromises a member's ability to safely perform essential job tasks 1, 2, 3, 4, 7, and 13. **Physician Guidance:** Pulmonary function tests should be performed after adequate healing and pain resolution. Generally, this is 4 weeks after thorascopic surgery and 6 to 8 weeks after open chest surgery. Pulmonary function tests should be either normal or show only a minimal restrictive disorder without evidence for interstitial disease or gas exchange abnormalities. If moderate to severe restriction is present (FVC <60% of predicted with an FEV_1/FVC ratio ≥0.80) then the member may not be able to safely perform essential job tasks unless a more complete evaluation of gas exchange and exercise capacity shows the ability to exercise at a 12-METS workload without evidence of exercise desaturation.

(11)* Spontaneous pneumothorax, when present, compromises a member's ability to safely perform essential job tasks 1, 2, 3, 4, 7, and 13 due to pain and dyspnea. **Physician Guidance:** Members with a history of spontaneous pneumothorax whose essential job tasks include SCUBA diving cannot safely perform this task since pressure changes can induce recurrence.

(12) Fibrothorax, chest wall deformity, and/or diaphragm abnormalities can compromise a member's ability to safely perform essential job tasks 2, 4, and 7. **Physician Guidance:** If moderate to severe restriction is present (FVC <60% of predicted with an FEV_1/FVC ratio greater than 0.80%) then the member may not be able to safely perform essential job tasks unless more complete evaluation of gas exchange and exercise capacity shows ability to exercise at a 12-METS level without exercise desaturation.

(13)* Pleural effusions can compromise the ability to safely perform essential job tasks 2, 4, and 7.

(14) Bronchiectasis and/or bronchiolitis obliterans with frequent productive cough, wheeze, or dyspnea, or if pulmonary function tests show moderate to severe dysfunction, compromises a member's ability to safely perform essential job tasks 1, 2, 3, 4, 5, and 7.

(15) Interstitial lung diseases include pneumoconiosis (coal, silicosis, asbestosis), hypersensitivity pneumonitis, eosinophilic pneumonitis, infections, and inhalation pneumonitis. If moderate or severe pulmonary dysfunction exists, as shown by pulmonary function or gas exchange tests (hypoxia at rest or exercise), member cannot safely perform essential job tasks 1, 2, 3, 4, and 7.

(16) Sarcoidosis. Moderate or severe pulmonary dysfunction, significant visual impairment, cardiac dysfunction at rest or exercise, or the need for current treatment with systemic corticosteroids compromises a member's ability to safely perform essential job tasks 1, 2, 3, 4, 7, 8, and 13.

(17) Acute, recent, or chronic pulmonary embolism. Requiring anticoagulation interferes with a member's ability to safely perform essential job tasks 2 and 8.

(18) Disorders of respiratory regulation can result in gas exchange abnormalities that prevent the safe performance of essential job tasks 1, 2, 4, 7, and 9. **Physician Guidance:** Conditions including but not limited to obstructive sleep apnea, central apnea, and disordered central breathing regulation require evaluation of medical history, physical exam, pulmonary function tests, exercise tests, sleep tests, and other tests as deemed necessary.

(19) Cystic lung diseases (e.g., congenital bullous disease, pneumatocele, or blebs) with abnormalities on chest film or moderate to severe pulmonary dysfunction compromise a member's ability to safely perform essential job tasks 1, 2, and 4. Members shall be restricted from SCUBA diving even if pulmonary function tests are normal.

(20) Tuberculosis, see Section 9.8.

(21) Lung cancer, see Section 9.17.

9.8 Infectious Diseases.

9.8.1 Infectious diseases shall include systemic, local, acute, and chronic infections as well as post-infectious processes. **Physician Guidance:** Many infections interfere with control of body temperature, hydration, and nutritional status. Many also produce severe pain, compromise mobility, and/or ability to safely perform heavy physical exertion. Members must be able to safely interact with other fire fighters and civilians without posing a significant public health risk. Acute and/or self-limited infectious processes can require temporary work restriction. Examples include influenza or upper respiratory tract infection, which can interfere with safe performance of essential job tasks 2 and 3, or acute dermatitis, which would interfere with safe performance of essential job task 3. Following resolution of these acute processes, members can return to full duty.

9.8.2 For potential interference with essential job tasks, the member shall be evaluated for the following:

(1) Skin infections and draining ulcers or cysts that prevent wearing personal protective clothing (essential job tasks 2 and 5) or because of their extent and severity present too high a risk for exposure to biologic or nonbiologic toxins (essential job task 3).

(2) Upper or lower respiratory infections that compromise a member's ability to safely perform essential job tasks 1, 2, 3, 4, 5, and 7.

(3) Ear infections that interfere with balance and/or hearing that compromise a member's ability to safely perform essential job tasks 8 and 12.

(4) Gastrointestinal infections including parasites that result in dehydration or frequent use of toilet facilities at least temporarily compromise a member's ability to safely perform essential job tasks 1, 5, 8, and 9.

(5) Kidney or urinary infections that result in dehydration or the frequent use of toilet facilities compromise a member's ability to safely perform essential job tasks 1, 5, and 9.

(6)* Any infection that results in dizziness, weakness, significant weight loss, or pain compromises a member's ability to safely perform essential job tasks 1, 5, 8, and 9.

(7)* Active pulmonary tuberculosis poses a public health risk to the community and other members. It also compromises a member's ability to safely perform essential job tasks 2, 4, 5, and 12.

(8)* Hepatitis, specifically infectious diseases of the liver caused by viruses including but not limited to A, B, C, D, and E. **Physician Guidance:** Medical management of members following occupational exposure or development of any viral hepatitis shall conform to the current CDC guidelines. This includes recommendations for restriction from various types of duty. *[See Section 7.11(2)]*.

(9)* Human immunodeficiency virus (HIV) infection. Members with AIDS and significant organ damage or dysfunction resulting from HIV infection can be unable to safely perform essential job tasks 1, 2, 4, 5, 7, 8, and 9 due to debilitation. Anemia, cardiopulmonary dysfunction, or neurologic dysfunction compromises a member's ability to safely perform essential job tasks 1, 2, 3, 4, 5, 7, 9, and 13. Peripheral neuropathy compromises a member's ability to safely perform essential job tasks 1, 3, and 5. Dementia compromises a member's ability to safely perform essential job tasks 1, 11, and 12.

9.9* Spine Disorders.

9.9.1 Spine disorders shall include conditions of the cervical, thoracic, and lumbosacral spine such as strains, fractures, and discogenic disease as well as cord, cauda equina, and paraspinous syndromes. **Physician Guidance:** Fire fighters with active, ongoing, or recurrent spinal disorders can have difficulty due to reduced motor strength, sensation, and flexibility as well as problems with fatigue, coordination, gait, and equilibrium. The PPE and SCBA can place the fire fighter's spine at a biomechanical disadvantage due to added weight and altered center of gravity.

9.9.2 For potential interference with essential job tasks, the member shall be evaluated for the following:

(1) Spine fusion at two or more levels places the spine at risk for future degenerative changes. Degenerative changes can prevent the member from safely performing essential job tasks 1, 2, 4, 5, 6, 7, 8, and 13.

(2) Ankylosing spondylitis. Prevents members from safely performing essential job tasks 1, 2, 4, 5, 6, 7, and 8.

(3) Any spinal condition with significant radiculopathy resulting in peripheral motor weakness, loss of strength, loss of sensation, and loss of reflexes. Due to limitations of endurance, strength, flexibility, pain, and gait disturbances, these conditions prevent the member from safely performing essential job tasks 1, 2, 4, 5, 6, 7, 8, and 13.

(4) The use of narcotics or muscle relaxants to treat any spinal condition compromises a member's ability to safely perform essential job tasks 1, 2, 4, 5, 6, 7, 8, and 13. **Physician Guidance:** Medication-induced somnolence, discoordination, and/or disequilibrium reduces a member's ability to operate in hazardous environments.

(5) Spine structural abnormality, fracture, or dislocation that causes progressive or recurrent impairment. These illnesses can prevent the member from safely performing essential job tasks 1, 2, 4, 5, 6, 7, 8, and 13 due to limitations of endurance, strength, flexibility, or pain. These conditions can also result in ligament instability increasing the risk for future dislocation and neurologic compromise.

(6) Herniation of nucleus pulposus or history of laminectomy, discectomy, or single level fusion. These illnesses can prevent the member from safely performing essential job tasks 1, 2, 4, 5, 6, 7, 8, and 13 due to pain or limitations of endurance, strength, or flexibility.

9.10* Orthopedic Disorders.

9.10.1 Orthopedic disorders shall include injuries and illnesses involving upper extremities, pelvis, and lower extremities including nerves, muscles, tendons, joints, and bones. **Physician Guidance:** Fire fighters with active, ongoing, or recurrent orthopedic disorders can have difficulty due to reduced motor strength, sensation, and flexibility as well as problems with fatigue, coordination, gait, and equilibrium. The PPE and SCBA can place the fire fighter's involved extremity (upper or lower) at a biomechanical disadvantage due to added weight and altered center of gravity. Certain medications (narcotics and muscle relaxants) used to treat orthopedic conditions can produce or worsen somnolence, discoordination, and disequilibrium.

9.10.2 For potential interference with essential job tasks, the member shall be evaluated for the following:

(1) Amputation of arm, hand, or thumb prevents the safe performance of essential job tasks 1, 2, 6, 7, and 8. The amputation of these limbs or joints interferes with grip and other physical abilities required to safely perform essential job tasks. Prosthetic limbs do not provide adequate function to safely perform these essential job tasks rapidly in a life-threatening, unforgiving environment.

(2) Amputation of leg (above or below knee) or entire foot prevents the safe performance of essential job tasks 1, 4, 6, 7, and 8. The amputation of these limbs or joints prevents ambulation and other physical abilities required to safely perform essential job tasks. Prosthetic limbs do not provide adequate function to safely perform these essential job tasks rapidly in a life-threatening, unforgiving environment.

(3) Amputation of finger(s), other than thumb, needs evaluation to determine if the member can safely perform essential job tasks 1, 2, 6, 7, and 8. The amputation

of these limbs or joints can interfere with grip and other physical abilities required to safely perform essential job tasks.

(4) Amputation of partial foot or toe(s) needs evaluation to determine if the member can safely perform essential job tasks 1, 4, 6, 7, and 8. The amputation of these limbs or joints can prevent ambulation and other physical abilities required to safely perform essential job tasks.

(5) Recurrent joint dislocation of a major joint (e.g., shoulder). Unrepaired repeat joint dislocations indicate an unstable shoulder, which can easily dislocate, thereby preventing the safe performance of essential job tasks 1, 2, 4, 6, 7, and 8. This can lead to sudden incapacitation, placing the member or the person depending on the member at life-threatening risk. Post-surgical repair, the member can safely perform essential job tasks if joint exam shows full functional motion, strength, and stability.

(6) Ligament and/or meniscus knee disease. A history of locking, buckling, or giving-way prevents the safe performance of essential job tasks 1, 4, 6, 7, and 8. This can lead to sudden incapacitation, placing the member or the person depending on the member at life-threatening risk. Post-surgical repair, the member can safely perform essential job tasks if joint exam shows full functional motion, strength, and stability.

(7) Joint replacements or any artificial joints can prevent the safe performance of essential job tasks 1, 4, 6, 7, and 8. **Physician Guidance:** Competitive athletes with artificial hip joints are not cleared for contact sports where explosive effort, high impact, and blunt trauma are frequent. Fire fighting presents similar limitations and stress, especially as their consequence can place the member or others at risk for life-threatening injuries.

(8) Limitation of joint motion to a degree that prevents the safe performance of essential job tasks 1, 2, 4, 6, 7, and 8 due to reduced flexibility.

(9) Dislocation of a joint. Single episode of joint dislocation or dislocation with residual limitation of motion of a degree to interfere with safe performance of essential job tasks 1, 2, 4, 6, 7, and 8. Successful surgery for shoulder dislocation, if range of motion and strength were intact, would not interfere with the safe performance of essential job tasks.

(10) Joint reconstruction. In cases where residual limitation of motion or strength can interfere with safe performance of essential job tasks 1, 4, 6, 7, and 8. For example, surgery for a torn anterior cruciate ligament or meniscus can interfere with safe performance of essential job tasks 1, 4, 6, 7, and 8 if quadriceps strength is reduced or if the knee is unstable or develops pain or swelling when stressed.

(11) Fractures. When healed and asymptomatic, evaluation should focus on ability to safely perform essential job tasks 1, 4, 6, 7, and 8. Fractures, including hip fractures requiring internal fixation, should not interfere with safe performance of essential job tasks as long as the radiograph demonstrates healing and exam is normal. Non-union fractures are not healed, and members cannot safely perform essential job tasks 1, 4, 6, 7, and 8 until union is achieved.

(12) Appliances (screws, pins, and/or metal plates) should not interfere with safe performance of essential job tasks 1, 4, 6, 7, and 8. If they are superficial and

they lead to perforation of the skin under the normal abrasive conditions of fire fighting, surgical consultation is advised to determine the risk benefit analysis for removing the appliance. After removing the appliance, radiographic evidence of bone healing (approximately 6 months) should be obtained before the member is allowed to safely perform the essential tasks.

(13) Bone grafts if well healed do not interfere with the safe performance of essential job tasks 1, 4, 6, 7, and 8 as long as the radiograph demonstrates healing and the exam is normal.

(14) Chronic osteoarthritis or traumatic arthritis can result in frequent episodes of pain and reduced range of motion. Evaluate for ability to safely perform essential job tasks 1, 4, 6, 7, and 8.

(15) Inflammatory arthritis (in cases where it is severe, recurrent, or a progressive illness or associated with deformity or limitation of range of motion) can result in frequent episodes of pain, reduced strength, and reduced flexibility. Evaluate for the ability to safely perform essential job tasks 1, 4, 6, 7, and 8.

(16) Reflex sympathetic dystrophy can interfere with the safe performance of essential job tasks 1, 4, 6, 7, and 8 if pain is severe, medications are required, or strength/flexibility is limited.

(17) Osteomyelitis or septic arthritis if active can cause pain, local drainage, systemic infection, and/or increased risk for pathologic or traumatic fractures. Evaluate for the ability to safely perform essential tasks 1, 4, 6, 7, and 8.

9.11 Disorders Involving Gastrointestinal Tract and Abdominal Viscera.

9.11.1 Disorders involving gastrointestinal tract and abdominal viscera shall include conditions of the abdominal wall and peritoneum, as well as esophagus, stomach, small bowel, colon, mesenteric structures, and intra-abdominal organs.

9.11.2 Potential for interference with essential job tasks — evaluate members for the likelihood of inadequate nutrition, a propensity for symptomatic dehydration, anemia, or incapacitating pain syndromes. The following GI disorders resulting in the above complications compromise a member's ability to safely perform essential job tasks 1, 4, 6, 7, 9, and 13:

(1) Cholecystitis
(2) Gastritis
(3) GI bleeding
(4) Inflammatory bowel disease or irritable bowel syndrome
(5) Intestinal obstruction
(6) Pancreatitis
(7) Diverticulitis
(8) History of gastrointestinal surgery
(9) Gastric or other GI ulcers, including Zollinger-Ellison syndrome
(10) Cirrhosis
(11) Hernias, such as the following:
  (a) Hernias of the abdominal wall, especially inguinal and femoral hernias, potentially interfere with a member's ability to safely perform essential job

tasks 1, 4, 6, 7, and 13 due to the risk of incarceration and bowel strangulation during heavy exertion and lifting.

(b) Large ventral hernias have a low risk of incarceration but can weaken the abdominal wall musculature and interfere with a member's ability to safely perform essential job tasks 1, 4, 6, and 7.

(c) Umbilical hernias that are small and asymptomatic will not generally interfere with fire-fighting duties.

(d) Abdominal wall hernias at any site that have been surgically corrected do not prevent otherwise qualified members from safely performing essential fire-fighting tasks, provided the incision site is well healed and the surgeon has cleared the member for full lifting.

9.12 Medical Conditions Involving Head, Eyes, Ears, Nose, Neck, or Throat.

9.12.1* For potential interference with essential job tasks, the member shall be evaluated for conditions that interfere with a member's ability to comfortably wear and be protected by the fire fighter's protective ensemble. Such conditions compromise a member's ability to safely perform essential job tasks 2, 4, 5, and 13.

(1) Deformities of the skull associated with evidence of disease of the brain, spinal cord, or peripheral nerves can result in the potential for sudden incapacitation and the inability to properly wear protective equipment.

(2) Contraction of head and neck muscles can interfere with wearing of protective equipment, impair speech, or otherwise compromise a member's ability to safely perform essential job tasks.

(3)* Disorders of the eyes or vision can interfere with a member's ability to safely perform essential job tasks 6, 8, 10, and 11.

(a)* Far visual acuity worse than 20/40 binocular corrected with contact lens or spectacles, and far visual acuity uncorrected worse than 20/100 binocular for wearers of hard contacts or spectacles, compromises a member's ability to safely perform essential job tasks 6, 8, 10, and 11. Successful soft contact lens wearers are not subject to the uncorrected standard.

(b)* Monocular vision, stereopsis without fusional capacity, inadequate depth perception, or loss of peripheal vision (>110 degrees on confrontation) interferes with safe performance of essential job task 10.

(c) Peripheral vision in the horizontal meridian of less than 110 degrees in the better eye or any condition that significantly affects peripheral vision in both eyes. **Physician Guidance:** New monocular vision requires a minimum of 6 months for depth perception accommodation in order to safely perform other essential job tasks.

(4)* Abnormal hearing requiring a hearing aid or impairing a member's ability to hear and understand the spoken voice under conditions of high background noise, or hear, recognize, and directionally locate cries or audible alarms, interferes with safe performance of essential job tasks 2, 6, 8, 10, 12, and 13.

(5)* Any condition causing chronic or recurring vertigo, ataxia, or other disturbance of gait and balance compromises a member's ability to safely perform essential job tasks 1, 8, 10, and 13.

(6)* Any deformity or disease of the nose, naso- or oropharynx, or dental structures, including anosmia and sinusitis, can interfere with a member's ability to safely perform essential job tasks 2, 3, 5, 8, 12, and 13.

9.13* Neurologic Disorders.

9.13.1 Neurologic disorders shall refer to ongoing, chronic, or recurrent disorders that impair an individual's neurological functions, including central regulation, cognitive abilities, strength, perception, reflexes, coordination, gait, and equilibrium.

9.13.2 For potential interference with essential job tasks, the member shall be evaluated for the following:

(1) Ataxias of the hereditary or degenerative type compromise a member's ability to safely perform essential job tasks 1, 4, 6, 7, and 8.

(2)* Cerebral arteriosclerosis as evidenced by documented episodes of focal, reversible, or irreversible neurological impairment interferes with a member's ability to safely perform essential job tasks 1 through 13.

(3)* Neuromuscular, demyelinating, and other progressive neurologic diseases interfere with a member's ability to safely perform essential job tasks 1, 4, 6, 7, 8, 12, and 13. **Physician Guidance:** This category refers to, but is not limited to, multiple sclerosis, myasthenia gravis, muscular dystrophies, Huntington's chorea, amyotrophic lateral sclerosis, and bulbar palsy.

(4)* Epileptic conditions including simple, partial complex, generalized, and psycho-motor seizure disorders interfere with a member's ability to safely perform essential job tasks 8, 9, 10, 11, and 13. **Physician Guidance:** A member diagnosed with epilepsy shall not be cleared for structural fire-fighting duty until he or she has completed 5 years without a seizure on a stable medical regimen or 1 year without a seizure after discontinuing all anti-epileptic drugs. In addition the member must have a normal neurological examination, no structural abnormality on brain imaging, normal EEG including provocative testing, normal awake and asleep EEG with photic stimulation and hyperventilation, as well as a definitive statement by a qualified neurologist.

(5)* Cerebral vascular bleeding prevents safe performance of essential job tasks 1, 4, 6, 7, 8, 9, 10, 11, 12, and 13.

(6)* Head trauma including concussion, brain contusion, subarachnoid hemorrhage, subdural, and/or epidural hematoma interferes with a member's ability to safely perform essential job tasks 1 through 13. **Physician Guidance:** Following significant head trauma a member should be evaluated and cleared to return to duty by a qualified neurosurgeon or neurologist.

(7) CNS tumors can interfere with the safe performance of essential job tasks 1 through 13 depending on location and size of the mass. **Physician Guidance:** After successful resection of a CNS tumor a member can safely return to duty with a neurosurgeon's certification that exam and imaging studies are normal (except for surgical site) and EEG shows no epileptic activity off all anti-convulsant medications. Where applicable, metastatic workup must be negative.

(8) Parkinson's and other diseases with tremor interfere with a member's ability to safely perform essential job tasks 1, 2, 4, 5, 6, 7, 8, and 9. **Physician Guidance:** Evaluate gait, balance, movement, and medications required to maintain

function. The impact of the operational environment including heat, hazards, stress, and exertion must be considered and specifically addressed.

(9) Progressive dementia (e.g., Alzheimer's) compromises a member's ability to safely perform essential job tasks 1 through 13.

9.14* Psychiatric and Psychologic Disorders.

9.14.1 Psychiatric and psychologic disorders shall include acute, ongoing, chronic, or recurrent disorders that impair psychological or emotional function.

9.14.2 For potential interference with essential job tasks, the member shall be evaluated for ability to safely perform essential job tasks 1, 3, 4, 5, 7, 8, 11, 12, and 13.

9.15* Substance Abuse.

9.15.1 Substance abuse shall refer to the frequent and/or persistent use of alcohol or other substances causing the following:

(1) Failure to fulfill major obligations either at work or at home

(2) Verifiable physical or emotional harm to the member

(3) Recurrent legal problems

(4) Exacerbation of social and/or other interpersonal problems

9.15.2 For potential interference with essential job tasks, the member shall be evaluated for the following:

(1) DSM IV criteria for substance abuse of alcohol and controlled substances prevents the safe performance of essential job tasks 1, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, and 13. **Physician Guidance:** Use of medical evaluations, supervisory evaluations, and/or performance evaluations coupled with urine screen and blood toxicology form a basis for determining and documenting substance abuse. There is a high recidivism rate with treatment but members must be offered treatment as in most cases this is a medical illness.

(2) Methadone maintenance interferes with cognitive functions, energy, coordination, and equilibrium and therefore prevents safe performance of essential job tasks 1, 4, 5, 7, 8, 10, and 11.

9.16 Medications.

Physician Guidance: The medications in this section are listed because of noteworthy side effects that may interfere with essential job tasks.

9.16.1 Medications shall include prescribed and over-the-counter medications.

9.16.2 For potential interference with essential job tasks, the member shall be evaluated for the following:

(1) Full dose anticoagulation due to the risk of internal bleeding from trauma with potential for significant internal bleeding while performing essential job task 8. If significant internal bleeding occurs it can result in life-threatening sudden incapacitation.

(2) Narcotics. Members cannot safely perform essential job tasks 1, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, and 13 due to alteration in mental status and other neurologic functions. Muscle relaxants can interfere with a member's ability to safely perform essential job tasks 8, 10, and 11.

(3) Sedatives and hypnotics prevent the safe performance of essential job tasks 8, 10, and 11.

(4) Psychoactive agents can interfere with a member's ability to safely perform essential job tasks 5, 8, 11, and 13 due to increased risk of heat stress, movement disorders, and somnolence.

(5) Anti-hypertensive agents (e.g., beta-blockers and high-dose diuretics). Some agents prevent the safe performance of essential job tasks 5 and 8 due to risk for dehydration, electrolyte disorders, lethargy, and disequilibrium. Evaluate for ability to safely perform essential job tasks 5 and 8.

(6) Other medications that can prevent the safe performance of essential job tasks 5, 8, 11, and 13 under certain conditions and require careful evaluation with specialized annual followup (e.g., MAOIs, phenothiazines, anti-cholinergics, tricyclic antidepressants). Evaluate for ability to safely perform essential job tasks 5, 8, 11, and 13.

9.17 Tumors — Malignant or Benign.

9.17.1 Malignant conditions of any organ system can produce specific organ dysfunction or generalized debilitation. **Physician Guidance:** Malignancy or its treatment can result in anemia, malnutrition, pain, and generalized weakness temporarily or permanently disabling a member.

9.17.2 For potential interference with essential job tasks, the member shall be evaluated for the following:

(1) Benign tumors can prevent the safe performance of essential job tasks 1 through 13 only if the space-occupying lesion and/or its treatment affects energy levels or the involved organ system's function.

(2) Acute illness related to malignancy or its treatment can prevent the safe performance of essential job tasks 1, 2, 3, 4, 5, 6, 7, 8, 9, and 13 due to lower energy levels, anemia, weight loss, or specific aspects of that organ's dysfunction, all of which lead to an acute debilitated state.

(3) Central nervous system tumors can prevent the ability to safely perform essential job tasks 1, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, and 13 due to lower energy levels, anemia, undernutrition, weight loss, and specific organ dysfunction (seizures, loss of balance, inability to communicate, inability to process complicated commands in an emergency situation, weakness), all of which lead to a debilitated state affecting anaerobic and aerobic job tasks and the ability to wear personal protective clothing and SCBA. If treated successfully, essential job tasks can be performed safely if, after evaluation by a specialist, it is concluded that exam is normal, imaging studies are normal (except for surgical site), and epilepsy is not present off medications (1 year later), and there is no further evidence of malignancy.

(4) Head and neck malignancies can prevent the safe performance of essential job tasks 1 through 13 due to lower energy levels, anemia, undernutrition, weight loss, inability to clear oral secretions, or other specific organ dysfunction that interferes with respiration, communication, hydration, and/or eating. If treated successfully, essential job tasks can be performed safely if, after evaluation by a specialist, it is concluded that exam allows for normal function, imaging studies show no tumor, and overall medical evaluation reveals no reason that the safe performance of essential job tasks would be impaired or that performance of such tasks would place member at undue risk.

(5) Lung cancer can prevent safe performance due to lower energy levels, anemia, undernutrition, weight loss, or specific organ dysfunction (abnormal secretions, dyspnea, or pulmonary dysfunction interfering with or prohibiting use of SCBA or strenuous physical activities, paraneoplastic syndromes, weakness) that if present, interferes with essential job tasks 1, 2, 3, 4, 5, 7, 8, 9, and 13, and a specialist concludes that a member has normal function, imaging studies show no tumor, and overall medical evaluation reveals no reason that the safe performance of essential job tasks would be impaired or that performance of such tasks would place member at undue risk.

(6) Gastrointestinal malignancies can prevent safe performance due to lower energy levels, anemia, undernutrition, weight loss, or specific organ dysfunction (abnormal secretions or bowel function interfering with or prohibiting prolonged use of personal protective clothing, or strenuous physical activities, paraneoplastic syndromes, weakness, etc). This debilitated state may affect a member's ability to safely perform essential job tasks 1, 3, 4, 5, 7, 8, and 9. If treated successfully, essential job tasks can be performed safely if, after evaluation by a specialist, it is concluded that exam allows for normal function (including nutrition intake and excretion), imaging studies show no tumor, and overall medical evaluation reveals no reason that the safe performance of essential job tasks would be impaired or that performance of such tasks would place member at undue risk.

(7) Genitourinary malignancies can prevent the safe performance of essential job tasks 1, 3, 4, 5, 7, 8, and 9 if altered urinary function prevents prolonged activity without use of toilet facilities or if underlying tumor has produced lower energy levels, anemia, undernutrition, weight loss, or specific organ dysfunction. If treated successfully, essential job tasks can be performed safely if, after evaluation by a specialist, it is concluded that exam allows for normal function (including nutrition intake and excretion), imaging studies show no tumor, and overall medical evaluation reveals no reason that the safe performance of essential job tasks would be impaired or that performance of such tasks would place member at undue risk.

(8) Hematologic or lymphatic malignancies (leukemia, lymphoma, etc.) can prevent safe performance if anemia, lymphopenia, or thrombocytopenia is present, or if adverse effects of treatment are present (i.e., neurologic or cardiac dysfunction after chemotherapy). This debilitated state can affect a member's ability to safely perform essential job tasks 1, 2, 3, 4, 5, 7, 8, and 9. If treated successfully, essential job tasks can be performed safely if, after evaluation by a specialist, it is concluded that exam allows for normal function, imaging studies show no tumor, and overall medical evaluation reveals no reason that the safe performance of essential job tasks would be impaired or that performance of such tasks would place member at undue risk.

(9) Skin cancer that requires significant resection or loss of skin integrity can prevent the safe performance of essential job tasks 1, 3, and 9 because of increased risk of burns, infection, dehydration, and heat rash while fire fighting and wearing PPE. If treated successfully, essential job tasks can be performed safely if, after evaluation by a specialist, it is concluded that exam allows for normal function,

imaging studies show no tumor, and overall medical evaluation reveals no reason that the safe performance of essential job tasks would be impaired or that performance of such tasks would place member at undue risk.

NEXT CHAPTER

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.1.1.1 Some of the medical requirements in this standard are not applicable to candidates and members whose essential job tasks within the fire department are not described in NFPA 1001, NFPA 1002, NFPA 1003, NFPA 1006, NFPA 1021, and NFPA 1051. However, particular attention must be paid to the essential job tasks of individual candidates or members when applying this standard (for example, administrative staff personnel, some EMS personnel, fire/police, and others who do not have responsibility for structural fire fighting and are not required to wear PPE and use SCBA). Medical requirements should reflect essential job tasks and all may not be specifically addressed in this standard. *(See also Chapter 5 and Chapter 9.)*

A.1.2.2 A direct relationship exists between the medical requirements and the job description of members. The job description should include all essential job functions of members, both emergency and nonemergency. Members perform a variety of emergency operations including fire fighting, emergency medical care, hazardous materials mitigation, driving/operating fire apparatus, and special operations. Nonemergency duties can include, but are not limited to, training, station and vehicle maintenance, and physical fitness. Each fire department needs to identify and develop a written job description for members.

A.1.3.2 The specific determination of the authority having jurisdiction depends on the mechanism under which this standard is adopted and enforced. Where this standard is adopted voluntarily by a particular fire department for its own use, the authority having jurisdiction should be the fire chief or the political entity that is responsible for the operation of the fire department. Where this standard is legally adopted and enforced by a body having regulatory authority over a fire department, such as federal, state, or local government or political subdivision, this body is responsible for making those determinations as the authority having jurisdiction. The compliance program should take into account the services the fire department is required to provide, the financial resources available to the fire department, the availability of personnel, the availability of trainers, and such other factors as will affect the fire department's ability to achieve compliance.

A.1.3.3 The most vital resource of any fire department is its members. This standard is to be implemented in a process aimed at improving member health and wellness. Due to the hazardous nature of the occupation, methods to reduce the risk of occupational injury, illness, and exposures to communicable diseases are warranted. Annual reports repeatedly indicate over 100 line-of-duty deaths and 100,000 occupational injuries and illnesses among career and volunteer fire fighters. Another concern is the fire fighters who experience disabling injuries or develop occupational diseases and conditions, which often have debilitating or fatal results, forcing them to leave their fire service activities. There is an increased risk of respiratory and heart disease in fire fighters and strong evidence of a link to some cancers and other conditions related to occupational exposures to carcinogens, toxic products of combustion, and hazardous materials. Safety and health are two of the many components of the risk management process. The intent of this standard is to reduce the risk and burden of fire service occupational

morbidity and mortality while improving the welfare of fire fighters. By implementing the medical requirements of this standard, a fire department commits to a process that evaluates and enhances the health and fitness for duty of members.

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.3.3.1 Candidate. Volunteer members are considered employees in some states or jurisdictions. Volunteer fire departments should seek legal counsel as to their legal responsibilities in these matters.

A.4.1.1 See Annex B.

A.4.1.2.1 Fire departments can require candidates to provide some form of medical clearance for candidate participation in pre-employment physical strength and agility tests. When there is such a requirement, the medical clearance forms should enumerate the tasks that the candidate will be asked to safely perform during the test.

A.4.1.4 This physician should also have experience with running an occupational medicine program for public safety workers, preferably fire fighters.

A.4.1.7 The fire department should provide the fire department physician with a representative list of essential job tasks for members of fire departments who wear PPE and SCBA to conduct interior structural fire-fighting operations. The tasks on this list should be verified by the fire department to be essential to the job under consideration for each individual candidate or member. A sample list based on NFPA 1001, NFPA 1002, NFPA 1003, NFPA 1006, NFPA 1021, and NFPA 1051 is provided in 5.1.3.1 and Section 9.1. An effective way to transmit this information to the physician is to use the list with checkboxes in front of each essential job task. This list is taken by a candidate or member to the medical provider at the time of medical evaluation. A check in the box indicates that there is no medical reason why an individual cannot safely perform that particular essential job task.

A.4.1.13 Suggested fields (data points) include but are not necessarily limited to the following:

(1) Medical history including the following:
   (a) Date of exam
   (b) Medical history
   (c) Smoking history
   (d) Tobacco (smokeless) use
   (e) Smoking in the past year
   (f) Tobacco cessation program participation
   (g) Alcohol use
   (h) Family history of heart disease or cancer
   (i) Personal history of past disease, disorders, or cancer
   (j) Exercise history

(2) Current medical and fitness results including the following:
   (a) Blood pressure and heart rate
   (b) ICD9 codes for physician assessment
   (c) Height and weight
   (d) Body composition (local recording only)
   (e) Blood analysis results
   (f) Urinalysis results
   (g) Vision
   (h) Hearing
   (i) Spirometry
   (j) Chest X-ray
   (k) Resting electrocardiogram
   (l) Cancer screening results
   (m) Immunizations
   (n) Aerobic capacity results
   (o) Muscle strength results
   (p) Muscle endurance results
   (q) Flexibility results

A.4.2.6 Incident scene rehabilitation is an important component of incident scene management that protects the health and safety of fire department members. NFPA 1500 and NFPA 1561 require the establishment of "REHAB" during incident scene operations. A significant component of member rehabilitation is ongoing medical evaluation. The standard does not require the fire department physician to be at every incident but does require that the physician coordinate with the EMS medical director to provide protocols for medical evaluation and management of members in emergency incident rehab. This medical planning process ensures optimal medical support for members at the scene and should include criteria for transportation to a medical facility for additional evaluation and treatment. Fire departments can develop specific standard operating procedures establishing conditions under which fire department physician(s) are dispatched to emergency incidents. *(See NFPA 1584.)*

A.6.1 The Americans with Disabilities Act requires that any medical examination must take place after an offer of employment is made and prior to the commencement of duties.

A.6.1.1 The medical history should include the candidate's known health problems, such as major illnesses, surgeries, medication use, and allergies. Symptom review is also important for detecting early signs of illness. A medical history should also include a personal health history, a family health history, a health habit history, an immunization history, and a reproductive history. An occupational history should also be obtained to collect information about the person's past occupational and environmental exposures.

Physical examination should include the following:

(1) Vital signs
(2) Head, eyes, ears, nose, and throat (HEENT)
(3) Neck
(4) Cardiovascular
(5) Pulmonary
(6) Breast
(7) Gastrointestinal (includes rectal exam for mass, occult blood)
(8) Genitourinary (includes pap smear, testicular exam, rectal exam for prostate mass)
(9) Hernia
(10) Lymph nodes
(11) Neurological
(12) Musculoskeletal
(13) Skin (includes screening for cancers)
(14) Vision testing

Laboratory tests on candidates should include the following:

(1) Blood tests including the following:
    (a) CBC with differential, RBC indices and morphology, and platelet count
    (b) Electrolytes (Na, K, Cl, HCO_3, or CO_2)
    (c) Renal function (BUN, creatinine)
    (d) Glucose
    (e) Liver function tests (ALT, AST, direct and indirect bilirubin, alkaline phosphatase)
    (f) Total cholesterol, HDL, LDL, clinically useful lipid ratios (e.g., percent LDL), and triglycerides
(2) Urinalysis. Dipstick test for glucose, ketones, leukocyte esterase, protein, blood, and bilirubin.
(3) Audiology. Hearing assessed in each ear at each of the following frequencies: 500 Hz, 1000 Hz, 2000 Hz, 3000 Hz, 4000 Hz, 6000 Hz, and 8000 Hz. Results should be corrected for age as permitted by OSHA. Baseline audiometry is performed in accordance with 29 CFR 1910.95, “Occupational Noise Exposure.” The basics of this standard include the following:

(a) The first audiogram done (for members this will probably be done during their pre-placement exam) becomes the baseline audiogram.

(b) If subsequent audiograms are better than the baseline, then the best one becomes the baseline. All audiograms should be done with no exposure to industrial noise for 14 hours.

(4) Spirometry. Pulmonary function testing (spirometry) is conducted to measure the member's forced vital capacity (FVC), forced expiratory volume in 1 second (FEV_1), and the FEV_1/FVC ratio. Data is corrected within American Thoracic Society Guidelines and normative equations. (Knudson et al., 1983 and ACOEM 2000)

(5) Chest radiography. Chest X-ray posterior-anterior and lateral views.

(6) Electrocardiograms (EKG). A resting 12-lead EKG.

(7) Immunizations and infectious disease screening. The following infectious disease immunizations or infectious disease screening are to be provided, as indicated:

(a) Tuberculosis screen (PPD).

(b) Hepatitis C virus screen (baseline).

(c) Hepatitis B virus vaccinations.

(d) Tetanus/diphtheria vaccine (booster every 10 years).

(e) Measles, mumps, rubella vaccine (MMR).

(f) Polio vaccine given to uniformed personnel if vaccination or disease is not documented.

(g) Hepatitis A vaccine. Vaccine offered to high risk (HazMat, USAR, and SCUBA) and other personnel with frequent or expected frequent contaminated water exposures.

(h) Varicella vaccine. Vaccine offered to all non-immune personnel.

(i) Influenza vaccine. Vaccine offered to all personnel.

(j) HIV screening. Screening available to all personnel.

(k) HIV testing offered on a confidential basis as part of post-exposure protocols and as requested by the physician or patient.

(l) All results from HIV tests are provided directly to the patient and will be maintained by the physician as a highly confidential document, and will not be forwarded to any local, state, provincial, national, or international database unless mandated by public health statute.

A.6.3.1.2(1) Deformities of the skull can result in the member's inability to properly wear protective equipment.

A.6.3.1.2(2) These deformities can result in the potential for sudden incapacitation, the inability to properly wear protective equipment, and the inability to communicate effectively due to oropharyngeal dysfunction.

A.6.3.1.2(3) Loss of or congenital absence of the bony substance of the skull can result in the inability to properly wear protective equipment and the inability to communicate effectively due to oropharyngeal dysfunction.

A.6.3.2.2(1) Thoracic outlet syndrome can result in frequent episodes of pain or inability to safely perform work.

A.6.3.2.2(2) Congenital cysts, chronic draining fistulas, or similar lesions can result in the inability to properly wear protective equipment and the inability to communicate effectively due to oropharyngeal dysfunction.

A.6.3.2.2(3) The contraction of neck muscles can result in the inability to properly wear protective equipment and the inability to safely perform functions as a member due to limitation of flexibility.

A.6.4.1(1) Far visual acuity is at least 20/30 binocular, corrected with contact lens or spectacles. Far visual acuity uncorrected is at least 20/40 binocular for wearers of hard contacts or spectacles. Successful long-term soft contact lens wearers (that is, 6 months without a problem) are not subject to the uncorrected standard. Inadequate far visual acuity can result in the failure to be able to read placards and street signs or to see and respond to imminently hazardous situations.

A.6.4.1(2) Persons with severe color vision loss will likely fail the acuity requirement. Formerly, color vision deficiency was listed as a Category B medical condition. However, it is felt that within most cases this condition will not affect the ability of a member to safely perform the essential functions of his or her job. The fire service physician should consider the color vision deficiency of the individual and consider the color vision requirements of the member's job and reach an individual determination.

A.6.4.1(3) Candidates with monocular vision are not allowed to drive per DOT/CDL regulations.

A.6.4.2(1) These diseases of the eye can result in the failure to read placards and street signs or to see and respond to imminently hazardous situations.

A.6.4.2(2) With retinal detachment, sufficient time (1 to 2 weeks for radial keratotomy and Lasik-type surgeries, and 3 months for retinal detachment) must have passed to allow stabilization of visual acuity and to ensure that there are no post-surgical complications. These ophthalmological procedures can result in the failure to be able to read placards and street signs or to see and respond to imminently hazardous situations.

A.6.5 Currently, no hearing tests will allow the fire department physician to accurately predict whether the fire fighter will adequately be able to safely perform essential job duties. Job-specific hearing tests should be individualized for each department and its specific job functions. The following list of hearing-specific tasks can assist to direct development of hearing protocols:

(1) Understanding spoken commands, both over the radio and while wearing SCBA
(2) Hearing alarm signals, including building evacuation, low air alarm on the SCBA, and PASS alarms
(3) Hearing and locating the source of calls for assistance from victims or other fire fighters

All of these tasks will need to be performed with reasonably simulated incident scene background noise and SCBA noise. The inability to hear sounds of low intensity or to distinguish voice from background noise can lead to failure to respond to imminently hazardous situations. *(See 5.1.3.1.)*

A.6.5.2(1) Unequal hearing can result in the inability to localize sounds, leading to failure in the ability to safely perform search and rescue and other localization tasks.

A.6.5.2(4) Severe external otitis, that is, recurrent loss of hearing can result in the inability to hear sounds of low intensity or to distinguish voice from background noise, leading to failure to respond to imminently hazardous situations.

A.6.5.2(5) Severe agenesis or traumatic deformity of the auricle can result in the inability to properly wear protective equipment and the inability to hear sounds of low intensity or to distinguish voice from background noise, leading to failure to respond to imminently hazardous situations.
A.6.5.2(6) Severe mastoiditis or surgical deformity of the mastoid can result in the inability to properly wear protective equipment and the inability to hear sounds of low intensity or to distinguish voice from background noise, leading to failure to respond to imminently hazardous situations.
A.6.5.2(7) Ménière's syndrome or severe labyrinthitis can result in the potential for sudden incapacitation and the inability to safely perform job functions due to limitations of balance.
A.6.5.2(8) Otitis media (chronic) can result in frequent episodes of pain or the inability to safely perform work and the inability to hear sounds of low intensity or to distinguish voice from background noise, leading to failure to respond to imminently hazardous situations.
A.6.6.2(1) Diseases of the jaws or associated tissues can result in the inability to properly wear protective equipment.
A.6.6.2(2) The wearing of orthodontic appliances can result in the inability to properly wear protective equipment.
A.6.6.2(3) Extensive loss of oral tissues can result in the inability to properly wear protective equipment and the inability to communicate effectively due to oropharyngeal dysfunction.
A.6.6.2(4) This condition can result in the inability to properly wear protective equipment and the inability to communicate effectively due to oropharyngeal dysfunction.
A.6.7.1(1) A tracheostomy can result in the inability to properly wear protective equipment, the inability to safely perform job functions due to limitations of endurance, and the inability to communicate effectively due to oropharyngeal dysfunction.
A.6.7.1(2) Aphonia can result in the inability to communicate effectively due to oropharyngeal dysfunction.
A.6.7.2(1) A congenital or acquired deformity can result in the inability to properly wear protective equipment.
A.6.7.2(2) Allergic rhinitis can result in frequent episodes of pain, the inability to safely perform work, and the inability to safely perform functions as a member due to limitations of endurance.
A.6.7.2(4) Recurrent sinusitis can result in frequent episodes of pain and the inability to safely perform work.
A.6.7.2(5) Severe dysphonia can result in the inability to communicate effectively due to oropharyngeal dysfunction.
A.6.8.1(5) Chronic obstructive airways disease can result in the inability to safely perform functions as a member due to limitations of endurance.
A.6.8.1(6) Hypoxemic disorders can result in the inability to safely perform functions as a member due to limitations of endurance.
A.6.8.1(7) Bronchial asthma or reactive airways disease can result in frequent episodes of pain or the inability to safely perform work, the potential for sudden incapacitation,

and the inability to safely perform functions as a member due to limitations of endurance.

A.6.8.2(1) These conditions can result in the inability to safely perform functions as a member due to limitations of strength or endurance and can result in the potential for sudden incapacitation.

A.6.8.2(3) Fibrothorax, chest wall deformity, and diaphragm abnormalities can result in the inability to safely perform functions as a member due to limitations of endurance.

A.6.8.2(4) Interstitial lung diseases can result in the inability to safely perform functions as a member due to limitations of endurance.

A.6.8.2(5) Pulmonary vascular diseases and pulmonary embolism can result in frequent episodes of pain and the inability to safely perform functions as a member due to limitations of endurance.

A.6.8.2(6) Bronchiectasis can result in the inability to safely perform functions as a member due to limitations of endurance.

A.6.9.1.1(1) Angina pectoris can result in frequent episodes of pain or inability to safely perform work, progressive illness leading to functional impairment, and the potential for sudden incapacitation.

A.6.9.1.1(2) Heart failure can result in frequent episodes of pain or inability to safely perform work, progressive illness leading to functional impairment, and the potential for sudden incapacitation.

A.6.9.1.1(3) These conditions can result in frequent episodes of pain or the inability to safely perform work.

A.6.9.1.1(4) Recurrent syncope can result in the potential for sudden incapacitation.

A.6.9.1.1(5) A medical condition requiring an automatic implantable cardiac defibrillator can result in the potential for sudden incapacitation.

A.6.9.1.1(7) If the person is pacemaker-dependent, then the risk for sudden failure due to trauma is not acceptable. Those with cardiac pacemakers can have the potential for sudden incapacitation.

A.6.9.1.2(1) Specific recommendations include the following:

(1) *Mitral stenosis*. Mitral stenosis is acceptable if in sinus rhythm and stenosis is mild, that is, valve area is >1.5 cm^2 or pulmonary artery systolic pressure is <35 mm Hg.

(2) *Mitral insufficiency*. Mitral insufficiency is acceptable if in sinus rhythm with normal left ventricular size and function.

(3) *Aortic stenosis*. Aortic stenosis is acceptable if stenosis is mild, that is, mean aortic valvular pressure gradient is <20 mm Hg.

(4) *Aortic regurgitation*. Aortic regurgitation is acceptable if left ventricular size is normal or slightly increased and systolic function is normal.

(5) *Prosthetic valves*. Prosthetic valves are acceptable unless full anticoagulation is in effect.

A.6.9.1.2(2) Recurrent paroxysmal tachycardia can result in the potential for sudden incapacitation and the inability to safely perform job functions due to limitations of strength or endurance.

A.6.9.1.2(3) These blocks will result in disqualification unless exercise can be performed with an adequate heart rate response. They can result in frequent episodes of

pain, the inability to safely perform work, and have the potential for sudden incapacitation.

A.6.9.1.2(6) Ventricular tachycardia can result in the potential for sudden incapacitation and the inability to safely perform job functions due to limitations of strength or endurance.

A.6.9.1.2(7) Hypertrophy of the heart can result in the potential for sudden incapacitation and the inability to safely perform job functions due to limitations of endurance.

A.6.9.1.2(8) A history of a congenital abnormality that has been treated by surgery but with residual complications or that has not been treated by surgery, leaving residuals or complications can result in frequent episodes of pain or inability to safely perform work and the potential for sudden incapacitation.

A.6.9.1.2(9) These conditions can result in the inability to safely perform job functions due to limitations of endurance.

A.6.9.2.1(1) Hypertension that is uncontrolled, poorly controlled, or requires medication likely to interfere with the performance of duties. Hypertension is an illness that can lead to functional impairment and potential for sudden incapacitation.

A.6.9.2.1(2) An aneurysm of the heart or major vessel, congenital or acquired, can result in inability to safely perform essential job tasks and the potential for sudden incapacitation.

A.6.9.2.1(4) Peripheral vascular disease can impair sensation, can increase the likelihood of injury, and can result in frequent episodes of pain or the inability to safely perform essential job tasks due to limitations of endurance.

A.6.9.2.2(2) Recurrent thrombophlebitis can result in frequent episodes of pain or the inability to safely perform work and the inability to safely perform functions as a member due to limitations of endurance.

A.6.9.2.2(3) Chronic lymphedema can result in the inability to safely perform functions as a member due to limitations of endurance.

A.6.9.2.2(4) Congenital or acquired lesions of the aorta or major vessels, for example, syphilitic aortitis, demonstrable atherosclerosis that interferes with circulation, and congenital acquired dilatation of the aorta, can result in the potential for sudden incapacitation and the inability to safely perform job functions due to limitations of endurance.

A.6.9.2.2(5) Marked circulatory instability can result in the inability to safely perform job functions due to limitations of endurance and the inability to safely perform job functions due to limitations of balance.

A.6.10.2(1) Cholecystitis (that which causes frequent pain due to stones or infection) can result in frequent episodes of pain or the inability to safely perform work.

A.6.10.2(2) Gastritis (that which causes recurrent pain and impairment) can result in frequent episodes of pain or the inability to safely perform work.

A.6.10.2(3) GI bleeding can cause fatigue and/or hemodynamic instability resulting in inability to safely perform work.

A.6.10.2(4) Acute hepatitis (until resolution of acute hepatitis as determined by clinical examination and appropriate laboratory testing) can result in frequent episodes of pain or the inability to safely perform work.

A.6.10.2(5)(c) The member should be evaluated for persistent abnormality causing increased risk of infection and/or strangulation.
A.6.10.2(6) Inflammatory bowel disease (that which causes disabling pain or diarrhea) can result in frequent episodes of pain or the inability to safely perform work. It is a progressive illness leading to functional impairment.
A.6.10.2(7) Intestinal obstruction (that is, recent obstruction with impairment) can result in frequent episodes of pain, the inability to safely perform work, and the potential for sudden incapacitation.
A.6.10.2(8) Pancreatitis (chronic or recurrent) can result in frequent episodes of pain or the inability to safely perform work.
A.6.10.2(10) A bowel resection (if frequent diarrhea precludes performance of duty) can result in frequent episodes of pain or the inability to safely perform work.
A.6.10.2(11) A gastrointestinal ulcer (where symptoms are uncontrolled by drugs or surgery) can result in frequent episodes of pain or the inability to safely perform work.
A.6.10.2(12) The member should be evaluated for underlying disease, history of trauma, or associated infections.
A.6.10.2(13) Cirrhosis, hepatic or biliary (that which is symptomatic or in danger of bleeding), can result in frequent episodes of pain or the inability to safely perform work.
A.6.10.2(14) Chronic active hepatitis can result in weakness, general malaise, or the inability to safely perform work.
A.6.11 See B.1.2.1.
A.6.14.2(1) The member should be evaluated for residual instability (subluxation) or significant limitation of motion.
A.6.14.2(4) The member should be evaluated for residual instability or laxity of ligament or intra-articular arthritis, which could cause instability in limb, inadequate range of motion, or increased pain, or use would limit crawling, kneeling, jumping, safe ladder use, or safe stretcher carrying.
A.6.14.2(5) The member should be evaluated for residual signs or symptoms (e.g., pain, swelling, atrophy, range of motion, gait).
A.6.14.2(6) The member should be evaluated for resulting functional impairment, disease activity, and chronicity.
A.6.15.1(4) Candidate must be free of clinical disease for 3 years, neurologic exam must be normal, and candidate must not require drugs that can impair ability to safely perform essential job tasks. In considering performance of essential job tasks, the impact of the operational environment (e.g., heat, stress, activity, variable night shifts) on exacerbations must be considered and specifically addressed by the neurological specialist and the medical officer.
A.6.15.1(5) The candidate must be free of clinical disease for 3 years and off all drug and other treatment. Cognitive function, neurologic exam, and respiratory status must all be normal and the candidate must be free of disease exacerbations for 3 years and off all drug treatment.
A.6.15.2(2) Exam and imaging studies must be normal and medications needed to control chronic pain will not affect neurologic or cardiac function (energy, cognitive ability, equilibrium, etc.). Examples include the following:

(1) Neuropathy (cranial, peripheral, plexus, etc.). Motor and sensory neurological exams and diagnostic/imaging studies (as needed) must be normal and medications needed to control pain will not affect nervous system function (energy, cognitive ability, equilibrium, etc.).

(2) Myopathy and/or myositis. Motor strength is normal, pain is controlled without narcotics, renal function is normal, and neither heart nor diaphragm is involved.

(3) History of infectious myo-neuropathies (e.g., Guillain-Barre, post-botulism, post-polio syndrome). Cognitive function, neurologic exam, and diagnostic imaging studies (as needed) must be normal.

A.6.16.2(1) The member should be evaluated for severity, chronicity, pain, likelihood of serious occupational infectious exposure, requirement for continuous medication, and impairment of ability to safely perform essential job tasks.

A.6.16.2(2) The member should be evaluated for thinned, stretched skin that is at risk for easy breakdown, burn damage, abnormal sensations, or infection.

A.6.16.2(3) The member should be evaluated for systemic involvement, skin involvement that interferes with function, or if localized complications such as fissures, weeping, or ulcerations are present due to risk of burn injury and/or infection.

A.6.16.2(4) The member should be evaluated for associated systemic lupus, skin integrity, and Raynaud's phenomenon.

A.6.16.2(5) The member should be evaluated for functional limitation of hand and/or foot when exposed to cold or systemic involvement of skin, muscles, heart, lungs, or joints.

A.6.16.2(6) The member should be evaluated for sclerodactyly with significant loss of function or systemic involvement.

A.6.16.2(7) The member should be evaluated for associated leg swelling, loss of function, or systemic involvement.

A.6.16.2(8) The member should be evaluated for percent body involvement with redness and scaling, requirement for regular application of lubrication/medication, and/or potential effect on performance of essential job tasks.

A.6.16.2(9) The member should be evaluated for extent, severity, chronicity, and known precipitants with attention to potential risk of serious, occupational infectious exposures or other interference with safe performance of essential job tasks.

A.6.16.2(10) The member should be evaluated for swelling, redness, scaling, itching, weeping, and/or cracking, pain, loss of function (e.g., cannot stand for long periods of time), or ulceration.

A.6.16.2(11) The member should be evaluated for functional limitations, ability to wear helmet, SCBA facepiece and protective clothing, and requirements for continuous treatment.

A.6.16.2(12) The member should be evaluated for extent, chronicity, and interference with essential job task performance.

A.6.16.2(13) The member should be evaluated for extent, chronicity, pain, ability to wear protective ensemble, and risk of occupational infectious exposure.

A.6.16.2(14) The member should be evaluated for extent and acuity of blistering, loss of function, aggravating agent(s) if known, ability to wear protective ensemble, ability

to tolerate moderate, incidental, job-related trauma to skin, risk of occupational infectious exposure, or inability to safely perform essential job tasks.

A.6.16.2(15) The member should be evaluated for severity, chronicity, association with underlying medical condition, and requirement for medications (antihistamines) that interfere with ability to safely perform essential job tasks.

A.6.18.1(2) A Hemoglobin A1C <6.5 is a reasonable serum blood test of diabetes control according to the American Diabetes Association.

A.6.18.2(1) The member should be evaluated for absence of orthostatic hypotension, electrolyte disorders, ability to maintain hydration during exercise under extreme environmental conditions, and for normal thyroxine levels with supplementation.

A.6.19.2(2) Previous burn injury per se does not interfere with the essential job tasks of fire fighting. Extensive burn injury with or without the need for skin grafting can result in skin surfaces that are easily damaged, sensitive to chemical or solvent exposure, or lacking in sweat or sebaceous glands. The member should be evaluated for heat or cold intolerance, range of motion and motor strength, and ability to wear personal protective clothing and equipment.

A.6.20.2(1) The member should be evaluated for space-occupying lesion, treatment, or sequelae affecting ability to perform essential job tasks.

A.6.20.2(2) The member should be evaluated for history or risk of seizure, residual effects on balance, coordination, strength, speech, judgment, and medication requirements.

A.6.20.2(3) The member should be evaluated for ability to wear SCBA and maintain nutrition and oral hydration.

A.6.20.2(4) The member should be evaluated for residual pulmonary function and medication requirements.

A.6.20.2(5) The member should be evaluated for abnormal bowel or urinary function that would interfere with emergency operations where toilet facilities are unavailable, ability to maintain nutrition and hydration, and medication requirements.

A.6.20.2(6) The member should be evaluated for muscle strength, deformity interfering with function, or ability to wear protective ensemble.

A.6.20.2(7) The member should be evaluated for anemia, leukopenia, or thrombocytopenia, residual cardiac, pulmonary, GI, dermatological or neurological effects of surgery, radiation, or chemotherapy.

A.6.22.2 The member should be evaluated for underlying condition requiring the medication and effects of medication that could affect ability to safely perform essential job tasks.

A.7.1.3 A department should set protocols regarding length of time absent from duty and/or medical conditions that require the department physician to evaluate a member. Physical therapy, strength training, work hardening, functional capacity evaluations, and alternate duty are all activities that can be helpful.

A.7.2.2(5) Universal agreement exists that wellness, fitness, and risk reduction for cardiovascular disease, pulmonary disease, and cancer can be reduced by tobacco abstinence, regular exercise, and control of weight, hypertension, cholesterol, and blood sugar. The annual medical evaluation should serve as one of many opportunities in the fire department to modify these risk factors. Clearly, risk reduction is easier if there is

early intervention and if the department promotes wellness and fitness. Tobacco cessation programs should be available to the member, and all fire department facilities should be tobacco-free zones. Control of weight, hypertension, cholesterol, and blood sugar are all improved with dietary education and regular exercise.

A.7.6.2 If performing these tests as part of an automated panel that includes additional tests is more cost effective, it is acceptable to do so.

A.7.7.1 Pulmonary spirometry is an essential part of the annual medical evaluation of fire fighters while wearing personal protective clothing and SCBA. Spirometric measures include the forced vital capacity (FVC), the forced expiratory volume at 1 second (FEV_1), and the calculated FEV_1/FVC ratio. Other spirometric measures of small airway flow limitations (e.g., FEF 25% to 75%) should not be used for screening evaluations. For spirometric measurements to be properly interpreted, they need to be performed according to American Thoracic Society recommendations. Modern spirometry allows for this through the use of computer-assisted quality control of both calibration and testing procedures. Based on American Thoracic Society criteria, a normal FVC or FEV_1 is within the range of 80 to 120 percent of predicted and minimal reductions are between 60 and 79 percent of predicted. Thus, when the FVC or FEV_1 is reduced below 60 percent of predicted, substantial dysfunction is present. For this reason, the American Thoracic Society considers moderate chronic obstructive pulmonary disease to be present when the FEV_1/FVC ratio is 0.45 to 0.59 (absolute ratio rather than percent of predicted) and severe chronic obstructive pulmonary disease to be present when the FEV_1/FVC ratio is <0.45 (absolute ratio rather than percent of predicted). Moderate to severe restriction is defined by an FVC <0.60 percent of predicted with an FEV_1/FVC ratio >0.80. In certain cases, additional pulmonary function testing can be required such as pre- and post-spirometry, lung volumes, diffusing capacity, exercise testing, and/or challenge testing but these tests are not screening tests and should be performed in a laboratory setting by an experienced specialist.

A.7.7.3 See D.2.4.

A.7.9.1 Baseline electrocardiography should be conducted. (Periodic resting electrocardiograms have not been shown to be useful but can be reasonable as a member's age increases.)

A.7.9.3 No firm guidelines for stress electrocardiography in asymptomatic individuals have been developed. False-positive results from this testing have been a problem, especially in younger age groups and in women. In those with two or more risk factors for coronary artery disease [hypercholesterolemia (total cholesterol greater than 240 mg/dl), hypertension (systolic blood pressure greater than 90 mmHg), smoking, diabetes mellitus, or family history of premature coronary artery disease (heart attack or sudden cardiac death in a first degree relative less than 60 years old)], there is probable justification for performing the testing. As well, stress tests are more important in those whose work deals with public safety.

Stress tests can be performed using a treadmill, bicycle, or stair climber as long as the protocol being used gradually increases in workload metabolic equivalent of resting energy expenditure (METS). A submaximal test, with the endpoint being the attainment of 85 percent of predicted maximal heart rate (PMHR), can be performed. Additional

information gained by performing a maximal symptom-limited test might not be worth the additional time, effort, cost, and risk.

A.7.11(1) An annual TB program should include the following:

(1) Documentation of a two-step purified protein derivative (PPD) prior to this PPD or a 0-mm PPD within the past year.

(2) Placement of PPD and reading by a trained, designated reader within 48 hours to 72 hours of placement. Members with a history of positive PPD should fill out a questionnaire.

(3) PPD results should be documented in millimeters (mm). A test with no skin reaction should be recorded as 0 mm.

(4) A PPD skin test will be considered positive if the following conditions are present:
   (a) Greater than 5 mm in someone who is immunosuppressed
   (b) Greater than 10 mm in someone with a normal immune system who is at risk for conversion due to an exposure
   (c) Greater than 10-mm increase from previous reading

(5) If PPD is positive (conversion), the following steps should be taken:
   (a) Fill out questionnaire
   (b) Obtain chest X-ray
   (c) Evaluate for active disease
   (d) Evaluate for preventative therapy

(6) If active disease is diagnosed, the member has to be removed from any duty until he/she has been determined to be noninfectious. This will occur when adequate therapy has been instituted, the cough has resolved, and 3 consecutive sputum smears for acid-fast bacillus (AFB) on different days are negative.

In the event of an exposure to TB, the following steps should be taken:

(1) Member should receive a PPD within 14 days of exposure. Members with a history of positive PPD should fill out a TB questionnaire.

(2) Repeat PPD or questionnaire should be done 6 weeks to 12 weeks after the first.

(3) If PPD is positive (conversion) or questionnaire is positive, proceed as per (5) and (6).

A.7.11(11) Physicians who care for members need to be familiar and up-to-date with the most current recommendations for post-exposure prophylaxis (PEP) for bloodborne pathogen (BBP) exposures. Also, there should be a written protocol for dealing with members who present with BBP exposures. The protocol should be based on the following elements:

(1) Fact sheet that explains in lay language the risks of infection, the various prophylactic and therapeutic options, the testing and follow-up that will be needed, and recommendations for personal behavior (i.e., safe sex, blood donation, and so forth) following an exposure.

(2) Classification table to determine the exposure type and recommendation for prophylaxis.

(3) Current recommendations of U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, and Public Health Services.

(4) Listing of testing to be done on exposed member, including the following:
   (a) HIV
   (b) Hepatitis B surface Antibody (HBsAb), if not previously known to be positive
   (c) Hepatitis B surface Antigen (HBsAg), if not previously known to be positive HBsAb
   (d) Hepatitis C Antibody (HCAb)
   (e) If HIV prophylaxis is to be given, the following tests should be done:
      i. CBC
      ii. Glucose, renal, and hepatic chemical function
      iii. Pregnancy test for females

(5) Listing of testing to be done on source patient, including the following:
   (a) HIV
   (b) HBsAg
   (c) HCAb

(6) If source is available, interview for HIV, HepB, and HepC risk/status.

(7) Determination of risk and need for PEP.

(8) Member counseling regarding PEP medication(s) and side effects of treatment. A printed fact sheet should be available for the member to review.

(9) If PEP prophylaxis is to be given, it should be done as soon as possible after the incident, preferably within 2 hours.

(10) Members on prophylaxis need to be followed for the duration of their treatment.

(11) Assessment of tetanus status and administration of dT booster, if appropriate.

(12) Assess HepB status as follows:
   (a) If previously immunized with a positive post-immunization titer, no further treatment is needed.
   (b) If previously immunized, titer was negative, and source is HBsAg positive or high risk, give Hepatitis B Immune Globulin (HBIG) as soon as possible, preferably within 24 hours, and a dose of Hepatitis B vaccine.
   (c) If previously immunized and titer is unknown, draw titer.
      i. If titer is positive, no further treatment is needed.
      ii. If titer is negative and source is HBsAg positive or high risk, then give HBIG as soon as possible, preferably within 24 hours, and a dose of Hepatitis B vaccine.
      iii. If previously immunized with negative titer and revaccinated with a negative titer, give HBIG immediately and a second dose 1 month later.
      iv. If never immunized, give HBIG and begin Hepatitis B vaccine series.

(13) Follow-up instructions should include the following:

(a) Adverse events and side effects of PEP

(b) Signs and symptoms of retroviral illness (fever, adenopathy, rash)

(c) Appointments for follow-up blood work, including the following:

i. HIV at 6 weeks, 3 months, 6 months, and 9 months

ii. HBsAb and/or HCAb at 6 weeks, 3 months, and 6 months, if source is HepB and/or HepC positive

iii. Every other week CBC, renal and liver function, if receiving PEP

A.7.11(12) For further guidelines and requirements also refer to local and state Department of Health and the Centers for Disease Control (CDC).

A.8.1.1 Besides the methods of determination of body fat mentioned in 8.1.2, other cruder methods have been used. Insurance companies have used height–weight tables to estimate risk of mortality. These tables of "ideal" weight for a given height simply reflect the norm for the U.S. population without consideration of relationship of the norm to health or fitness. Another means of determining obesity that has more scientific basis is the measurement of body mass index (BMI) or the Quetelet index. This is defined as body weight in kilograms divided by height in meters squared. Studies have shown that the Quetelet index correlates rather well ($r = 0.70$) with actual measurement of body fat from hydrostatic weighing — better than do height–weight tables. BMI also correlates with risks associated with obesity. Some experts feel that the major limitation of the body mass index is that it is difficult to interpret to patients and to use in counseling about weight loss. It does have the advantage of being more precise than weight tables and of permitting comparison of populations. However, skinfold measurements correlate more highly with data from hydrostatic weighing, measuring percent body fat, and are thus more accurate for fat-related classification than the Quetelet index. Researchers from The Panel on Energy, Obesity, and Body Weight Standards have recommended that Table A.8.1.1 be used when using the Quetelet index for obesity classification.

Table A.8.1.1 Quetelet Index for Obesity

BMI (kg/m^2)	Classifications
20–25	Desirable range for men and women
25–29.9	Grade 1 Obesity
30–40	Grade 2 Obesity
>40	Grade 3 Obesity (morbid obesity)

The health risks associated with obesity begin in the range of 25 to 30 kg/m^2. For example, someone with a large fat-free mass (e.g., a bodybuilder) would be classified by the Quetelet index as obese, though not to the same extent as he/she would with relative weight or the height–weight tables. Another example of exception to this

standard would be members of the Phoenix Fire Department, whose average BMI is 28. This would place the members in the mildly obese range, yet on their fitness evaluations they score in the excellent range.

A.8.1.2(1) A number of researchers have found that the ratio of waist-to-hip circumference (WHR) and the following circumference measurements are an accurate and convenient method of determining the type of obesity present:

(1) Abdomen I (males) over the umbilicus

(2) Abdomen II (females) just below the umbilicus, at the narrowest portion of the waistline below the ribs and above hips with the abdomen relaxed

The guide for measurement is as follows:

(1) Hips at the widest part below the waist; landmark is the greater trochanter, feet should be together.

(2) Neck just below the larynx perpendicular to the long axis of the neck.

Equations for body fat prediction from circumferences and height measured in inches are as follows:

Males (N = 592; R = 90; S.E. meas = 3.52% fat) % fat = + [85.20969 ×log (abdomen I circumference - neck circumference)] - [69.73016 ×log (height)] + 37.26673

Females = + [161.27327 ×log (abdomen II circumference + hip - neck circumference)] - [100.81032 ×log (height)] - 69.55016

A.8.1.2(3) The most widely used method for determining obesity is based on the thickness of skinfolds. The measures, when performed correctly, have a high correlation (r = 0.80+) with body density from underwater weighing.

Many researchers in the United States (including those performing the large national surveys of the U.S. population that form the basis for normative data worldwide) take skinfold measurements on the right side of the body. UK and European investigators, on the other hand, tend to take measurements on the left side of the body. Most research, however, reveals that it matters little on which side measurements are taken.

A suggested way to conduct measurements is as follows:

(1) As a general rule, those with little experience in skinfold measurement should mark the site to be measured with a black felt pen. A flexible steel tape can be used with sites when it is necessary to locate a bodily midpoint. With experience, however, the sites can be located without marking.

(2) The measurer should feel the site prior to measurement, to familiarize himself and the person being measured with the area where the skinfold will be taken.

(3) The skinfold should be firmly grasped by the thumb and index finger of the left hand and pulled away from the body. While this is usually easy with thin people, it is much harder with the obese, and can be somewhat uncomfortable for the person being tested. The amount of tissue pinched up must be enough to form a fold with approximately parallel sides. The thicker the fat layer under the skin, the wider the necessary fold (and the more separation needed between thumb and index finger).

(4) The caliper is held in the right hand, perpendicular to the skinfold and with the skinfold dial facing up and easily readable. The caliper heads should be placed ½

in. to ½in. away from the fingers holding the skinfold, so that the pressure of the caliper will not be affected.

(5) The skinfold caliper should not be placed too deep into the skinfold or too far away on the tip of the skinfold. Try to visualize where a true double fold of skin thickness is and place the caliper heads there. It is good practice to position the caliper arms one at a time, first the fixed arm on one side and then the lever arm on the other.

(6) The dial is read approximately 4 seconds after the pressure from your hand has been released on the lever arm of the caliper jaw.

(7) A minimum of two measurements should be taken at each site. Measurements should be at least 15 seconds apart to allow the skinfold site to return to normal. If consecutive measurements vary by more than 1 mm, more should be taken until there is consistency.

(8) Maintain the pressure with the thumb and forefinger throughout each measurement.

(9) When measuring the obese, it can be impossible to elevate a skinfold with parallel sides, particularly over the abdomen. In this situation, try using both hands to pull the skinfold away while a partner attempts to measure the width. If the skinfold is too wide for the calipers, underwater weighing or another technique will have to be used.

(10) Measurements should not be taken when the skin is moist because there is a tendency to grasp extra skin, obtaining inaccurately large values. Also measurements should not be taken immediately after exercise or when the person being measured is overheated, because the shift of body fluid to the skin will inflate normal skinfold size.

(11) It takes practice to be able to grasp the same amount of skinfold consistently at the same location every time. Accuracy can be tested by having several technicians take the same measurements and comparing results. It can take up to 20 to 50 practice sessions to become proficient. Calipers should be accurately calibrated and have constant pressure of 10 g/mm^2 throughout the full measurement range. The accuracy of skinfold measurements can be reduced by many factors, including measurement at the wrong sites, inconsistencies among different calipers and testers, and the use of inconsistent equations. However, when testers practice together and take care to standardize their testing procedures, inconsistencies among testers can usually be held under 1 percent.

A.8.2.1 Fitness Evaluation for Members. Fitness evaluations shall be mandatory for all members, shall be part of a comprehensive fitness and wellness program as required by NFPA 1583, and shall be conducted under the auspices of the fire department physician. The actual evaluations may be performed by the fire department's fitness personnel. All data collected by the evaluator(s) are considered clinical in nature and are to be maintained in the member's confidential medical file. Protocols for assessment of fitness levels of members are outlined in Annex C.

A.8.2.1.1 See C.2.1.1.1 for the protocol.

A.8.2.1.2(1) See C.2.1.1.1.3 for the protocol.

A.8.2.1.2(2) See C.2.1.1.1.4 for the protocol.

A.8.2.1.2(3) See C.2.1.1.1.5 for the protocol.
A.8.2.1.3(1) See C.2.1.1.1.6 for the protocol.
A.8.2.1.3(2) See C.2.1.1.1.7 for the protocol.
A.8.2.1.4 See C.2.1.1.1.8 for the protocol.
A.9.1(1) A member, while wearing full protective clothing (turnout coat and pants, helmet, boots, and gloves) and SCBA, is required to safely perform a variety of fire-fighting tasks that require upper body strength and aerobic capacity. For those not familiar with fire suppression, the following specific details inherent to the activities in essential job task 1 are offered:

(1) Lifting and carrying tools and equipment (e.g., axe, halligan tool, pike pole, chain saw, circular saw, rabbet tool, high-rise pack and hose) that weigh between 7 and 20 lb and are used in a chopping motion over the head, extended in front of the body, or in a push/pull motion.
(2) Advancing a 1¾ in. or a 2½ in. diameter hose line, which requires lifting, carrying, and pulling the hose at grade, below or above grade, or up ladders. In addition to the weight of the hose itself, a 50 ft section of charged 1¾ in. hose contains approximately 90 lb of water, and a 50-ft section of 2½ in. hose holds approximately 130 lb of water.
(3) Performing forcible entry while utilizing tools and equipment (e.g., axe, halligan tool, chain saw, circular saw, or rabbet tool) that requires chopping, pulling, or operating these items to open doors, windows, or other barriers to gain access to victims, possible victims, or to initiate fire-fighting operations.
(4) Performing ventilation (horizontal or vertical) utilizing tools and equipment (e.g., axe, circular saw, chain saw, pike pole) while operating on a flat or pitched roof or operating off a ground or aerial ladder. This task requires the fire fighter to chop or push tools through roofs, walls, or windows.

Other tasks that could be performed can include search and rescue operations and other emergency response actions under stressful conditions, including working in extremely hot and cold environments for prolonged time periods.
A.9.3.2 Possible accommodations include but are not limited to changes in assignment, provision of devices, revision of SOPs, and/or techniques.
A.9.4 The medical conditions relating to the cardiovascular system have been reviewed since the previous edition (2000) of this document. The task forces at the Bethesda Conference published recommendations for athletes competing with cardiovascular disease in the *Journal of the American College of Cardiology*, in October 1994. The analysis used by the task force has relevance to the evaluation of members with cardiovascular disease. Fire-fighting activities have a high static component (i.e., inducing predominantly an increase in blood pressure) and a moderate to high dynamic component (i.e., inducing predominantly an increase in heart rate). Sports with a similar set of demands include wrestling, body building, and boxing. Recommendations made by the task force with respect to athletic activities that have these physical demands (high static, moderate dynamic) have been followed in this document.
Performance of the aerobic and anaerobic critical job tasks in a stressful, noxious fire or rescue environment with low oxygen, high carbon monoxide, and numerous toxic gases has significant risk for acutely aggravating pre-existing arrhythmias and cardiac ischemia (oxygen delivery), and decreasing cardiac valve or muscle function (oxygen

supply). To protect from this environment requires that the fire fighter wear personal protective equipment (PPE) and SCBA. The PPE provides a thermal barrier at the cost of added weight, encapsulation, dehydration, and increased metabolic cost for a given workload. The SCBA is a positive pressure demand valve respirator that provides a barrier against the inhalation of noxious/toxic gases and particulate matter but at increased metabolic cost due to its weight and increased respiratory workload. Fire-fighting activities have a high static component (i.e., inducing predominantly an increase in blood pressure) and a moderate to high dynamic component (i.e., inducing predominantly an increase in heart rate). These factors increase physiologic stress and cardiac demand and can precipitate acute cardiac collapse, heart attack, syncope (black-out), or sudden death. In the absence of sudden death, the fact that the fire fighter was operating in an isolated, dangerous environment when a cardiac event occurred would make the subsequent risk for such an event leading to death unacceptably high for that fire fighter, for the civilian who depends upon that fire fighter, or for other fire fighters who not only depend upon that fire fighter but can also be called upon to rescue that fire fighter.

A.9.4.2(7) Syncope first episode must be fully evaluated to determine that the underlying cause does not compromise a member's ability to safely perform essential job tasks. Underlying neurologic, cardiovascular, circulatory, and/or endocrine disturbance must be ruled out. If after evaluation there is no evidence for underlying disease, exam is normal, and there has been no reoccurrence, then the member need not be restricted from performing essential job tasks. If underlying disease is present and not reversible, then the member may not safely perform essential job tasks 1, 4, 5, 7, 8, 9, and 13 due to risk for life-threatening sudden incapacitation *(for additional recommendations, see section relevant to the underlying disease)*. If recurrent and no underlying disease, then the member may not safely perform essential job tasks 1, 4, 5, 7, 8, 9, and 13.

A.9.4.2(8) This technology has not been FDA approved for operating effectively under conditions commonly found on the fire ground (electromagnetic interference). In addition, the requirement for pacemaker or implantable defibrillator defines the underlying cardiac condition as life threatening. Many pacemakers do not have the ability to automatically increase heart rate upon demand during the critical job tasks performed on the fire ground.

A.9.4.2(14) Evaluation with EKG, holter monitor, and/or stress test should be further supplemented with electrophysiologic study (EPS). If rapid supraventricular tachycardia is inducible and surgical ablation is successful, there is no medical reason to restrict the member from performing essential job task 13.

A.9.4.2(15) Even if rate controlled (with or without medication), the added catecholamine stress and dehydration produced when performing critical job tasks on the fire ground makes the potential for life-threatening sudden incapacitation associated with this rhythm disturbance too great a risk. If persistent or recurrent, these arrhythmias, even if rate controlled, can result in embolic events, which prevent the successful and safe performance of critical job tasks on the fire ground or during emergency responses.

A.9.4.2(18) Severe uncontrolled hypertension is a significant risk factor for the development of coronary artery disease, congestive heart failure, and stroke. Blood

pressure increases as a normal response to exercise. This response is further exaggerated by the emotional and physical stress of performing these critical tasks while operating in personal protective clothing at extremes of temperature. This normal elevation of blood pressure under these response conditions can lead to life-threatening hypertensive emergencies if a member's daily blood pressure is already elevated to high levels. In addition, hypertension is a progressive illness that, when uncontrolled, ultimately and inevitably leads to target organ damage. Target organs that are sensitive to the effects of elevated blood pressure are the central nervous system, vision, heart, major blood vessels, and kidneys.

A.9.6 All disorders of the hypothalamic-pituitary-adrenal axis can potentially affect fire fighters because these hormonal systems play an essential role in maintaining homeostasis when exposed to physiologic and emotional stress while performing critical tasks on the fire ground or during emergency operations. Homeostatic regulation is further impaired under conditions of extreme temperature and dehydration, both of which are common when performing the critical tasks of fire fighting while wearing personal protective clothing on the fire ground.

Without treatment, the risk of life-threatening dehydration, extreme alterations in body temperature, electrolyte disturbances, and muscle weakness while operating at a fire scene is unacceptably high. Mineralocorticoid deficiency also increases the risk of life-threatening hypotension and/or arrhythmias associated with exertion and dehydration. For this reason, untreated or uncorrected hypothalamic, hypopituitarism, hypothyroidism, hyperthyroidism, thyroid storm, hypoadrenalism, hyperadrenalism, parathyroidism, and other disorders of thyroid and adrenal function threaten a member's ability to safely perform essential job tasks.

A.9.6.2(1) Insulin-requiring diabetics, regardless of usual glycemic control on medication(s), are not able to safely perform certain essential job tasks on the fire ground during prolonged incidents due to the precipitous nature of the progression from early hypoglycemic symptoms to complete incapacitation. There is generally no safe access to food while wearing respiratory protection in a hazardous environment, and it is not always possible to exit a hazard zone rapidly enough to treat hypoglycemic symptoms before complete incapacitation occurs. Unpredictable meal schedules, periods of physical exertion, adrenergic stimulation, and sleep deprivation all compound the likelihood of incapacitating hypoglycemia on the fire ground. Members engaged in fire suppression are at greater risk than those engaged in other emergency activities (EMS, law enforcement) for this reason.

A major concern for diabetic fire fighters is the risk of becoming hypoglycemic during fire ground operations or other emergency responses. Both exogenous insulin and oral hypoglycemic agents can be associated with episodes of hypoglycemia that can progress from impaired judgment to unconsciousness. In one study of insulin-dependent adolescents conducted at the Joslin Clinic, all 196 patients experienced hypoglycemia at least once during the 2-year observation period. Of these, 15 percent were classified as severe, based on loss of consciousness, seizure, or the clinical need for therapeutic glucagon or intravenous glucose. It was of particular concern that 24 percent of hypoglycemic episodes detected by blood glucose monitoring were not apparent to the patients. The probable causes of hypoglycemia were identified in 71 percent of cases, and the most common were strenuous exercise and skipped meals or snacks. Both of

these precipitants are likely to occur in emergency responders, especially fire service personnel. In addition to accelerating glucose utilization, strenuous exercise increases insulin sensitivity.

Physicians strongly encourage tighter glucose control to decrease and delay onset of diabetic complications. However, with more aggressive treatment, there is concomitantly increased likelihood of exercise-induced hypoglycemia. In sharp contrast to the general population or even competitive athletes with diabetes requiring medication, fire fighters are not capable of maintaining scheduled food intake during emergency operations, and their physical exertion (time of onset, duration, or extent) is not predictable. Furthermore and again in contrast to the general population or competitive athletes, the warning signs of hypoglycemia (diaphoresis, weakness, fatigue, dizziness, tachycardia, and thirst) are experienced by most fire fighters operating on the fire ground, and can therefore be ignored, possibly progressing to life-threatening incapacitation.

Type II diabetics controlled with diet and/or exercise or by oral hypoglycemics are at far less risk for life-threatening hypoglycemia and sudden incapacitation than either Type I or Type II diabetics requiring insulin therapy. Very large studies place the risk of symptomatic hypoglycemia among patients on oral agents alone at less than 2 percent annually. Incapacitating hypoglycemia is quite rare in this group and occurs almost exclusively in patients over the age of 65, those with significant renal impairment, and those on medications that potentiate the effects or interfere with the metabolism of the sulfonylureas. Additionally, the counter-regulatory hormonal responses in non-insulin dependent diabetics are not altered following episodes of hypoglycemia as they are with insulin use. This population therefore tends to remain more sensitive to early clinical signs of hypoglycemia. Recent studies have also documented that diabetics using oral agents, even very long acting forms such as glipizide, are able to safely perform moderate exercise while fasting without chemical or symptomatic hypoglycemia. There are no studies that approximate the exercise intensity of fire fighting, but exercise durations have exceeded 90 minutes in some experiments.

Non-insulin dependent diabetic members should be carefully monitored for control of blood sugar because lack of glycemic control increases the risk for dehydration, hypotension, and target organ damage (e.g., myocardial infarction) that can result in life-threatening sudden incapacitation during performance of critical job tasks. Such members should be monitored at regular intervals to ascertain that blood glucose and blood hemoglobin A1C levels remain under control. Special attention should be paid to the occasional use of medications, including antibiotics, in members on oral hypoglycemic agents. The risk of symptomatic hypoglycemia in these individuals is increased but has not been quantified.

A.9.7 Theoretically, respiratory protection from this environment is afforded by SCBA use. Experience shows that SCBA are frequently taken off to improve visibility and that SCBA air supply is often not sufficient to last the entire time spent fighting a fire. Thus, performance of essential job tasks is regularly done for short periods of time in a noxious fire or hazardous materials environment with high carbon monoxide, noxious/toxic gases, and irritants. Working in this environment has added potential for increasing carbon monoxide levels, decreasing oxygen levels, and reducing oxygen delivery, and the extent of this reduction and resulting risk is directly related to the

degree of dysfunctional gas exchange already present prior to the performance of these essential job tasks. It also has potential for acutely aggravating pre-existing airway hyperreactivity commonly found in patients with even mild asthma and other obstructive pulmonary conditions (bronchitis, etc.). Acute hyperreactivity in this environment is likely to induce immediate clinical asthma (bronchospasm and wheeze) with a significant increased work of breathing and gas exchange abnormalities. Respiratory insufficiency, no matter the cause, has the potential for arrhythmias, cardiac ischemia (oxygen delivery), decreased respiratory and cardiac function (oxygen delivery to tissues), acidosis, and life-threatening sudden incapacitation.

A.9.7.2(3) Asthma as defined by reversible bronchospasm can be a brief episode lasting days to months following irritant or infectious exposure. When this occurs without prior history, it most likely will resolve over the next few weeks or months. Asthma as a chronic condition is suspected when there is a clinical history of recurrent reversible bronchospasm or longstanding reversible bronchospasm. Like coronary artery disease, asthma is a disease with potential devastating consequence, on the fire ground or hazardous materials environment. When suspected, asthma can be confirmed by spirometry showing obstructive airway flow limitations with a positive bronchodilator response (>12 percent and 200 ml increase in FEV_1) or when spirometry is normal or minimally reduced, airway hyperreactivity can be demonstrated by abnormal provocative challenge testing to cold air, exercise, or methacholine (≥20 percent decline in FEV_1). Challenge testing is not a screening test and should not be performed in members or candidates without a history suggestive of asthma. Challenge testing should only be performed by an experienced specialist and should never be performed in members with severe pulmonary dysfunction since life-threatening bronchospasm can result. Response to bronchodilators in a laboratory helps to confirm the presence of asthma but should not be used to allow continued performance of essential job tasks on the fire ground or hazardous materials environment.

A.9.7.2(4) A member with current or recent history of clinically evident reversible bronchospasm and persistent airway hyperreactivity is no different from a nonallergic asthmatic in their inability to safely perform the essential job tasks of fire fighting on the fire ground or hazardous materials environment. Two caveats exist. First, some members could have a distant history of allergic asthma, are unlikely to be exposed to this allergen again, or have successfully been desensitized by an allergist. These members, if asymptomatic off asthma medications for more than 5 years, can perform all essential job tasks with reasonable safety. If asthma is still suspected, then airway hyperreactivity can be assessed by provocative challenge testing. In this case, challenge testing should be to general irritants (cold air, methacholine, etc.) and not to specific allergens, as the risk for life-threatening asthma during a specific challenge test clearly outweighs the benefit. Second, members can have allergic sinus or skin conditions without a history or suspicion of clinical asthma. These members do not require provocative challenge testing unless asthma is suspected.

A.9.7.2(5) Based on American Thoracic Society criteria, moderately severe chronic obstructive pulmonary disease is characterized by an FEV_1/FVC ratio of 0.45 to 0.59 (absolute ratio rather than percent of predicted) and severe chronic obstructive pulmonary disease by an FEV_1/FVC ratio of <0.45 (absolute ratio rather than percent of predicted) on spirometry. Additional tests that can be of value are lung volumes,

diffusing capacity, chest radiograph, and chest CT scan. With moderate to severe chronic obstructive pulmonary disease, elevated respiratory workload and lack of respiratory reserve will not provide adequate gas exchange for the safe performance of essential job tasks. Working in this environment has the potential for increasing carbon monoxide levels, decreasing oxygen levels, and reducing oxygen delivery, and the extent of this reduction and resulting risk is directly related to the degree of dysfunctional gas exchange already present prior to the performance of these essential job tasks. It also has the likely potential for acutely aggravating pre-existing airway hyperreactivity commonly found in patients with chronic obstructive pulmonary diseases (bronchitis, etc.). Acute hyperreactivity in this environment can induce immediate or progressive clinical asthma (bronchospasm and wheeze) that can lead to sudden incapacitation from status asthmaticus and/or cardiac ischemia. In contrast, asymptomatic members with mild chronic obstructive pulmonary disease (FEV_1/FVC ratio of 0.60 to 0.79) should be able to safely perform the essential job tasks. However, if members with mild chronic obstructive pulmonary disease are symptomatic, especially during exercise or on the fire ground, then appropriate additional testing can be useful including pre- and post-spirometry, lung volumes, diffusion, exercise testing, and/or provocative challenge testing.

A.9.7.2(11) Members who are otherwise qualified can safely resume fire-fighting duties as long as they have recovered from their pneumothorax (with or without surgery), and their pulmonary function has returned to acceptable limits. Most patients with spontaneous pneumothorax have cysts or bullous disease from congenital or infectious etiology. Some have bullous disease due to chronic pulmonary disease. Usually, those with congenital or infectious cause will have pulmonary function tests that are compatible with the safe use of SCBA while those with chronic pulmonary disease can have pulmonary function tests that are not compatible with the safe performance of essential job tasks 1, 2, 3, 4, 5, and 7. Regardless of cause, many (10 percent to 20 percent) will have a recurrence on the same side unless surgically corrected. If pulmonary function allows for safe use of SCBA, surgical correction is not a prerequisite for returning to fire-fighting duty.

A.9.7.2(13) Significant pleural effusions should be referred for diagnostic tests, as new or increasing effusions can be a sign of cardiac, liver, or renal disease, pneumonia, empyema, tuberculosis, or cancer. These illnesses can compromise the ability to safely perform essential job tasks due to limitations of endurance or inability to safely wear SCBA. If not, then pulmonary function tests should be assessed. If moderate to severe restriction is present (FVC <60 percent of predicted with an FEV_1/FVC ratio >0.80) then the member may not be able to safely perform essential job tasks unless more complete evaluation of gas exchange and exercise capacity shows ability to exercise at a 12-METS level without exercise desaturation.

A.9.8.2(6) After acute infection has resolved, the fire fighter can return to work if weight, muscle strength, cardiac function, and function of other involved organs have returned to levels required for safe performance of essential job tasks. Concepts used within this document for each of these organ systems should be applied here.

A.9.8.2(7) After active infection has resolved (e.g., sputum AFB or sputum culture negative for 3 successive days) and the fire fighter is no longer contagious (usually within 2 weeks of successful treatment), the fire fighter can return to work but can only

perform essential job tasks 1, 2, 3, 4, 5, 7, and 9 if weight, muscle strength, pulmonary function, and function of other involved organs have returned to acceptable levels for safe performance. Concepts used within this document for each of these organ systems should be applied here. A positive tuberculin (PPD) skin test without symptoms and with a normal chest radiograph indicates exposure, and latent infection without evidence for active infection does **not** prevent a fire fighter from performing essential job tasks. If conversion from negative to positive skin test status occurred within last 2 years, they are at increased risk for the development of active contagious tuberculosis and require either treatment or frequent monitoring for symptoms and by chest radiographs (annually for 2 years or during evaluation of symptoms). Members on prophylactic treatment can perform all essential job tasks without restrictions. Treatment is a personal decision but in its absence, monitoring with chest radiographs at prescribed intervals is mandatory because the development of active disease is a public health hazard to other members and the public.

A.9.8.2(8) Hepatitis when not acute or when chronic but without symptoms and without significant liver dysfunction or other organ system dysfunction does not prevent the successful and safe performance of essential job tasks during fire fighting or EMS work. Hepatitis A when not acute is no longer a public health risk. Hepatitis B, C, and so forth, are bloodborne pathogens and are not a public health risk as universal precautions to prevent the spread of bloodborne infections are a mandatory part of all emergency operations. Treatment to prevent Hepatitis C from progressing to liver insufficiency or failure (cirrhosis) is now available and FDA approved. Members receiving this treatment need to be regularly evaluated to determine their ability to safely perform their essential job tasks. This combination drug therapy protocol can produce dehydration, fatigue, depression, anemia, thrombocytopenia (bleeding disorder), and so forth.

A.9.8.2(9) HIV without AIDS does not prevent the successful and safe performance of essential job tasks during fire fighting or EMS work. HIV is a bloodborne pathogen and is not a public health risk as universal precautions to prevent the spread of bloodborne infections are a mandatory part of all emergency operations. The fire fighter with AIDS but without significant organ dysfunction can be able to safely perform essential job tasks after careful evaluation. Treatment to prevent AIDS from occurring when HIV infection occurs or to control the progression of AIDS is available and FDA approved. Members receiving this treatment need to be regularly evaluated to determine their ability to safely perform the essential job tasks on the fire ground, during emergency operations, and when wearing protective clothing. This combination drug therapy protocol can produce dehydration, fatigue, depression, anemia, thrombocytopenia (bleeding disorder), and so forth.

A.9.9 The personal protective ensemble and SCBA can place the fire fighter's spine at a biomechanical disadvantage due to added weight and altered center of gravity. Certain medications (narcotics and muscle relaxants) used to treat spinal conditions can frequently produce or worsen somnolence, discoordination, and disequilibrium. Neurologic dysfunction, regardless of cause, can produce sudden incapacitation, which when working in dangerous environments, can result in life-threatening injuries.

A.9.10 Fire fighters with active, ongoing, or recurrent orthopedic disorders can have difficulty due to reduced motor strength, sensation, and flexibility as well problems with

fatigue, coordination, gait, and equilibrium. These physical abilities are required to safely perform essential job tasks 1, 2, 4, 5, 6, 7, 8, and 13. The protective uniform and SCBA can place the fire fighter's involved extremity (upper or lower) at a biomechanical disadvantage due to added weight and altered center of gravity. Certain medications (narcotics and muscle relaxants) used to treat orthopedic conditions can produce or worsen somnolence, discoordination, and disequilibrium.

A.9.12.1 The fire fighter works in hazardous environments, both on the fire ground and during other emergency operations. Heavy debris can fall on the fire fighter. The helmet offers some protection when it fits well and is worn properly. The fire fighter with a defect in the skull is more vulnerable to head trauma and life-threatening sudden incapacitation.

A.9.12.1(3) Diseases of the eye such as retinal detachment, progressive retinopathy, optic neuritis (severe or progressive), macular degeneration, cataracts, and glaucoma can result in the failure to read placards and street signs or to see and respond to imminently hazardous situations. Evaluation of visual acuity and visual fields with consultation by an ophthalmologist is suggested.

Ophthalmological procedures such as radial keratotomy and repair of retinal detachment require sufficient time (1 to 2 weeks for radial keratotomy and Lasik-type surgery and 3 months for retinal detachment) to allow stabilization of visual acuity and to ensure that there are no post-surgical complications. Members should be cleared for duty by the ophthalmologic surgeon who understands the essential job tasks associated with fire fighting. These ophthalmological procedures can result in the failure to be able to read placards and street signs or to see and respond to imminently hazardous situations.

The fire service physician should also consider any color vision deficiency of the member in view of the color vision requirements of the member's specific job in a given fire department.

A.9.12.1(3)(a) Far visual acuity is at least 20/40 binocular, corrected with contact lens or spectacles. Far visual acuity uncorrected is at least 20/100 binocular for wearers of hard contacts or spectacles. Successful long-term soft contact lens wearers (i.e., 6 months without a problem) are not subject to the uncorrected standard. Inadequate far visual acuity can result in the failure to be able to read placards and street signs or to see and respond to imminently hazardous situations.

A.9.12.1(3)(b) Most persons with monocular vision, after a 6-month accommodation period, are able to function well. There is some loss of depth perception and peripheral vision. The loss of depth perception has not been shown to be of a type that will affect a member's ability to safely perform essential fire-fighting tasks. Some very specialized tasks can be difficult to safely perform, and the fire service physician should consider the depth of field deficiency of the individual and consider the depth of field requirements of the member's job in order to reach an individual determination. It should be noted that the FAA will award all classes of pilot's licenses to monocular pilots. The loss of peripheral vision is compensated for by increased scanning and head movements. There are studies that show some detriment of driving function in the driving lab. As of the writing of this section the DOT does not allow monocular persons to hold a CDL license. In view of this and the increased dependence on visual cues when driving emergency vehicles, monocular fire fighters should be restricted from driving fire apparatus and other emergency vehicles.

A.9.12.1(4) Baseline and annual audiometry is performed on each fire fighter. This should be done in accordance with 29 CFR 1910.95, “Occupational Noise Exposure.” The basics of this standard include:

(1) The first audiogram done (for members this will probably be done during their pre-placement exam) becomes the baseline audiogram.

(2) If subsequent audiograms are better than the baseline, then the best one becomes the baseline. All audiograms should be done with no exposure to industrial noise for 14 hours.

(3) Each subsequent audiogram is compared to the baseline audiogram (not to the previous year's) to determine if there is a threshold shift. This is an average loss of 10 dB or more at 2000 Hz, 3000 Hz, and 4000 Hz in either ear. This number should be corrected for presbycusis by age tables *[see Table A.9.12.1(4)(a) and Table A.9.12.1(4)(b)]*. Thus, for each of the three frequencies the baseline reading is subtracted from the current reading, and the presbycusis correction is subtracted from this result. The results from the three frequencies are averaged and if this number is 10 or greater, then there is a threshold shift.

Table A.9.12.1(4)(a) Age Correction Values i

	Audiometric Test Freque				
Years	**1000**	**2000**	**3000**	**4000**	
≤20	5	3	4	5	
21	5	3	4	5	
22	5	3	4	5	
23	5	3	4	6	
24	5	3	5	6	
25	5	3	5	7	
26	5	4	5	7	
27	5	4	6	7	
28	6	4	6	8	
29	6	4	6	8	
30	6	4	6	9	
31	6	4	7	9	
32	6	5	7	10	
33	6	5	7	10	

34	6	5	8	11	
35	7	5	8	11	
36	7	5	9	12	
37	7	6	9	12	
38	7	6	9	13	
39	7	6	10	14	

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Table A.9.12.1(4)(a) Age Correction Values i

	Audiometric Test Freque				
Years	**1000**	**2000**	**3000**	**4000**	
40	7	6	10	14	
41	7	6	10	14	
42	8	7	11	16	
43	8	7	12	16	
44	8	7	12	17	
45	8	7	13	18	
46	8	8	13	19	
47	8	8	14	19	
48	9	8	14	20	
49	9	9	15	21	
50	9	9	16	22	
51	9	9	16	23	
52	9	10	17	24	
53	9	10	18	25	
54	10	10	18	26	
55	10	11	19	27	
56	10	11	20	28	
57	10	11	21	29	
58	10	12	22	31	
59	11	12	22	32	
≥60	11	13	23	33	

Source: 29 CFR 1910.95.

Table A.9.12.1(4)(b) Age Correction Values in

	Audiometric Test Freque				
Years	**1000**	**2000**	**3000**	**4000**	
≤20	7	4	3	3	
21	7	4	4	3	
22	7	4	4	4	
23	7	5	4	4	
24	7	5	4	4	
25	8	5	4	4	
26	8	5	5	4	
27	8	5	5	5	
28	8	5	5	5	
29	8	5	5	5	
30	8	6	5	5	
31	8	6	6	5	
32	9	6	6	6	
33	9	6	6	6	
34	9	6	6	6	
35	9	6	7	7	
36	9	7	7	7	
37	9	7	7	7	
38	10	7	7	7	
39	10	7	8	8	
40	10	7	8	8	
41	10	8	8	8	
42	11	8	9	9	
43	11	8	9	9	
44	11	8	9	9	
45	11	8	10	10	
46	11	9	10	10	

47	11	9	10	11	
48	12	9	11	11	
49	12	9	11	11	
50	12	10	11	12	
51	12	10	12	12	
52	12	10	12	13	
53	13	10	13	13	
54	13	11	13	14	
55	13	11	14	14	
56	13	11	14	15	
57	13	11	15	15	
58	14	12	15	16	
59	14	12	16	16	
≥60	14	12	16	17	

Source: 29 CFR 1910.95.

Audiometric pure tone threshold testing includes frequencies 500 Hz, 1000 Hz, 2000 Hz, 3000 Hz, 4000 Hz, and 6000 Hz. Tests are performed using audiometric instrumentation calibrated to ANSI S3.6.

Fire fighters should have adequate hearing in order to hear a victim cry for help, to hear a PASS alarm, to hear noises associated with imminent collapse, or noise associated with changes in the fire pattern. Hearing and the ability to localize sounds is crucial in a fire-fighting environment where smoke often minimizes visual cues and there is a high degree of background noise and stress-related distractions. Fire fighters should be able to hear fire department portable and vehicle radio communications. They should be able to hear, discriminate, and localize safety related acoustic cues such as air horns, sirens, screams, collapsing walls, beams, timbers, or gas leaks to safely perform their critical job tasks during fire suppression and fire rescue.

These critical job tasks need to be safely performed under conditions of extreme background noise and SCBA noise as typically found at the incident scene. The inability to hear sounds of low intensity or to distinguish voice from background noise can lead to failure to respond to imminently hazardous situations and thus lead to life-threatening sudden incapacitation to the member or others depending on the member.

Hearing aid use is **not** considered a reasonable accommodation for the following reasons:

(1) U.S. FDA regulations (21 CFR 801.420) require that all hearing aids be labeled with a statement that hearing aids do *not* restore normal hearing.

(2) Hearing aids are adjusted to restore ½ to ¾ the measured loss in pure tone frequency range of 250 to 6000 Hz (National Acoustic Labs). This allows for

improved hearing of speech but will not restore ability to hear or discriminate acoustic cues (such as collapsing wall/timber, gas leaks, traffic sounds), or radio broadcasts that are essential safety requirements at a fire or rescue scene.

(3) Hearing aids seriously compromise the ability to localize acoustic cues so that the source of impending danger is confused and safety is imperiled.

(4) Hearing aids are not calibrated to function in areas of high background noise (fire scene, rescue scene, traffic), during radio transmissions.

(5) Hearing aids are not reliable after submersion or heavy exposure to water.

(6) If there is a threshold shift the AHJ must be notified. They are responsible for initiating evaluation of personal protective equipment (PPE) and engineering controls.

(7) If there is a threshold shift the member should be advised in writing and referral to an audiologist and/or an otologist should be made.

(8) If the threshold shift is determined to be permanent then this audiogram becomes the “revised baseline.”

A.9.12.1(5) Intact gait and balance are required to safely perform critical tasks such as climbing stairs, carrying heavy items (tools, equipment, victims, stretchers), climbing ladders, and walking on narrow/elevated/inclined areas (roofs). Fire fighter's balance can be further stressed by the need to safely perform these critical job tasks wearing personal protective clothing and SCBA.

Any symptomatic balance disturbance, vertigo, change of gait and coordination, or history of these that has not resolved completely should be fully investigated. Examples include but are not limited to Ménière's syndrome, severe labyrinthitis, and cerebellar syndromes. Current use of medications needs careful evaluation to be certain that condition is completely controlled and that the side effects of the medication do not impose additional unacceptable risks for the successful and safe performance of critical job tasks.

A.9.12.1(6) The nasal, oropharyngeal, and dental structures should be of sufficient structure and function to allow the proper use and fitting of SCBA and other protective clothing and gear. These structures should allow sufficient function for proper nutrition, balance, communication, and respiration. Aphonia, severe dysphonia, or a speech pattern that prevents oral communication during fire or emergency operations should resolve or be corrected.

Anosmia (loss of smell) can interfere with the ability to safely perform critical tasks on the fire ground. Evaluation of anosmia is difficult as objective testing could not be available in all medical settings.

Recurrent sinusitis (severe, requiring repeated hospitalizations or repeat surgery) can interfere with the successful and safe performance of critical tasks due to inability to effectively wear SCBA and inability to safely perform other critical tasks during emergency operations due to limitations of pain, endurance, or respiration.

Severe and recurrent epistaxis can prevent successful and safe performance of critical tasks due to inability to wear SCBA on the fire ground.

Orthodontic and certain other maxillo-facial appliances or prostheses can preclude safe and effective use of protective equipment, compromise nutritional or hydration status, or ability to communicate.

Pharyngeal or laryngeal stenosis, mass or accessory tissues can interfere with speech, communication, or respiration. In which case, this will not permit the successful and safe performance of critical tasks on the fire ground and during emergency operations, especially when wearing SCBA and personal protective clothing.

A.9.13 Fire fighters with active, ongoing, or recurrent neurologic disorders can have difficulty following orders, communicating information, and working in a coordinated manner with workers, victims, and involved civilians (essential job tasks 11, 12, and 13). Fire fighters with neurologic disturbances can also have difficulty with fatigue, somnolence, cognitive function, motor strength, sensation, coordination, gait, and equilibrium, all required to safely perform essential job tasks. The fire fighter often is exposed to considerable stress (temperature, physical exertion, and psychological) during emergency operations. Stress conditions can exacerbate or highlight neurologic deficiencies when the fire fighter is performing essential job tasks rapidly during an emergency operation where there is little room for error and where such errors can have life-threatening consequences for fire fighter, colleagues, or victims. Removing oneself from the scene, even temporarily, can significantly impact on the success of the operation. Medications used to treat neurologic conditions can frequently produce or worsen somnolence, discoordination, and/or disequilibrium.

A.9.13.2(2) Cerebral vascular insufficiency includes the spectrum of syndromes from transient ischemic attack to stroke, and its cause should be investigated. If due to arteriovenous malformation, cerebral aneurysm, or bleeding then see specific recommendations. If due to hypertension then this is evidence of end organ disease. Stroke does not permit safe performance of essential job tasks (1, 2, 4, 5, 6, 7, 8, 9, 10, 11, 12, and 13) since the physiological stress associated with strenuous physical exertion can increase the likelihood for new strokes leading to life-threatening sudden incapacitation. Cerebral vascular insufficiency can affect control of respiration, cognitive abilities, communication, motor strength, sensation, coordination, and equilibrium. If stroke is due to embolic disease then risk factors (hypercoaguable state, collagen vascular disease, carotid vascular disease, patent foramen ovale, cardiac disease) need to be evaluated. Ability to safely perform essential job tasks is based on an evaluation of current neurologic status, treatment, and any contributory underlying conditions. (For example, Coumadin and other full-dose anticoagulant treatment regimens do not allow the safe performance of essential job task 8.)

A.9.13.2(3) Multiple sclerosis and other demyelinating diseases may interfere with safe performance of essential job tasks 1, 2, 4, 5, 6, 7, 8, 9, 10, 11, 12, and 13 unless the member is free of clinical disease for 3 years and evaluation by a specialist concludes that cognitive function and neurologic exam are normal and the member is on no drugs that can impair job function. In considering performance of essential job tasks, the impact of the operational environment (heat, stress, activity, variable night shifts, etc.) on exacerbations should be considered and specifically addressed by the specialist and the medical officer.

With myasthenia gravis, essential job tasks 1, 2, 4, 5, 6, 7, 8, 9, 10, 11, 12, and 13 cannot be safely performed unless the member is free of clinical disease for 3 years and if after evaluation by a specialist it is concluded that cognitive function and exam are normal and the member has been free of disease exacerbations for 3 years and is off all drug treatment. In considering performance of essential job tasks, the impact of the

operational environment (heat, stress, activity, variable night shifts, etc.) on exacerbations should be considered and specifically addressed by the specialist and the medical officer. The member cannot safely perform essential job tasks if evidence of respiratory muscle weakness or prior episode of respiratory muscle weakness in the last 5 years. The member cannot safely perform essential job tasks if on drug treatment for myasthenia including corticosteroids, cytotoxic drugs (e.g., Imuran), and/or plasmapheresis as these treatments indicate that disease is still active and likelihood for exacerbation and life-threatening sudden incapacitation exists during emergency operations.

A.9.13.2(4) Epilepsy is defined as the presence of "unprovoked, recurrent seizures — paroxysmal disorders of the central nervous system characterized by an abnormal cerebral neuronal discharge with or without loss of consciousness." Generalized, complex, partial, simple epilepsy, or recurrent seizures, even those that do not impair consciousness, prevent safe performance of essential job tasks 1, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, and 13 because of the uncertainty regarding how much of the brain could be involved, and the risk of propagation to other regions of the brain, particularly in the highly epileptogenic environment of the fire ground.

Treatment of patients with epilepsy is only variably successful, with roughly 40 percent of patients attaining remission on anticonvulsant therapy. Remission is defined as 5 years without recurrence of seizure activity. Further complicating the fitness-for-duty issue is the fact that only 50 percent of patients who achieve remission do so without toxic side effects of the anticonvulsant drug.

Seizure disorder without epilepsy by history or EEG (as described in the previous paragraph). As much as 10 percent of the population will experience at least one seizure in a lifetime, whereas less than 1 percent of the population qualifies for a diagnosis of epilepsy. However, because of the life-threatening nature of this disorder on the fire ground or during emergency operations, members with seizure but without epilepsy cannot safely perform essential job tasks 1, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, and 13 unless all of the following conditions are met:

(1) No seizures for 1 year off all anti-epileptic medication or 5 years seizure free on a stable medical regimen
(2) Neurologic examination is normal
(3) Imaging (CT or MRI scan) studies are normal
(4) EEG is normal, including provocative testing
(5) A definitive statement from a qualified neurological specialist that the member can safely perform these essential job tasks

Many conditions producing seizures in the pediatric age group are known to remit prior to adulthood, and many adults sustain a reactive seizure that can be attributed to a reversible, underlying precipitant. These circumstances do not necessarily represent an ongoing risk of sudden, unpredictable incapacitation of a member. After a provoked seizure, with the precipitant identified and alleviated, a member can be cleared for duty if the previous conditions (2) through (5) are met.

A.9.13.2(5) The cause of cerebral bleed needs to be determined. If due to hypertensive bleed then this is evidence for target organ disease. Hypertension with target organ disease does not permit safe performance of essential job tasks 1, 4, 5, 6, 7, 8, 9, 10, 11, 12, and 13 as the hypertension and stress associated with strenuous physical exertion

can increase the likelihood for new bleeds and strokes leading to life-threatening sudden incapacitation due to central nervous system instability affecting control of respiration, cognitive abilities, communication, motor, sensory, coordination, and equilibrium. Arteriovenous Malformation or Cerebral Aneurysm does not allow for the safe performance of essential job tasks 1, 4, 5, 6, 7, 8, 9, 10, 11, 12, and 13 since hypertension and stress associated with strenuous physical exertion can increase the likelihood for acute rupture and stroke leading to life-threatening sudden incapacitation. Members can safely return to duty after evaluation by a neurosurgeon if resection was successful, exam and imaging studies are normal (except for surgical site), and EEG shows no epileptic activity off all anticonvulsant medications.

A.9.13.2(6) Essential job tasks 1, 4, 6, 7, 8, 9, 10, 11, 12, and 13 may not be performed safely unless after evaluation by a specialist it is concluded exam is normal and imaging studies are normal. If trauma produced seizures then see recommendations for seizures in A.9.13.2(4).

A.9.14 Fire fighters perform individually and as a team. Fire fighters with active, ongoing or recurrent psychiatric and/or psychological conditions can have difficulty following orders, communicating information, and working in a coordinated manner with workers, victims, and involved civilians. The fire fighter with a personality disorder might not respond appropriately to command structure or adequately control his/her interpersonal behavior. Behavior that undermines command structure, group function, and/or group cohesion is not safe to the member or others performing essential job tasks. Fire fighters are exposed to gruesome tragedy during emergency operations, further exacerbating the stress of the job. Removing oneself from the scene, even temporarily, can significantly impact on the success of an emergency operation. Medications used to treat psychiatric or psychological conditions can produce or worsen somnolence, impair coordination, and predispose to heat stress.

A.9.15 Substance abuse interferes with cognitive functions, energy, command structure, communication, strength, sensation, gait, coordination, and equilibrium, which are all required to safely perform essential job tasks 1, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, and 13. Visual abnormalities increase risk for auto accidents when driving departmental vehicles. Overall increased risk of dehydration, arrhythmia, and disequilibrium can be life threatening in a toxic/traumatic/stress environment. Fire fighters perform individually and as a team. The member works in a coordinated effort with others to safely perform the essential job tasks of fire fighting. Behavior that undermines command structure, group function, and/or group cohesion is not safe to the member or others performing essential job tasks. The fire fighter with substance abuse issues can be unable to handle the stress associated and produced by having to safely perform essential job tasks rapidly during an emergency operation.

NEXT CHAPTER

Annex B Guide for Fire Department Administrators

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

B.1 Legal Considerations in Applying the Standard.

The consideration of an application or continued employment of a member based on medical or physical performance evaluations involves a determination that is not without legal implications. To this end, prior to making an adverse employment decision based on the current standard, the authority with jurisdiction may wish to consult with legal counsel.

B.1.1 Legal Protections for Individuals with Handicaps or Disabilities. The Rehabilitation Act of 1973, as amended, 29 U.S.C. § 791 et seq., and implementing regulations prohibit discrimination against those with handicaps or disabilities under any program receiving financial assistance from the federal government. The Americans with Disabilities Act (ADA) of 1990, 42 U.S.C. § 12101 et seq., also prohibits employment discrimination by certain private employers against individuals with disabilities. In addition, many states have enacted legislation prohibiting discrimination against those with handicaps or disabilities. Generally speaking, these laws prevent the exclusion, denial of benefits, refusal to hire or promote, or other discriminatory conduct against an individual based on a handicap or disability, where the individual involved can, with or without reasonable accommodation, perform the essential functions of the job without creating undue hardship on the employer or program involved.

Beginning in 1999, the United States Supreme Court has issued a series of decisions limiting the scope of the ADA. As a result, persons with certain kinds of impairments that are mitigated by corrective measures such as medication for high blood pressure or eyeglasses for myopia are not “disabled” under the ADA. See *Sutton v. United Airlines, Inc*., 527 U.S. 471 (1999); *Murphy v. United Parcel Service, Inc*., 118 S. Ct 2133 (1999); and *Albertsons, Inc. v. Kirkingburg*, 527 U.S. 555 (1999). More recently the Supreme Court held that an impairment is not a disability covered by the ADA unless it severely restricts a person from doing activities that are of central importance to most people's daily lives. See *Toyota Motor Mfgr., Kentucky, Inc. v. Williams*, 534 U.S. 184 (2002). These cases significantly limit the persons who can claim the protections of the federal ADA, but do not, by any means, eliminate the ADA as an important consideration in fire service-related employment decisions. Moreover, it should be borne in mind that separate disability protections exist under laws of many states, and some of these laws have been interpreted to afford greater protections than that afforded by the ADA. See, for example, *Dahill v. Boston Department of Police*, 434 Mass. 233 (2001), where the Supreme Judicial Court of Massachusetts ruled that a corrective device to alleviate a disability is not relevant in determining whether someone is disabled under the state's disability law.

The disability discrimination laws, therefore, continue to be an important part of the legal framework that governs employment-related decisions. Although this standard has been developed with this in mind, these laws can, depending on the jurisdiction and the circumstances, affect the degree to which the authority having jurisdiction can implement the standard in an individual case. Users of this standard should be aware that, while courts, in assessing disability discrimination claims, are likely to give

considerable weight to the provisions of a nationally recognized standard such as NFPA 1582 [see, for example, *Miller v. Sioux Gateway Fire Department*, 497 N.W.2d 838 (1993)], reliance on the standard alone may not be sufficient to withstand a challenge to an adverse employment decision.

B.1.2 Legal Protections for Individuals Who Are Members of Protected Classes (Race, Sex, Color, Religion, or National Origin). Title VII of the Civil Rights Act of 1964, as amended, 42 U.S.C. § 2000e, and implementing regulations by the Equal Employment Opportunity Commission (EEOC), prohibit discrimination in employment on the basis of race, sex, color, religion, or national origin (i.e., protected classes). Under Title VII, an "employer" is defined, generally, to mean a person with "15 or more employees for each working day in each of 20 or more calendar weeks in the current or preceding calendar year." (42 U.S.C. § 2000e) Several federal jurisdictions have held that unpaid volunteers are not considered to be "employees" under Title VII. Additionally, many states, cities, and localities have adopted similar legislation. Generally, physical performance or other requirements that result in "adverse impact" on members of a protected class (e.g., on the basis of gender) are required to be validated through a study in accordance with EEOC guidelines, if such requirements are to be relied on in making employment decisions. Under EEOC guidelines, a study validating employment standards in one jurisdiction can be transportable to another jurisdiction (and therefore used in lieu of conducting a separate study). However, specific preconditions must be met in this regard, and the authority having jurisdiction should seek the advice of counsel before relying on a transported validation study.

B.1.2.1 Pregnancy and Reproduction. Federal regulations, as well as many court decisions, including the U.S. Supreme Court's decision in *International Union, et al. v. Johnson Controls, Inc.* [499 U.S. 187, 111 S. Ct. 1196 (1991)], have interpreted the requirements of Title VII with respect to pregnancy and reproduction. The authority having jurisdiction should seek the advice of counsel in resolving specific questions concerning these requirements as well as other requirements that can be imposed by state or local laws.

B.2 Determining Essential Job Tasks.

The medical requirements in this edition of the standard were revised based on the essential job tasks contained in Chapter 5 and Chapter 9. It is recognized that some fire-fighting functions and tasks can vary from location to location due to differences in department size, functional and organizational differences, geography, level of urbanization, equipment utilized, and other factors. Therefore, it is the responsibility of each individual fire department to document, through job analysis, the essential job functions that are performed in the local jurisdiction.

There are a wide variety of job analytic techniques available to document the essential functions of the job of a member. However, at a minimum, any method utilized should be current, in writing, and meet the provisions of the Department of Labor regulations [29 CFR § 1630.2(n)(3)]. Job descriptions should focus on critical and important work behaviors and specific tasks and functions. The frequency and/or duration of task performance, and the consequences of failure to safely perform the task, should be specified. The working conditions and environmental hazards in which the work is performed should be described.

The job description should be made available to the fire department physician for use during the pre-placement medical examination for the individual determination of the medical suitability of applicants for member.

B.3 Choosing a Fire Department Physician.

Several factors should be considered in choosing a fire department physician. There are relatively few physicians with formal residency training and certification in occupational medicine. The fire department physician should be qualified to provide professional expertise in the areas of occupational safety and health as these areas relate to emergency services. For the purpose of conducting medical evaluations, the fire department physician should understand the physiological and psychological demands placed on members as well as the environmental conditions under which members have to perform.

Knowledge of occupational medicine and experience with occupational health programs are essential for physicians not formally trained in occupational medicine.

The physician must be committed to meeting the requirements of the program, including appropriate record keeping. The physician's willingness to work with the department to continually improve the program is also important. Finally, the physician's concern and interest in the program and in the individuals in the program are vital.

The following are some of the many options for obtaining physician services:

(1) Physicians may be paid on a service basis or through a contractual arrangement.

(2) For volunteer departments, local physicians may be willing to volunteer their services for the program, with other arrangements for payment of laboratory testing, X-rays, and so forth.

(3) Some departments may utilize a local health care facility for medical care. However, in that case, the department should have one individual physician responsible for the program, record keeping, and so forth.

(4) The use of a military reserve or a National Guard unit.

B.4 Coordinating the Medical Evaluation Program.

An individual from within the department should be assigned the responsibility for managing the health and fitness program, including the coordination and scheduling of evaluations and examinations. This person should also act as liaison between the department and the physician to make sure that each has the information necessary for decisions about placement, scheduling appointments, and so forth.

B.5 Confidentiality.

Confidentiality of all medical data is critical to the success of the program. Members need to feel assured that the information provided to the physician will not be inappropriately shared. No fire department supervisor or manager should have access to medical records without the express written consent of the member. There are occasions, however, when specific medical information is needed to make a decision about placement, return to work, and so forth, and a fire department manager should have more medical information for decision making. In that situation, written medical consent should be obtained from the member to release the specific information necessary for that decision.

Budgetary constraints can affect the medical program. Therefore, it is important that components of the program be prioritized such that essential elements are not lost. With additional funding, other programs or testing can be added to enhance the program.

NEXT CHAPTER

Annex C Protocols for Evaluation of Fitness of Members

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

C.1 Annual Fitness Evaluation — NFPA 1583.

The following copyrighted material is extracted from Chapter 4 of NFPA 1583.

C.1.1 General.

C.1.1.1 All members shall participate in a periodic fitness assessment under supervision of the department HFC and shall provide the HFC with data on which to base individual exercise prescription. [**1583:**4.1]

C.1.1.2 The fitness assessment shall be conducted at least annually. [**1583:**4.1]

C.1.2 Fitness Assessment.

C.1.2.1 All members shall be cleared for participation in the fitness assessment by the fire department physician. [**1583:**4.2]

C.1.2.2 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 presents to the fire department for review. [**1583:**4.2]

C.1.3 Pre-Assessment Questionnaire. The HFC shall administer to all members a pre-assessment questionnaire that seeks to identify contraindications for participation in the fitness assessment and department exercise training program. [**1583:**4.3]

C.1.4 Fitness Assessment Components. The annual fitness assessments shall consist of the following components:

(1) Aerobic capacity
(2) Body composition
(3) Muscular strength
(4) Muscular endurance
(5) Flexibility [**1583:**4.4]

C.1.4.1 Sample Assessment Protocols for the Health-Related Components of Fitness. The following examples of assessment protocols for health-related components of fitness vary in terms of ease of administration, safety, cost, and predictive value:

(1) Aerobic capacity
    (a) 1-mile walk
    (b) 1.5-mile run/walk
    (c) 12-minute run
    (d) Step test (various)
    (e) Stairclimbing machine
    (f) Cycle ergometer (various)
    (g) Treadmill (various)
(2) Percentage of body fat
    (a) Skinfold (various)
    (b) Circumference (various)
    (c) Bioimpedance (BIA)
    (d) Hydrostatic weighing
    (e) Body mass index (optional)

(f) Waist-to-hip ratio (optional)

(3) Muscular strength
   (a) Handgrip dynometer
   (b) Static bicep curl with dynometer
   (c) Static leg press with dynometer
   (d) Bench press (1 rep maximum or percent of body weight)
   (e) Leg press (1 rep maximum or percent of body weight)

(4) Muscular endurance
   (a) Push-ups
   (b) Modified push-ups
   (c) Pull-ups
   (d) Bent knee sit-ups
   (e) Crunches given time
   (f) Crunches to cadence

(5) Flexibility
   (a) Sit and reach
   (b) Modified sit and reach
   (c) Trunk extension
   (d) Shoulder elevation [**1583:** A.4]

C.2 Annual Fitness Evaluation — IAFF/IAFC Joint Labor-Management Fitness and Wellness Initiative.

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C.2.1 Fitness Evaluation Protocols for Members.

C.2.1.1 The following mandatory fitness protocols shall be used to determine the member's baseline level of fitness and to evaluate progress from year to year. Fitness evaluations shall be under the auspices of the fire department physician. The actual evaluations are permitted to be conducted by the fire department's fitness personnel. All data collected by the evaluator is to be held confidential and maintained in the member's confidential medical file. The evaluator can provide exercise prescriptions to encourage the members to maintain or improve their level of fitness.

There are many protocols currently available to measure the submaximal VO_2 levels of apparently healthy individuals. These protocols differ in evaluation equipment (i.e., treadmill, stairmill, step, and stationary bike), rate of increasing work output, degree of increasing work output, and final result. To increase the consistency of VO_2 measurements, as well as the accuracy of the data collected between members within and between participating fire departments, one of the two following submaximal protocols is to be used for measuring aerobic capacity. These are the Gerkin Treadmill Protocol and the FDNY Stairmill Protocol. Both protocols were specifically developed and validated to evaluate the sub-maximal aerobic capacity of members.

After continued evaluation and research by the IAFF/IAFC Wellness-Fitness Initiative's technical experts, it was determined that significant errors were occurring when past protocols were applied to a population that has different characteristics from those for which the evaluation was developed. For this reason, the Bruce and Balke Treadmill Protocols were removed as evaluation protocols and as a means to collect data. Both Bruce and Balke were specifically tailored for less-fit populations to determine

cardiovascular pathology and thus proved to be less accurate protocols for the general members population. The YMCA Stationary Bike Test Protocol was also removed since it consistently and grossly underestimated VO_2 for above average body size (i.e., most members). The Canadian Step Test was also removed since it relies on a single-stage exercise that was found to underestimate measurement of member's VO_2.

A maximal cardiopulmonary evaluation with an electrocardiogram (ECG) shall be permitted to be used to obtain VO_2 measurements. This medical evaluation shall only be conducted in a medical facility with proper monitoring by a physician and available resuscitation equipment.

The muscular endurance evaluations were also modified. In order to improve the accuracy of the evaluation and the data collection, the sit-and-hold evaluation was eliminated. The sit-up protocol was changed to a curl-up evaluation in order to ensure the safety of the participant and to improve the specificity of the evaluation. The push-up evaluation was modified to ensure uniformity in data collection.

The flexibility evaluation was modified to address the difference in limb length and/or differences in proportion between an individual's arm and legs.

The IAFF/IAFC Wellness-Fitness Initiative's technical experts have evaluated all equipment utilized in these fitness protocols. The technical experts found either accuracy, maintenance, or availability problems with some evaluation equipment. Manufacturer's information, product names, and model numbers are included in each protocol. Unless indicated, this equipment must not be substituted with other equipment. All equipment must be maintained and properly calibrated in accordance with the manufacturer's instructions.

Members must be fully recovered from the previous evaluation before proceeding to the next evaluation. The evaluation events can be sequenced to minimize the effects of previous evaluations on subsequent evaluation performance. If evaluations for aerobic capacity, muscular strength, muscle endurance, and flexibility are to be evaluated in one evaluation battery, the following sequence should be used:

(1) Resting heart rate and resting blood pressure
(2) Aerobic capacity
(3) Muscular strength
(4) Muscle endurance
(5) Flexibility

The following is a mandatory pre-evaluation procedure. It shall be conducted for all members prior to conducting the fitness evaluations:

(1) Review and confirm individual's current medical status. It is required that all members are medically cleared through this standard's medical evaluation within 12 (±3) months prior to any fitness evaluation.
(2) Notify members in advance of the scheduled time and place of physical fitness evaluations. The individual should understand the protocol and what is expected before, during, and after the evaluation, including start and stop procedures. Individual will be required to wear comfortable clothes and either sneakers or athletic shoes. All members must refrain from eating, drinking, smoking, and any physical activity prior to the evaluation to ensure accurate heart rate and blood pressure measurements.

(3) Obtain a resting heart rate and blood pressure prior to aerobic capacity evaluation. If resting heart rate exceeds 110 beats per minute and/or resting blood pressure exceeds 160/100 mm Hg, ask the individual to relax in a quiet place for 5 minutes and re-test. If the heart rate and/or blood pressure remain at these levels, cancel the fitness evaluation and refer the individual to the fire department physician. If the retest indicates a reduction in heart rate and blood pressure, the evaluation can be given. The aerobic capacity protocols also require that age (both protocols) and weight in kilograms (FDNY protocol only) be obtained prior to the evaluation.

(4) Review health status with the individual being evaluated. Contraindications for evaluations shall be reviewed, addressing any changes in the individual's health status since their last medical evaluation that would warrant deferring the evaluation, including:

(a) Chest pain during or absence of physical activity
(b) Loss of consciousness
(c) Loss of balance due to dizziness (ataxia)
(d) Recent injury resulting in bone, joint, or muscle problem
(e) Current prescribed drug that inhibits physical activity
(f) Chronic infectious disease (e.g., hepatitis)
(g) Pregnancy
(h) Any recent disorders that can be exacerbated by exercise
(i) Any other reason why the individual believes that he or she should not be physically evaluated

C.2.1.1.1 Aerobic Capacity.

Treadmill. Submaximal treadmill evaluations shall use the Gerkin Treadmill Protocol. The treadmill shall be a LifeFitness 9100HR or a commercial treadmill capable of obtaining a 15-percent grade and 10 mph. The fire department must verify that the treadmill is equivalent to the LifeFitness 9100HR. A Polar Heart Rate Monitor or equivalent shall be used for heart rate measurements and a stopwatch used for timing.

Stairmill. Submaximal stairmill evaluations shall use the FDNY Stairmill Protocol. The stairmill shall be a StairMaster 7000PT. A Polar Heart Rate Monitor or equivalent shall be used for heart rate measurements and a stopwatch used for timing.

Treadmill. Maximal treadmill evaluations shall use a continuous, multigrade medical cardiovascular protocol utilizing an electrocardiogram (ECG) for cardiac measurements. This evaluation must be under the direct supervision of a physician. The treadmill shall be a commercial treadmill capable of obtaining a 25-percent grade.

All aerobic capacity evaluation results must be recorded in milliliters of oxygen per kilograms of body weight per minute (V_{O2max}).

(1) Choose the aerobic capacity protocol and worksheet.
(2) Inform the fire fighter of all evaluation components.
(3) Ensure that the individual is in proper clothing and footwear, is comfortable, and understands all facets of the evaluation.
(4) Review all indicators for stopping the evaluation with the individual

(5) Place and secure heart rate monitor transmitter around individual's chest, in accordance with the manufacturer's instructions; evaluator shall hold or wear the heart rate monitor wrist receiver

(6) Measure the fire fighter's resting heart rate and resting blood pressure and record on the protocol worksheet

(7) Obtain and record weight (for FDNY protocol only) and age (for both protocols)

(8) Determine 85 percent of the fire fighter's estimated maximum heart rate, which will be the target exercise heart rate, using the following simple Karvonen Method equation:

Target exercise heart rate = .85 (220 – age)

Example: The target exercise heart rate of a 40-year-old individual is:
Target exercise heart rate = .85 (220 – 40) = 153

(9) Record the target exercise heart rate on the protocol worksheet

C.2.1.1.1.1 Submaximal Graded Treadmill Evaluation (Gerkin Protocol).

(1) Conduct pre-evaluation procedures.

(2) The individual being evaluated is instructed to straddle the treadmill belt until it begins to move. At approximately 1 mph, the individual is instructed to step onto the belt and the belt speed is increased to 3 mph at 0 percent grade. The individual warms up at 3 mph at 0 percent grade for 3 minutes. During the warm up, the individual is informed that the evaluation is submaximal and will terminate once their monitored heart rate exceeds the target exercise heart rate for 15 seconds. The individual is informed that the target exercise heart rate is 85 percent of their predicted maximal heart rate. The individual is advised that the evaluation is a series of 1-minute exercise stages, alternating between percent grade and speed (i.e., first minute percent grade is increased, second minute speed is increased, etc.). Inform the individual that if at anytime during the evaluation they experience chest pain, light-headedness, ataxia, confusion, nausea, or clamminess, they should ask the evaluator to terminate the evaluation.

(3) The individual is informed that the belt speed will gradually increase to the starting speed of 4.5 mph and 0 percent grade, at which Stage 1 begins. The individual is permitted to either walk or run, whichever feels more comfortable.

(4) During the evaluation, the individual's heart rate is continuously monitored and the heart rate is recorded during the last quarter (15 seconds) of each stage. At the completion of the first minute (Stage 1: 4.5 mph at 0-percent grade), the grade should be increased to 2 percent. Subsequently, after every odd minute the grade will be increased an additional 2 percent. After every even minute the speed will be increased 0.5 mph. This will continue until the individual's heart rate exceeds their target exercise heart rate or demonstrates any of the criteria for early termination of the treadmill evaluation.

(5) Once the individual's heart rate exceeds the target exercise heart rate, the individual continues the evaluation for an additional 15 seconds. This 15-second period allows for the individual's heart rate to stabilize. During this stabilization period, the evaluation will remain at the stage where the target exercise heart rate is exceeded, with speed or grade unchanged. If the heart rate does not return

to or below the target exercise heart rate the evaluation ends and the final evaluation stage will be recorded.

(6) If the evaluation is terminated early, the stage at which the evaluation is terminated and the reason for the termination is documented. For data collection, record that the evaluation was terminated.

(7) Once the individual exceeds their target exercise heart rate or reaches the eleventh minute of the evaluation, the evaluation is ended and the final stage is recorded.

(8) The individual is instructed to remain on the treadmill for a cool-down period for a minimum of 3 minutes at 3 mph, 0-percent grade. Continue to monitor the heart rate during the cool-down period. Record the heart rate after 1 minute of cool-down.

(9) Use the final stage and Table C.2.1.1.1.1 to establish V_{O2max}. The Gerkin maximal graded exercise test protocol. *Source:* Richard Gerkin, MD, Director of Health Center, Phoenix Fire Department.

(10) Record the V_{O2max}.

Table C.2.1.1.1.1 Submaximal Treadmill Test Conver

Stage	Time at Target Exercise	V_{O2max} (ml/kg•min)
1.0	1:00	31.15
2.1	1:15	32.55
2.2	1:30	33.6
2.3	1:45	34.65
2.4	2:00	35.35
3.1	2:15	37.45
3.2	2:30	39.55
3.3	2:45	41.30
3.4	3:00	43.4
4.1	3:15	44.1
4.2	3:30	45.15
4.3	3:45	46.2
4.4	4:00	46.5
5.1	4:15	48.6
5.2	4:30	50.0

5.3	4:45	51.4
5.4	5:00	52.8
6.1	5:15	53.9
5.2	5:30	54.9
6.3	5:45	56.0
6.4	6:00	57.0
7.1	6:15	57.7
7.2	6:30	58.8
7.3	6:45	60.2
7.4	7:00	61.2
8.1	7:15	62.3
8.2	7:30	63.3
8.3	7:45	64.0
8.4	8:00	65.0
9.1	8:15	66.5
9.2	8:30	68.2
9.3	8:45	69.0
9.4	9:00	70.7
10.1	9:15	72.1
10.2	9:30	73.1
10.3	9:45	73.8
10.4	10:00	74.9
11.1	10:15	76.3
11.2	10:30	77.7
11.3	10:45	79.1
11.4	11:00	80.0

C.2.1.1.1.2 Submaximal Stepmill Evaluation (FDNY Protocol).

(1) Conduct pre-evaluation procedures. Obtain and record individual's age in years and weight (males only) in kilograms.

(2) The individual being evaluated is instructed to assume a starting position about two-thirds of the way up the stairs. The individual is instructed to temporarily

grasp the handrails to reduce the possibility of losing balance when the stairs begin to move. The individual is also informed that holding or leaning on the handrails is not allowed once the evaluation begins since this will cause false overestimations of aerobic capacity.

(3) The evaluation will commence at Level 3 for a 30-second warm-up period. During this time, the individual is instructed to remove both hands from the handrail, establish a steady rhythm, and walk with their hands by their sides. The individual is informed that the evaluation is submaximal and will terminate in 3 minutes. The individual is advised that if at anytime during the evaluation they experience chest pain, light-headedness, ataxia, confusion, nausea, or clamminess, they should ask the evaluator to terminate the evaluation.

(4) If the evaluation is terminated early, the time at which the evaluation terminated and the reason for the termination is documented. For data collection, record that the evaluation was terminated.

(5) At the conclusion of the warm-up, the stairmill will be set to Level 4, which begins the actual evaluation time. The individual will walk at a constant rate of 60 steps per minute for 3 minutes. Heart rate is measured during the final 15 seconds of the exercise and recorded.

(6) Upon completion of the evaluation, the individual is instructed to re-grasp the handrails, the stepping machine is shut off, and the individual is assisted off the apparatus.

(7) The following equations are used to establish V_{O2max}:
Male V_{O2max} = 113.34 - 0.15 (weight) - 0.32 (final heart rate) - 0.54 (age)
Female V_{O2max} = 88.22 - 0.31 (final heart rate) - 0.32 (age)

(8) Record the V_{O2max}.

Note: This protocol has been validated as accurate when final heart rate equals or is greater than 110 bpm.

C.2.1.1.1.3 Hand grip strength evaluations shall use the following protocol. The hand grip dynamometer shall be a Jamar Hydraulic Hand dynamometer.

(1) Conduct pre-evaluation procedures.

(2) The individual being evaluated is instructed to towel hands to ensure they are dry. The individual is instructed to place dynamometer in the hand to be evaluated; the evaluator adjusts, ensuring that the bottom of the handle clip is adjusted to fit snug in the first proximal interphalangeal joint. The red peak-hold needle is rotated counterclockwise to the zero position. The individual is advised that the evaluation is a series of six measurements — three for each hand. The individual is informed that the isometric contraction (squeezing) required during this evaluation must be eased into and then released slowly, without swinging arm, pumping arm, or jerking hand. Inform the individual that if at anytime during the evaluation they experience chest pain, light-headedness, ataxia, confusion, nausea, or clamminess, they should terminate the evaluation.

(3) The individual is instructed to assume a slightly bent forward position, with elbow bent at a 90-degree angle, shoulder adducted and neutrally rotated, forearm and wrist in neutral position.

(4) The individual is instructed to squeeze with maximum strength 2 to 3 seconds while exhaling and then slowly release grip. The peak-hold needle will automatically record the highest force exerted.

(5) Measure both hands alternatively allowing three evaluations per hand. Reset the peak-hold needle to zero before obtaining new readings. List the scores for each hand to the nearest kilogram.

(6) Record the highest score.

C.2.1.1.1.4 Leg strength evaluations shall use the Wellness-Fitness Initiative Protocol for Leg Strength. The leg dynamometer shall be the Jackson Strength Evaluation System or a commercial dynamometer system that is digital, incorporates dead load cells, and includes an adjustable chain, handlebar, and test platform. The fire department must verify that the dynamometer is equivalent to the Jackson Strength Evaluation System. A V-grip handlebar (chinning triangle) is required.

(1) Conduct pre-evaluation procedures.

(2) The individual being evaluated is instructed to towel hands to ensure they are dry. The individual is advised that the evaluation is a series of three measurements. The individual is informed that the isometric arm contraction required during this evaluation must be eased into and then released slowly, without swinging arm, pumping arm, or jerking hands. Inform the individual that if at anytime during the evaluation they experience back pain, chest pain, light-headedness, ataxia, confusion, nausea, or clamminess, they should terminate the evaluation.

(3) The individual is instructed to stand upon the dynamometer base plate, which has been placed on a level and secure surface, with feet spread shoulder width apart. The individual is instructed to hold the bar with a wide grip and bend their elbows (keeping their elbows to their sides) 90 degrees. Individual must stand erect without arching back.

(4) The instructor verifies that the arm/elbow joint angle is 90 degrees and adjusts the chain so that it is taut in this position.

(5) The individual shall be instructed not to shrug shoulders, bend back, or perform any other motion other than to contract arms and attempt to move the handlebar in a vertical direction.

(6) Instruct the individual to flex arms for a total of 3 seconds.

(7) After 3 seconds, instruct the individual to slowly relax arms and to remain at standing rest for 30 seconds.

(8) Once the individual has completed the 30-second recovery period begin the second evaluation. Repeat evaluation for the third time using the same procedure.

(9) List all scores. *Note: Digital readout will display the actual force, the highest peak force, and the average force achieved during the three evaluations.*

(10) Record the highest of the three trials to the nearest kilogram.

C.2.1.1.1.5 Arm strength evaluations shall use the following protocol. The arm dynamometer shall be the Jackson Strength Evaluation System or a commercial dynamometer system that is digital, incorporates dead load cells, and includes an

adjustable chain, handlebar, and test platform. The fire department must verify that the dynamometer is equivalent to the Jackson Strength Evaluation System. A straight-grip handlebar is required.

(1) Conduct pre-evaluation procedures.

(2) The individual being evaluated is instructed to towel hands to ensure they are dry. The individual is advised that the evaluation is a series of three measurements. The individual is informed that the isometric leg extension required during this evaluation must be eased into and then released slowly, without bending back, swinging arm, pumping or bending arm, or jerking hand. Inform the individual that if at anytime during the evaluation they experience back pain, chest pain, light-headedness, ataxia, confusion, nausea, or clamminess, they should terminate the evaluation.

(3) The individual is instructed to stand upon the dynamometer base plate, which has been placed on a level and secure surface, with feet spread shoulder width apart. The individual is instructed to stand erect. The chain is then adjusted so the upper (inside) edge of the bottom cross member of the V-grip handlebar is at the top of the individual's kneecap. The evaluator verifies this position, ensuring the chain is taut.

(4) The individual is then instructed to hold the bar, look straight with head in the neutral position, fully extend arms, and maintain a straight back. The evaluator shall verify this position and ensure that the individual's hips are directly over their feet, with trunk and knees slightly bent.

(5) Instruct the individual to lift using their legs for a total of 3 seconds.

(6) After 3 seconds, instruct the individual to slowly relax arms and legs and to remain at standing rest for 30 seconds.

(7) Once the individual has completed the 30-second recovery period begin the second evaluation. Repeat the evaluation for the third time using the same procedure.

(8) List all scores. *Note: Digital readout will display the actual force, the highest peak force, and the average force achieved during the three evaluations.*

(9) Record the highest of the three trials to the nearest kilogram.

C.2.1.1.1.6 Push-up muscle endurance evaluations shall use the Wellness-Fitness Initiative Protocol for Push-ups. Equipment used for this evaluation includes a 5 in. prop (i.e., cup, sponge), a metronome, and a stopwatch.

(1) Conduct pre-evaluation procedures.

(2) The individual is advised that the evaluation is a series of push-ups performed in a 2-minute time period. The individual is advised that the evaluation is initiated from the “up” position (hands are shoulder width apart, back is straight, and head is in neutral position). The individual is informed that they are not allowed to have their feet against a wall or other stationary item. Additionally, the individual is informed that the back must be straight at all times and they must push up to a straight arm position. The individual is instructed to continue performing push-ups in time with the cadence of the metronome, one beat up and one beat down. Inform the individual that if at anytime during the evaluation

they experience chest pain, light-headedness, ataxia, confusion, nausea, or clamminess, they should terminate the evaluation.

(3) The evaluator places the 5-in. prop on the ground beneath the individual's chin and the individual must lower their body to the floor until the chin touches this object.

(4) The metronome should be set at a speed of 80, allowing for 40 push-ups per minute.

(5) The individual has a 2-minute time limit to complete a maximum of 80 push-ups.

(6) The administrator shall stop the evaluation when the individual:

(a) Reaches 80 push-ups

(b) Performs three consecutive incorrect push-ups

(c) Does not maintain continuous motion with the metronome cadence

(7) Record the highest number of successfully completed push-ups.

C.2.1.1.1.7 Curl-up muscle endurance evaluations shall use the Wellness-Fitness Initiative Protocol for Curl-ups. Equipment used for this evaluation includes a gym mat, a metronome, and a stopwatch.

(1) Conduct pre-evaluation procedures.

(2) The individual is advised that the evaluation is a series of curl-ups performed in a 3-minute time period. The individual is informed that the evaluation is initiated from the supine position with knees bent at a 90-degree angle, hands cupped over the ears or at the temples, and with hand and arm position maintained for the entire duration of the evaluation. The individual is advised that their feet will be secured by a bar or a second administrator, but the holding or bracing of the knees and or ankles is not allowed. The individual is instructed that the curl-up is initiated by flattening the lower back followed by actively contracting the abdominal muscles and then continuing the movement until the trunk reaches a 45-degree angle with respect to the floor. This is followed by curling down of the trunk with the lower back fully contacting the mat before the upper back and shoulders. A rocking or bouncing movement is not permitted and the buttocks must remain in contact with the mat at all times. The individual is instructed to continue performing curl-ups in time with the cadence of the metronome, one beat up and one beat down. Inform the individual that if at anytime during the evaluation they experience back pain, chest pain, light-headedness, ataxia, confusion, nausea, or clamminess, they should terminate the evaluation.

(3) The metronome is set at a speed of 60, allowing for 30 curl-ups per minute.

(4) The individual has a 3-minute time limit to successfully complete a maximum of 90 curl-ups.

(5) The administrator shall observe the evaluation from the side to ensure that each curl-up is performed correctly and shall stop the evaluation when the individual does any of the following:

(a) Reaches 90 curl-ups

(b) Performs three consecutive incorrect curl-ups

(c) Does not maintain continuous motion with the metronome cadence

(6) Record the highest number of successfully completed curl-ups.

C.2.1.1.1.8 Sit-and-reach flexibility evaluations shall use the Wellness-Fitness Initiative Sit and Reach Protocol. Equipment used for this evaluation shall be a Novel Acuflex I or equivalent trunk flexibility tester that compensates for variable arm and leg lengths.

(1) Conduct pre-evaluation procedures.

(2) The individual is advised that the evaluation is a series of three measurements that will evaluate the flexibility of the lower back, hamstring muscles, and shoulders. The individual is informed that the flexion required during this evaluation must be smooth and slow, as the individual advances the slide on the box to the most distal position possible. Inform the individual that if at anytime during the evaluation they experience back pain, chest pain, light-headedness, ataxia, confusion, nausea, or clamminess, they should terminate the evaluation.

(3) The individual is instructed to sit on the floor ensuring the head, upper back, and lower back are in contact with the wall. The individual is instructed to place legs together, fully extended. The sit and reach box with the sliding measurement guide is placed with the box flat against the feet.

(4) While maintaining head and upper/lower back contact with the wall, the individual is instructed to extend arms fully in front of their body with the right hand overlaying the left hand, with middle finger of each hand directly over each other. The rule is set to 0.0 in. at the tips of the middle fingers. The individual is then instructed to exhale slowly while stretching slowly forward, bending at the waist, and pushing the measuring device with the middle fingers. During the stretch, legs are to remain together and fully extended and hands are to remain overlaid. The stretch is held momentarily and the distance obtained. If the individual bounces, flexes knee, or uses momentum to increase distance, the evaluation is not counted.

(5) Instruct the individual to relax for 30 seconds. Once the individual has completed the 30-second recovery period begin the second evaluation. Repeat evaluation for the third time using the same procedure.

(6) Record the furthest distance from the three trials (rounded to the nearest ½in.) as the final score.

C.2.1.1.1.9 Fitness protocol equipment list:

(1) LifeFitness 9100HR Treadmill: for information and local distributor contact, LifeFitness, 10601 West Belmont Avenue, Franklin Park, IL 60131, Phone (847) 288-3300, fax (847) 288-3791, Website www.lifefitness.com.

(2) Jackson Strength Evaluation System with V-Grip Handlebar (chinning triangle): for information and local distributor contact, Lafayette Instrument, 3700 Sagamore Parkway North, P.O. Box 5729, Lafayette, IN 47903, Phone (765) 423-1505 or (800) 428-7545, fax (765) 423-4111, Website www.licmef.com(*Note: The Jackson Strength Evaluation System includes a Jamar Hydraulic Hand Dynamometer).*

(3) Jamar Hydraulic Hand Dynamometer: for information and local distributor contact, Jamar, Sammons Preston, 4 Sammons Court, Bolingbrook, IL 60440,

Phone (800) 323-5547 (*Note: The Jackson Strength Evaluation System includes a Jamar Hydraulic Hand Dynamometer).*

(4) Novel Acuflex I Trunk Flexibility Tester: for information and local distributor contact, Novel Products Incorporated, Post Office Box 408, Rockton, IL 61072-0408, Phone (800) 323-5143, fax (815)624-4866, E-mail novelprod@aol.com.

(5) Polar Heart Rate Monitor: for information and local distributor contact, Polar Electro Inc., 370 Crossways Park Drive, Woodbury, NY 11797, Phone (800) 227-1314; Canada (888) 918-5043, fax (516) 364-5454, Website www.polarus.com.

(6) StairMaster StepMill 7000 PT: for information and local distributor contact, StairMaster Sports/Medical Products, L.P., 12421 Willows Road, NE, Suite 100, Kirkland, WA 98034, Phone (425) 823-1825, ext. 7605, fax (425) 821-3794, Website www.stairmaster.com.

NEXT CHAPTER

Informational References

D.1 Referenced Publications.

The following documents or portions thereof are referenced within this standard for informational purposes only and are thus not part of the requirements of this document unless also listed in Chapter 2.

D.1.1 NFPA Publications. National Fire Protection Association, 1 Batterymarch Park, P.O. Box 9101, Quincy, MA 02269-9101.

NFPA 1001, *Standard for Fire Fighter Professional Qualifications*, 2002 edition.

NFPA 1002, *Standard for Fire Apparatus Driver/Operator Professional Qualifications*, 2003 edition.

NFPA 1003, *Standard for Airport Fire Fighter Professional Qualifications*, 2000 edition.

NFPA 1006, *Standard for Rescue Technician Professional Qualifications*, 2003 edition.

NFPA 1021, *Standard for Fire Officer Professional Qualifications*, 2003 edition.

NFPA 1051, *Standard for Wildland Fire Fighter Professional Qualifications*, 2002 edition.

NFPA 1500, *Standard on Fire Department Occupational Safety and Health Program*, 2002 edition.

NFPA 1561, *Standard on Emergency Services Incident Management System*, 2002 edition.

NFPA 1583, *Standard on Health-Related Fitness Programs for Fire Fighters*, 2000 edition.

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

D.1.2 Other Publications.

D.1.2.1 ANSI Publication. American National Standards Institute, Inc., 11 West 42nd Street, 13th Floor, New York, NY 10036.

ANSI S3.6, *Specification for Audiometers*, 1996.

D.1.2.2 U.S. Government Publications. U.S. Government Printing Office, Washington, DC 20401.

Title 21, *Code of Federal Regulations*, Part 801.420.

Title 29, *Code of Federal Regulations*, Part 1910.95, "Occupational Noise Exposure," 1980.

D.1.2.3 Additional Publications.

Journal of the American College of Cardiology, October 1994.

American Thoracic Society Guidelines Journal of Occupational and Environmental Medicine, 2000.

D.2 Informational References.

The following documents or portions thereof are listed here as informational resources only. They are not a part of the requirements of this document.

D.2.1 Testing Protocols.

American College of Sports Medicine, 1995. *Guidelines for Exercise Testing and Prescription.* Baltimore, MD: Williams & Wilkins.

Bilzon JFJ, Scarpello EG, Smith DV, Ravenhill NA, et al. “Characterization of the metabolic demands of simulated shipboard Royal Navy fire-fighting tasks.” *Ergonomics* 2001; 44:766–780.

Gibbons RJ, Balady GJ, Beasley JW, et al. “ACC/AHA guidelines for exercise testing: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines (Committee on Exercise Testing).” *J Am Coll Cardiol* 1997; 30:260–311.

Gledhill N, Jamnik VK. “Characterization of the physical demands of firefighting.” *Can J Sport Sci* 1992; 17:207–213.

Lemon PW, Hermiston RT. “The human energy cost of fire fighting.” *J Occup Med* 1977; 19:558–552.

Malley KS, Goldstein AM, Aldrich, TK, Kelly, KJ, Weiden M, Coplan N, Karwa ML, and Prezant DJ. “Effects of fire fighting uniform (modern, modified modern and traditional) design changes on exercise duration in New York City firefighters.” Occup *J. Med* 1999; 41:1104-1115.

Manning JE, Griggs TR. “Heart rate in fire fighters using light and heavy breathing equipment: simulated near maximal exertion in response to multiple work load conditions.” *J Occup Med* 1983; 25:215–218.

O'Connell ER, Thomas PC, Lee D, Cady LD, et al. “Energy costs of simulated stair climbing as a job-related task in fire fighting.” *J Occup Med* 1986; 28:282–285.

Sothmann MS, Saupe K, Jasenof D, Blaney J. “Heart rate responses of firefighters to actual emergencies.” *J Occup Med* 1992; 34:797–800.

U.S. Preventive Services Task Force, 1996. *Guide to Clinical Prevention Services,* 2nd edition. Baltimore, MD: Williams & Wilkins, 3–14.

D.2.1.1 Cancer Screening.

Smith RA, Mettlin CJ, Davis KJ, Eyre H. “American Cancer Society guidelines for the early detection of cancer.” *CA J Clin* 2000; Jan-Feb 50(1):34–49.

D.2.1.2 Spinal Fusion and Its Impact on Adjacent Vertebral Level.

Eck JC, Humphreys SC, Hodges SD. “Adjacent-segment degeneration after lumbar fusion: a review of clinical biomechanical and radiologic studies.” *Am J Orthopedics* 1999; 28(6):336–340.

Lee CK. “Accelerated degeneration of the segment adjacent to a lumbar fusion.” *Spine* 1988 March; 13(3):375–377.

D.2.2 Cardiology.

Alfred EN, Bleecker ER, Chaitman BR, Dahms TE, Gottlieb SO, Hackney JD, Pagano M, Selvester RH, Walden WM, Warren J. “Short-term effects of carbon monoxide exposure on the exercise performance of subjects with coronary artery disease.” *N Engl J Med* 1989 Nov; 321(21):1426–1432.

Jouven X, Zureik M, Desmos M, Courbon D, Ducimetiere P. “Longterm outcome in asymptomatic men with exercise-induced premature ventricular depolarizations.” *N Engl J Med* 2000 Sept 21; 343(12):826–833.

“Premature ventricular depolarizations and exercise” (editorial comment on E.N. Alfred reference). *N Engl J Med* 2000 Sept 21; 343(12):879–880.

Gibbons RJ, Balady GJ, Beasley JW, et al. ACC/AHA guidelines for exercise testing; a report of American College of Cardiology/American Heart Association Task Force on

Practice Guidelines (Committee on Exercise Testing). *J Am Coll Cardiol* 1997; 30:260-311)D.

D.2.3 Asthma and Chronic Obstructive Pulmonary Diseases.

Bousquet J, Jeffery PK, Busse WW, Johnson M, Vignola AM. "Asthma from bronchoconstriction to airways inflammation and remodeling." *Am J Respir Crit Care Med* 2000 May; 161(5):1720–1745.

Nadel JA, Busse WW. "Asthma." *Am J Respir Crit Care Med* 1998 Apr; 157(4 Pt. 2):S130–138.

Postma DS, Kerstjens HA. "Characteristics of airway hyperresponsiveness in asthma and chronic obstructive pulmonary diseases." *Am J Respir Crit Care Med* 1998 Nov; 158 (5 Pt. 2):S187–192.

Prezant, DJ, Weiden M, Banauch GI, McGuinness G, Rom WN, Aldrich TK, and Kelly KJ. "Cough and bronchial responsiveness in firefighters at the World Trade Center site." *N Engl J Med* 2002; 347:806-815.

Senior RM, Anthonisen NR. "Chronic obstructive pulmonary diseases (COPD)." *Am J Respir Crit Care Med* 1998 Apr; 157(4 Pt. 2):S139–147.

Sherman CB, Barnhart S, Miller MF, Segal MR, Aitken M, Schoene R, Daniell W, Rosentsock L. "Firefighting acutely increases airway hyperreactivity." *Am Rev Resp Dis* 1989 Jul; 40(1):185–190.

D.2.4 Pulmonary Function Testing: Challenge Testing and Exercise Testing.

American College of Sports Medicine, 1995. *Guidelines for Exercise Testing and Prescription.* Baltimore, MD: Williams & Wilkins.

American College of Occupational and Environmental Medicine Position Statement on Occupational Spirometry in the Occupational Setting. Townsend MC and the Occupational and Environmental Lung Disorder Committee. *Journal of Occupational and Environmental Medicine.* 2000; 42:228-245.

American Thoracic Society, Medical Society of the American Lung Association. "Guidelines for the evaluation of impairment/disability in patients with asthma." *Am Rev Resp Dis* 1993 Apr; 147(4):1056–1061.

American Thoracic Society. "Standardization of Spirometry." 1994 Update. *Am J Respir Crit Care Med* 1995 Sept; 152(3):1107–1136.

Crapo RO, Casaburi R, Coates AL, Enright PL, Hankinson JL, Irvin CG, MacIntyre NR, McKay RT, Wanger JS, Anderson SD, Cockcroft DW, Fish JE, Sterk PJ. "Guidelines for methacholine and exercise challenge testing — 1999." This official statement of the American Thoracic Society (ATS) was adopted by the ATS Board of Directors July 1999. *Am J Respir Crit Care Med* 2000 Jan; 161(1):309–329.

Crapo RO, Morris AH, Gardner RM. "Reference spirometric values using techniques and equipment that meet ATS recommendations." *Am Rev Resp Dis* 1981; 123:659-664.

Hankinson JL, Odencrantz JR, Fredan KB. "Spirometric reference values from a sample of the U.S. general population." *Am J Respir Crit Care Med* 1999; 159:179-187.

Knudson RJ, Lebowitz MD, Holberg CJ, Burrows B. "Changes in the normal maximal expiratory flow-volume curve with growth and aging." *Am Rev Resp Dis* 1983; 127:725-734.

D.2.5 Tuberculosis.

"Diagnostic standards and classification of tuberculosis in adults and children." This official statement of the American Thoracic Society (ATS) and the Centers for Disease Control and Prevention (CDC) was adopted by the ATS Board of Directors July 1999. This statement was endorsed by the Council of the Infectious Diseases Society of America (IDSA), Sept. 1999. *Am J Respir Crit Care Med* 2000 Apr; 161(4 Pt. 1):1376–1395.

"Targeted tuberculin testing and treatment of latent tuberculosis infection." This official statement of the American Thoracic Society (ATS) was adopted by the ATS Board of Directors July 1999. This is a joint statement of the ATS and the Centers for Disease Control and Prevention (CDC). This statement was endorsed by the Council of the Infectious Diseases Society of America (IDSA), Sept. 1999. *Am J Respir Crit Care Med* 2000 Apr; 161(4 Pt. 2):S221–247.

D.2.5.1 Cancer Screening.

Smith RA, Mettlin CJ, Davis KJ, Eyre H. "American Cancer Society guidelines for the early detection of cancer." *CA J Clin* 2000 Jan-Feb; 50(1):34–49.

D.2.6 IAFF/IAFC *Joint Labor-Management Fitness-Wellness Initiative*, International Association of FireFighters, 1750 New York Ave. NW, Washington, DC.

D.2.7 U.S. Department of Defense, Department of the Army Regulation 40-501 Medical Services Standards of Medical Fitness. Headquarters Department of the Army Washington, DC, 27 February 1998 edition.

D.3 References for Extracts.

The following documents are listed here to provide reference information, including title and edition, for extracts given throughout this standard as indicated by a reference in brackets [ ] following a section or paragraph. These documents are not a part of the requirements of this document unless also listed in Chapter 2 for other reasons.

NFPA 1583, *Standard on Health-Related Fitness Programs for Fire Fighters*, 2000 edition.

NEXT CHAPTER