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**PERSONAL ALERT
SAFETY SYSTEMS
(PASS) FOR
FIRE FIGHTERS
1983**



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NATIONAL FIRE PROTECTION ASSOCIATION, INC.
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The Board of Directors reaffirms that the National Fire Protection Association recognizes that the toxicity of the products of combustion is an important factor in the loss of life from fire. NFPA has dealt with that subject in its technical committee documents for many years.

There is a concern that the growing use of synthetic materials may produce more or additional toxic products of combustion in a fire environment. The Board has, therefore, asked all NFPA technical committees to review the documents for which they are responsible to be sure that the documents respond to this current concern. To assist the committees in meeting this request, the Board has appointed an advisory committee to provide specific guidance to the technical committees on questions relating to assessing the hazards of the products of combustion.

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NFPA 1982

Standard on

Personal Alert Safety Systems (PASS)

for Fire Fighters

1983 Edition

This edition of NFPA 1982, *Standard on Personal Alert Safety Systems (PASS) for Fire Fighters*, was prepared by the Technical Committee on Protective Equipment for Fire Fighters and acted on by the National Fire Protection Association, Inc. on May 18, 1983 at its Annual Meeting in Kansas City, Missouri. It was issued by the Standards Council on June 9, 1983 with an effective date of June 29, 1983.

The 1983 edition of this standard has been approved by the American National Standards Institute.

Origin and Development of NFPA 1982

The Technical Committee on Protective Equipment for Fire Fighters began work on this standard in 1980 in answer to requests from the fire service to establish requirements for a device that would signal for aid if a fire fighter became incapacitated while operating at an emergency. The International Association of Fire Fighters (IAFF) was instrumental in the developmental work that resulted in this standard. Developmental work was completed in the Spring of 1982, and submitted to the NFPA for official adoption.

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NFPA 1982
Standard on
Personal Alert Safety Systems (PASS)
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1983 Edition

Chapter 1 Administration

1-1 Scope.

1-1.1 This standard specifies minimum performance criteria, functioning, and test methods for Personal Alert Safety Systems (PASS) to be used by fire fighters engaged in rescue, fire fighting, and other hazardous duties.

1-1.2 This standard is not intended to serve as a detailed manufacturing or purchase specification, but may be referenced in purchase specifications as minimum acceptable requirements.

1-1.3 It is not the intention of this standard to bar from consideration material of improved quality or special performance features not known at the time of the development of this standard.

1-2 Purpose.

1-2.1 The purpose of this standard is to provide Personal Alert Safety Systems, to be worn by fire fighters, that will emit an audible alarm signal to summon aid in the event the fire fighter becomes incapacitated or needs assistance.

1-2.2 Environmental and physical tests are used to indicate compliance with the performance requirements of this standard. These tests shall not be deemed as establishing performance levels for all fire fighting situations to which fire fighting personnel may be exposed.

1-2.3 PASS manufactured in accordance with this standard shall be designed to endure the adverse environmental effects to which the fire fighter is commonly exposed. Users are cautioned that if unusual conditions prevail, such as higher or lower extremes of temperature than described herein, or if there are signs of abuse or mutilation of the PASS or any component, its ability to function as intended may be reduced.

1-3 Definitions.

1-3.1 Alarm Signal. An audible warning that is identifiable as an indication that a fire fighter is in need of assistance.

1-3.2 Automatic. A functional mode in which the motion detector is activated and is sensing motion of the wearer.

1-3.3 Hazardous Environment. A place where a fire fighter is likely to receive harmful exposure to a hazardous atmosphere or substance, or be exposed to physical or mechanical hazards that are likely to cause injury.

1-3.4 Manual. A functional mode in which the Alarm Signal is activated.

1-3.5 Motion Detector. An integral portion of the PASS that senses movement, or lack of movement, and activates the Alarm Signal under a specified sequence of events.

1-3.6 Off. A functional mode in which the PASS is deactivated with no drain on the power source.

1-3.7 PASS. An acronym for Personal Alert Safety System.

1-3.8 Pre-Alert Signal. A warning signal which indicates the motion detector has activated the Alarm Signal sequence.

1-3.9 Shall. Indicates a mandatory requirement.

1-4 General Provisions.

1-4.1 The Personal Alert Safety System (PASS) that meets the requirements of this standard shall emit an audible alarm to notify others and assist in locating the fire fighter in danger.

1-4.2 Manufacturers of PASS meeting the requirements of this standard shall, upon request, provide data to substantiate product conformance.

1-4.3 Marking.

1-4.3.1 Each PASS unit shall be durably and legibly marked in a manner such that the marking can be easily read, and include the following information:

- (a) Name or designation of manufacturer,
- (b) Model number or design,
- (c) Lot or serial number,
- (d) Power requirement (recommended battery type and size).

1-4.4 Maintenance.

1-4.4.1 The PASS manufacturer shall provide with each PASS unit instructions for cleaning, storage, and frequency and details of inspection, along with informational and advisory material.

Chapter 2 Design and Performance Requirements

2-1 Mode Selection.

2-1.1 PASS shall operate as specified in this section after being conditioned and tested in accordance with the requirements of Sections 3-1, 3-2, 3-3, and 3-4 of this standard.

2-1.2 PASS shall incorporate a switch(es) that shall allow for operation in three modes: (1) Off, (2) Manual, and (3) Automatic. The switch(es) shall be clearly labeled for each of the three modes of operation.

2-1.3 The switch(es) shall be protected against accidental change of operation or impact damage. The switch(es) shall be operated by a gloved hand to both the Manual or Automatic mode.

2-1.4 The switch(es) shall be rated for a service life of not less than 50,000 cycles.

2-1.5 Two separate and distinct manual actions shall be required to change the switch(es) from Automatic to Off, to reduce the possibility of unintentional deactivation of the PASS.

2-1.6 PASS shall be provided with a visual or audible indication of the mode selection status.

2-2 Motion Detector.

2-2.1 PASS shall operate as specified in this section after being conditioned and tested in accordance with the requirements of Sections 3-1, 3-2, 3-3, and 3-4 of this standard.

2-2.2 PASS shall incorporate a motion detector that shall sense movement of the fire fighter and automatically activate the Alarm Signal specified in 2-3.4.2 if no movement is sensed for 30 (± 5) seconds.

2-2.3 The motion detector shall be operable independent of angle of deployment of device.

2-2.4 PASS shall sound the Alarm Signal specified in 2-3.4.2 to warn of failure of the motion detector within 30 (± 5) seconds.

2-3 Signals.

2-3.1 PASS shall operate as specified in this section after being conditioned and tested in accordance with the requirements of Sections 3-1, 3-2, 3-3, and 3-4 of this standard.

2-3.2 Operational Signal.

2-3.2.1 PASS shall emit an audible signal within 1 second when switched to Automatic mode, indicating to the wearer that the unit is functioning properly.

2-3.3 Pre-Alert Signal.

2-3.3.1 PASS shall emit a Pre-Alert Signal which shall sound 7 (± 3) seconds preceeding sounding of the Alarm Signal.

2-3.3.2 The Pre-Alert Signal shall be between 30 percent and 50 percent of the dBA of the Alarm Signal as specified in 2-3.4.2.

2-3.3.3 PASS shall provide for a motion-induced cancellation of the Alarm Signal after the Pre-Alert Signal and prior to the Alarm Signal sounding.

2-3.3.4 Cancellation of the sounding of the Pre-Alert Signal shall not require the use of the users' hands.

2-3.3.5 PASS shall return to the Automatic mode upon cancellation of the Pre-Alert Signal.

2-3.4 Alarm Signal.

2-3.4.1 PASS shall emit an Alarm Signal when activated either by the motion sensor, or by activation of the Manual mode.

2-3.4.2 The Alarm Signal shall be audible in a variable or noncontinuous tone. The Alarm Signal frequency shall not be less than 1,000 Hertz (Hz) nor more than 4,000 Hz. The Alarm Signal sound pressure level (SPL) shall not be less than 95 dBA measured at a distance of 3 m (9.9 ft) for an uninterrupted duration of not less than 1 hour, when tested in accordance with Section 3-6. These requirements shall be met with the battery discharged to 80 percent of rated voltage.

2-3.5 Low Battery Warning Signal.

2-3.5.1 While in the Automatic mode, PASS shall emit a distinct and different audible Low Battery Warning Signal when the battery can no longer maintain the 95 dBA sound for a period of 1 hour.

2-4 Retention System.

2-4.1 PASS shall be secured to the wearer by a retention system that meets the requirements of Section 3-5 of this standard.

2-4.2 The retention system shall not affect the performance of the PASS as worn. The retention system shall not cause the fire fighter's protective clothing and protective equipment to become degraded to a protection level less than the requirements to which the protective clothing and protective equipment were designed or certified.

2-5 Weight.

2-5.1 The weight of a complete PASS unit shall not be greater than 454 g (16 oz) including power source.

2-6 Intrinsic Safety.

2-6.1 PASS shall meet the requirements of NFPA 493, *Standard for Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III, Division 1 Hazardous Locations*.

Chapter 3 Test Requirements

3-1 Environmental Tests.

3-1.1 PASS shall be conditioned and tested in accordance with each of the following procedures, in the sequence given.

3-1.2 Case Integrity.

3-1.2.1 PASS shall support a 200-kg (442-lb) weight on each surface of the case without affecting case integrity or visible damage.

3-1.3 High Operating Temperature.

3-1.3.1 PASS shall be tested in accordance with MIL-STD-810:501.1 (Procedure II) with highest designed operating temperature of 71 °C (160 °F).

3-1.4 Low Operating Temperature.

3-1.4.1 PASS shall be tested in accordance with MIL-STD-810:502.1 (Procedure I) with lowest designed operating temperature of -40 °C (-40 °F).

3-1.5 Temperature Shock.

3-1.5.1 PASS shall be tested in accordance with MIL-STD-810:503.1 (Procedure I) except the cold temperature chamber temperature shall be -40 °C (-40 °F).

3-1.6 Humidity.

3-1.6.1 PASS shall be tested in accordance with MIL-STD-810:507.1 (Procedure III).

3-1.7 Salt Fog.

3-1.7.1 PASS shall be tested in accordance with MIL-STD-810:509.1 (Procedure I).

3-1.8 Dust.

3-1.8.1 PASS shall be tested in accordance with MIL-STD-810:510.1 (Procedure I).

3-1.9 Immersion/Leakage.

3-1.9.1 PASS shall be tested in accordance with MIL-STD-810:512.1 (Procedure I) for conditioning only. This test shall exclude the opening and examining of the interior of the PASS.

3-1.10 Corrosion.

3-1.10.1 PASS shall survive leakage from specified batteries without damage to the operating components as defined by ASTM G15-79A, *Corrosion and Corrosion Testing*.

3-2 Radiant Heat Test.

3-2.1 PASS shall be stabilized at 71°C (160°F) for 4 hours. The face of the PASS unit shall then be exposed to 1.5 cal/cm² for 10 seconds.

3-3 Flame Resistance Test.

3-3.1 The PASS unit shall be positioned to receive radiant flux of 0.60 (+0.06/-0.00) W/cm². After 60 (+5/-0) seconds exposure to the radiant heat flux, and without removing the radiant heat source, the tip of the inner core of a Bunsen burner flame of 25-38 mm (1-1½ in.) length shall be placed against the face of the PASS unit so that the flame makes an angle of 45° (±10°) with the plane tangent to the test area at the point of contact. The Bunsen burner flame shall be fueled by a gas of 1,100 (±200) British Thermal Units (BTU) per cu ft. The barrel of the Bunsen burner shall be 12 (±3) mm [½ (±⅛) in.] in diameter. A flame spreader shall not be used.

3-3.2 After 15 (+1/-2) seconds, the flame shall be removed and the duration of after flame and after glow shall be measured.

3-3.3 There shall not be any visible flame or after glow 5 seconds after removal of the test flame.

3-4 Impact Tests.

3-4.1 A separate PASS shall be used for each series of drops. Each PASS unit tested shall be complete with power source.

3-4.2 Ambient Temperature.

3-4.2.1 PASS shall be preconditioned by exposure to temperature of 25°C (77°F) for at least 4 hours.

3-4.2.2 The PASS unit shall be removed from the conditioning chamber, and set in the Automatic mode. The PASS unit shall then be dropped a total of 8 times from a distance of 3 m (9.9 ft) onto a concrete surface, so that impact is on each face and on one corner and one edge of the PASS.

3-4.2.3 Following each drop, the PASS unit shall remain motionless and shall sound the Pre-Alert and Alarm Signals from the Automatic mode after which the Alarm Signal shall be stopped and the PASS reset to Automatic mode for the next drop.

3-4.2.4 The entire series of drops shall be completed within 10 minutes of removal from the preconditioning chamber.

3-4.3 Cold Temperature.

3-4.3.1 PASS shall be preconditioned by exposure to temperature of -40°C (-40°F) for at least 4 hours.

3-4.3.2 The PASS unit shall be removed from the conditioning chamber, and set in the Automatic mode. The PASS unit shall then be dropped a total of 8 times from a distance of 3 m (9.9 ft) onto a concrete surface, so that impact is on each face and on one corner and one edge of the PASS.

3-4.3.3 Following each drop, the PASS unit shall remain motionless and shall sound the Pre-Alert and Alarm Signals from the Automatic mode after which the Alarm Signal shall be stopped and the PASS reset to Automatic mode for the next drop.

3-4.3.4 The entire series of drops shall be completed within 10 minutes of removal from the preconditioning chamber.

3-4.4 Elevated Temperature.

3-4.4.1 PASS shall be preconditioned by exposure to temperature of 71°C (160°F) for at least 4 hours.

3-4.4.2 The PASS unit shall be removed from the conditioning chamber, and set in the Automatic mode. The PASS unit shall then be dropped a total of 8 times from a distance of 3 m (9.9 ft) onto a concrete surface, so that impact is on each face and on one corner and one edge of the PASS.

3-4.4.3 Following each drop, the PASS unit shall remain motionless and shall sound the Pre-Alert and Alarm Signals from the Automatic mode after which the Alarm Signal shall be stopped and the PASS reset to Automatic mode for the next drop.

3-4.4.4 The entire series of drops shall be completed within 10 minutes of removal from the preconditioning chamber.

3-5 Retention Test.

3-5.1 The PASS retention system shall withstand a static force of $445 (\pm 5) \text{ N}$ [$100 (\pm 1) \text{ lb}$]. The force shall be applied steadily from 45 N (10 lb) at between 9.0 N/second (2.01 lb/sec) and 45 N/second (10 lb/sec). Force shall be applied perpendicular to the plane of the PASS as worn.

3-5.2 The retention system pull test shall be conducted after the retention system attachment method has been cycled 500 times to ensure the PASS will remain attached to the wearer after it has been attached and removed repeatedly during its service life.

3-6 Sound Pressure Level Test.

3-6.1 Sound pressure level of Alarm Signal shall be determined in accordance with ANSI S1.13, *Methods for Measurement of Sound Pressure Level*.
