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4123:1-21-01 Scope and definitions.

(A) Scope.

The purpose of Chapter 4123:1-21 of the Administrative Code (hereinafter "this chapter") is to provide reasonable safety for life, limb, and health of employees.

The requirements of this chapter are minimum requirements of an employer for the protection of such employer's employees and no others, and constitute protective standards for all regular members of lawfully constituted fire departments of municipal corporations and townships, whether paid or volunteer, and employees employed in private or contractual-type fire departments that serve the public, who are engaged in the act of fire fighting. The requirements of this chapter do not apply to employees employed in industrial fire brigades, industrial fire departments, and private or contractual-type fire departments that do not serve the public. To the extent that any other codes of specific requirements adopted by the bureau of workers' compensation may conflict with the requirements of this chapter, this chapter shall prevail.

In cases of practical difficulty or unnecessary hardship, the administrator of the bureau of workers' compensation may grant exemptions from the literal provisions of these requirements or permit the use of other devices or methods when, in the opinion of the administrator, equivalent protection is thereby secured.

Unless otherwise indicated, materials or equipment bought or contracted for prior to the effective date of any requirement of this chapter shall be deemed to comply with the provisions of these requirements, if such materials or equipment complies either with the provisions of these requirements or with the provisions of any applicable specific requirement that was in effect at the time contracted for or bought.

(B) Definitions.

- (1) "Aerial device": An aerial ladder, elevating platform, aerial ~~ladder platform~~ fire apparatus, or water tower that is designed to position personnel, handle materials, provide egress, and discharge water.
- (2) "Aerial ladder": A self-supporting, turntable-mounted, power-operated ladder of two or more sections permanently attached to a self-propelled automotive fire apparatus and designed to provide a continuous egress route from an elevated platform to the ground.
- (3) "Aerial ~~ladder platform~~ fire apparatus": ~~a type of elevating platform that includes the continuous escape capabilities of an aerial ladder~~ a vehicle equipped with an aerial ladder, elevating platform, or water tower that is designed and equipped to support fire fighting and rescue operations by positioning personnel, handling materials, providing continuous egress, or discharging water at positions elevated from the ground.
- (4) "Air flow control device": a manual or automatic device incorporated in the air flow system of a self-contained breathing apparatus to control the free flow of air to the facepiece during donning or doffing.
- (5) "Angle of approach": the smallest angle made between the road surface and a line drawn from the front point of ground contact of the front tire to any projection of the apparatus in front of the front axle.
- (6) "Angle of departure": the smallest angle made between the road surface and a line drawn from the rear point of ground contact of the rear tire to any projection of the apparatus behind the rear axle.

DRAFT - NOT FOR FILING

- (7) "Attack hose": hose designed to be used to combat fires beyond the incipient stage to supply handline nozzles, distributor nozzles, master stream appliances, portable hydrants, manifolds, standpipe and sprinkler systems, pumps, and fire department pumpers.
- (8) "Attic extension ladder": an extension ladder that is specifically designed to be used to gain entry through a scuttle, hatch, or other restricted opening.
- (9) "Base (bed) section": the lowest, or widest, section of non-self-supporting ground ladders.
- (10) "Basic plane": the plane through the centers of the external ear openings and the lower edges of the eye sockets of a human head.
- (11) "Beam (side rail)": the main structural side of a ground ladder.
- (12) "Bedded position": the position in which fly section(s) of extension ladders are stored in the nonextended position with the pawls resting on a rung of the supporting section.
- (13) "Booster hose": a hose having a rubber tube, a braided or spiraled reinforcement, and an outer protective cover. It is intended for use on fire apparatus.
- (14) "Braided hose": a nonwoven rubber hose manufactured by braiding one or more layers of yarn, each separated by a rubber layer over a rubber tube and encased in a rubber cover. Usually manufactured for use as booster hose in sizes up to one and one-half inches.
- (15) "Butt": the end of the beam placed on the ground or other lower support surface when ground ladders are in the raised position. It may be the lower end of beams or added devices.
- (16) "Butt spurs (foot)": that component of ground ladder support which is in contact with the lower support surface to reduce slippage. It may be the lower end of beams or added devices.
- (17) "Certification organization": an independent, third-party organization that determines product compliance with the requirements of NFPA standards with a labeling/listing/follow-up program.
- (18) "Char": ~~a substantial change in the physical characteristics of a material under heat or flame tests~~ the formation of a brittle residue when material is exposed to thermal energy.
- (19) "Chin strap": an adjustable strap fitting under the chin to secure the helmet to the head.
- (20) "Coat": a garment worn to protect the upper part of the body except the hands and head. Also referred to as "protective coat" in this chapter of the Administrative Code.
- (21) "Combination ladder": a ground ladder capable of being used both as a step ladder and single or extension ladder.
- (22) "Coronal plane": the plane, perpendicular to the basic and mid-sagittal planes, which passes through the centers of the external ear openings of a human head.
- (23) "Crown straps": the part of a suspension that passes over the head.
- (24) "Dangerous to life or health": conditions that pose a threat to life or health, or conditions that pose a threat of severe exposure to contaminants, such as radioactive materials, which are likely to have adverse cumulative or delayed effects on health.

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- (25) "Ear covers": ~~an integral part of a helmet which provides cover for the ears~~ an interface component of the protective helmet element that provides limited protection to the helmet/coat interface area.
- (26) "Elevating platform": a self-supporting, turntable-mounted device consisting of a personnel-carrying platform attached to the uppermost boom of a series of power-operated booms that articulate, telescope, or both.
- (27) "Energy absorbing system": a material or suspension system, or combination thereof, incorporated into the design of a helmet to attenuate impact energy.
- (28) "Escape rope": a single-purpose emergency self-escape/self-rescue rope. It has a diameter of 0.295 inch (7.5 mm) or greater and less than three-eighths inch (9.5 mm).
- (29) "Extension ladder": a non-self-supporting ground ladder adjustable in length. It consists of two or more sections traveling in guides, brackets, or equivalent, so arranged as to permit length adjustment.
- (30) "Face/neck shroud": an item of wildland protective clothing that attaches to the helmet to provide minimum thermal protection to the face and neck area.
- (31) "Faceshield": limited protection for the face, eyes, or portions thereof.
- (32) "Factor of safety": the ratio between the ultimate breaking stress and the working stress of the material, structure, or device.
- (33) "Fire apparatus": the emergency vehicle(s) of the fire department used for fire suppression.
- (34) "Fire shelter": an item of protective equipment configured as an aluminized tent to reflect radiant heat in a fire entrapment situation.
- (35) "Flame resistance": the property of a material whereby the application of a flaming or nonflaming source of ignition and the subsequent removal of the ignition source results in the termination of combustion.
- (36) "Fluorescence": a process by which radiant energy of certain wavelengths is absorbed and reradiated nonthermally in other, longer wavelengths.
- (37) "Fly section": the upper section(s) of an extension ladder. The first section above the base section is the first fly section; the second section above the base section is the second fly section; etc.
- (38) "Folding ladder": a single ladder designed so that the rungs can be folded or moved in a manner to allow the beams to be brought into a position of touching each other, or nearly touching each other, for storage or carrying purposes.
- (39) "Gauntlet": the circular, flared, or otherwise expanded part of the glove that extends beyond the opening of the glove body.
- (40) "Goggles": the helmet component intended to help protect the wearer's eyes and a portion of the face.
- (41) "Gross axle weight rating (GAWR)": the value specified as the load-carrying rating of a single axle system, as measured at the tire ground interfaces.
- (42) "Gross combination weight rating (GCWR)": the value specified as the loaded weight of a combination vehicle.

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- (43) "Gross vehicle weight rating (GVWR)": the value specified by the chassis manufacturer as the loaded weight rating of a single vehicle.
- (44) "Ground ladder": ladders not mechanically or physically attached permanently to fire apparatus and not requiring mechanical power from the apparatus for ladder use and operation.
- (45) "Halyard": rope used on extension ladders for the purpose of raising the fly section(s). A wire cable may be referred to as a halyard when used on the uppermost fly section(s) of three or four section extension ladders.
- (46) "Hazardous atmosphere":
- (a) Any atmosphere containing a toxic or disease-producing gas, vapor, dust, fume, or mist dangerous to the life or health or where the concentration is unknown.
 - (b) Any atmosphere containing an oxygen partial pressure of less than 19.5 per cent by volume at sea level.
- (47) "Hazardous environment": the area where members might be exposed to a particular substance, device, event, circumstance, or condition that presents a danger to members of the fire department.
- (48) "Headband": the portion of a suspension that encircles the head.
- (49) "Headform": a test device that conforms to the configuration of the human head.
- (50) "Heat sensor label": a label that turns color at a preset temperature to indicate a specific heat exposure.
- (51) "Inside ladder width": the distance measured from the inside edge of one beam to the inside edge of the opposite beam.
- (52) "Insole": that part of protective footwear next to the bottom of the foot designed to afford support and padding.
- (53) "Ladder belt": a belt intended for use as a positioning device for a person on a ladder. It fastens around the waist only.
- (54) "Ladder/escape belt": a belt intended as both a ladder belt and an escape belt for use by the wearer only as an emergency self-rescue device. It fastens around the waist only.
- (55) "Ladder shank": reinforcement to the shank area of protective footwear designed to provide additional support to the instep when standing on a ladder rung.
- (56) "Large-diameter hose": ~~attack or supply~~ hose of three and one-half-inch diameter or larger used to move large volumes of water.
- (57) "Life safety harness": harness used to support persons during fire service rescue.
- (a) Class I: harness that fastens around the waist and around thighs or under buttocks; designed to be used for emergency escape with a design load of three hundred lbf.
 - (b) Class II: harness that fastens around the waist and around the thighs or under the buttocks; designed for rescue with a design load of six hundred lbf.

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- (c) Class III: harness that fastens around the waist, around the thighs or under the buttocks, and over the shoulders; designed for rescue with a design load of six hundred lbf that may be encountered and where inverting may occur.
- (58) "Life safety rope": rope dedicated solely to the purpose of constructing lines for supporting persons during fire rescue, fire fighting, or during training activity.
 - (a) "~~Light use~~ Technical use": rope having a diameter of three-eighths inch (9.5 mm) or greater and less than one-half inch (thirteen mm).
 - (b) "General use": rope having a diameter of one-half inch (thirteen mm) or greater and not more than five-eighths inch (sixteen mm).
- (59) "Lining": a material or material assemblage attached to the inside of the outer shell for the purpose of thermal protection and padding.
- (60) "Maximum extended length": the total length of the extension ladder when all fly sections are fully extended and pawls engaged.
- (61) "Mid-sagittal plane": the plane, perpendicular to the basic and coronal planes, which symmetrically bisects the head.
- (62) "Moisture barrier": that material used to prevent or substantially inhibit the transfer of water, corrosive liquids, and steam and other hot vapors from the outside of the garment to the wearer's body.
- (63) "Optical warning device": a manufactured assembly of a single optical light emitter or a fixed array of any number of optical light emitters.
- (64) "Outer shell": the outside material of the garment, except trim.
- (65) "Outside ladder width": the distance measured from the outside edge of one beam to the outside edge of the opposite beam, or the widest point of the ladder including staypoles when provided, whichever is greater.
- (66) "P.A.S.S.": acronym for personal alert safety system. Devices that sense movement or lack of movement, and that automatically activate an audible alarm signal (which also can be manually activated) to alert and to assist others in locating a firefighter who is in danger.
- (67) "Pawls": devices attached to fly sections for the purpose of anchoring fly sections, when extension ladders are used in the extended position. Pawls engage ladder rungs near the beams for anchoring purposes.
- (68) "Permanent deformation (set)": that deformation remaining in any part of a ladder or its components after all test loads have been removed from the ladder.
- (69) "Pompier ladder (scaling ladder)": a ladder having a single center beam only and with a large hook on top, used for scaling.
- (70) "Prescribed fire": any fire ignited by management actions under certain predetermined conditions to meet specific land management objectives.
- (71) "Protective hood": a garment worn under a helmet to protect the exposed portions of the head, face, and

DRAFT - NOT FOR FILING

neck.

- (72) "Protective toecap": reinforcement to the toe area of protective footwear. Toecaps are designed to protect the toes from impact and compression.
- (73) "PTO": power takeoff.
- (74) "Puncture-resistant plate": reinforcement to the bottom of protective footwear located between the sole with heel and the insole, designed to resist puncture.
- (75) "~~Qualitative SCBA~~ Quantitative fit test": ~~a fit test during which a person wearing a SCBA is exposed to an irritant smoke, an odorous vapor, or other suitable test agent. If the SCBA wearer is unable to detect penetration of the test agent into the facepiece, the wearer has achieved a satisfactory fit~~ an assessment of the adequacy of respirator fit by numerically measuring the amount of leakage into the respirator.
- (76) "Reference plane": the plane 2.36 plus or minus 0.04 inches above and parallel to the basic plane.
- (77) ~~"Relay supply hose": a single jacket fire hose of three and one half inch diameter and larger used to move large volumes of water at low pressure and manufactured prior to January, 1987 to meet the requirements of the 1979 edition and prior editions of NFPA 1961, "Standard for Fire Hose."~~ "Rehabilitation" : An intervention designed to mitigate against the physical, physiological, and emotional stress of fire fighting in order to sustain a member's energy, improve performance, and decrease the likelihood of on-scene injury or death.
- (78) "Retention system": the complete assembly by which a helmet is retained in position on the head.
- (79) "Retroreflective markings": material that reflects and returns a relatively high proportion of light in a direction close to the direction from which it came.
- (80) "Roof ladder": a single ladder equipped with hooks at the top end of the ladder.
- (81) "Rungs": the ladder crosspieces on which a person steps while ascending or descending.
- (82) "Seams, Major A": outermost layer seam assemblies where rupture could reduce the protection of the garment by exposing the inner layers such as moisture barrier, thermal barrier, the wearer's station/work uniform, other clothing, or skin.
- (83) "Seams, Major B": moisture barrier or thermal barrier seam assemblies where rupture could reduce the protection of the garment by exposing the next layer of the garment, the wearer's station/work uniform, other clothing, or skin.
- (84) "Seams, Minor": seams that are not classified as "Major A" or "Major B" seams.
- (85) "Self-contained breathing apparatus (SCBA)": a device providing the wearer with a supply of respirable gas carried in or generated by the apparatus. When in use, this apparatus requires no intake of air from the environment in which the wearer is operating.
 - (a) "Closed circuit SCBA": an apparatus of the type in which the exhalation is rebreathed by the wearer after the carbon dioxide has been effectively removed and a suitable oxygen concentration restored.

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- (b) "Open circuit SCBA": an apparatus of the following types from which exhalation is vented to the atmosphere and not rebreathed:
 - (i) "Demand type": an apparatus in which the pressure inside the facepiece, in relation to the immediate environment, is positive during exhalation and negative during inhalation (prohibited by rule 4123:1-21-02 of the Administrative Code).
 - (ii) "Pressure demand (positive pressure) type": an apparatus in which the pressure inside the facepiece, in relation to the immediate environment, is positive during both inhalation and exhalation.
- (86) "Service tests": tests to be performed on a regular basis after a ground ladder is in service to determine its suitability for service.
- (87) "Shall": to be construed as mandatory.
- (88) "Shell": the outermost part of a helmet.
- (89) "Single jacket": a construction of fire hose consisting of one woven jacket.
- (90) "Single ladder": a non-self-supporting ground ladder, non-adjustable in length, consisting of only one section.
- (91) "Split shaft PTO": a power takeoff (PTO) drive system that directs the chassis power either to the pump or to the chassis drive axle. This is accomplished by splitting the chassis driveline that connects the chassis transmission to the drive axle and inserting the split shaft PTO that has the shift mechanism necessary to direct the engine power as described above.
- (92) "Stabilizer": a device integral with or separately attached to the chassis of an aerial fire apparatus that is used to increase the moments tending to resist overturning the apparatus.
 - (a) "Stabilizer pad": a plate inserted beneath a stabilizer shoe to give greater surface bearing area.
 - (b) "Stabilizer shoe": a permanently mounted shoe on a stabilizer to provide a ground surface area.
- (93) "Station/work uniforms": garments worn under protective clothing, consisting of trousers, shirts, jackets, or coveralls, but excluding underwear socks, dress uniforms, or outerwear.
- (94) "Staypoles (tormentors)": poles attached to each beam of the base section of extension ladders and used to assist in the raising of the ladder and to help provide stability to the raised ladder.
- (95) "Structural fire fighting": the physical activity of fire rescue, fire suppression, or both, at buildings, enclosed structures, vehicles, vessels, or like properties that are involved in a fire or a situation where there is the potential for fire.
- (96) "Suction, hard": a rubber-lined, rubber-covered hose whose reinforcement contains a semi-rigid or rigid helix to resist collapse under vacuum.
- (97) "Suction, soft": collapsible hose used to supply pumpers from hydrants.
- (98) "Supply hose": hose of three and one-half inch diameter or larger designed for the purpose of moving water between a pressurized water source and a pump that is supplying attack lines, ~~not to exceed one~~

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~~hundred eighty-five psi operating pressure.~~

- (99) "Suspension": an energy attenuating system made up of headband and crown straps.
- (100) "Thermal barrier": the portion of protective ensemble element composites that is designed to provide thermal protection.
- (101) "Thermal protective performance": measurement of the amount of heat transfer through the protective ensemble from a thermal exposure equal to flashover conditions that results in second degree burn damage to the wearer's skin as related to the time of heat exposure.
- (102) "Throwline": a floating one-person rope that is intended to be thrown to a person during water rescues or as a tether for rescuers entering the water.
- (103) "Tip": the end of the beam opposite the ladder butt.
- (104) "Total heat loss": measurement of the amount of heat transfer through the protective ensemble from heat that is generated by the wearer's body.
- (105) "Trim": a tape material permanently attached to the outer shell for visibility enhancement.
- (106) "Trouser": a garment worn to protect the lower part of the body, except the feet. [Also referred to as "protective trousers" in this chapter of the Administrative Code.](#)
- (107) "Ultimate failure": collapse of a ground ladder structure or component thereof.
- (108) "Unlined hose": a hose, usually made of linen yarns, consisting of only the woven jacket and having such qualities that the yarn of the jacket swells when wetted, tending to seal the hose.
- (109) "Upper": that part of the protective footwear including but not limited to the toe, vamp, quarter, shaft, collar, and throat; and other than the sole with heel, puncture-resistant plate, and insole.
- (110) "Water hammer": the surge of pressure caused when a high velocity flow of water is abruptly shut off. The pressure exerted by the flowing water against the closed system can be seven times or more than the static pressure.
- (111) "Water tower": a device consisting of permanently mounted, power-operated booms and a waterway designed to supply a large capacity mobile elevated water stream. The booms may be of articulating design or telescoping design and may be equipped with a ladder.
- (112) "Wildland fire fighting": the activities of fire suppression and property conservation in woodlands, forests, grasslands, brush, prairies, and other such vegetation, or any combination of vegetation.
- (113) "Working structural fire": any fire that requires the use of a one and one-half inch or larger fire attack hose line and that also requires the use of self-contained breathing apparatus for members entering the hazardous area.
- (114) "Wristlet": an attachment, fitted to the top of a glove or to the sleeve of a protective coat, to completely cover the wrist area under all conditions.

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4123:1-21-02 Personal protective clothing and equipment for structural fire fighting.

- (A) The employer shall provide and require the use of personal protective clothing and equipment, as specified in this rule, when employees are required to work in a hazardous environment that may be encountered during structural fire fighting activities and under similar conditions during training activities.
- (B) The employer shall assure that protective clothing protects the head, body, and extremities and consists of at least the following components: foot protection; hand protection; body protection; eye, face, and head protection; and respiratory protection.
- (C) Personal protective clothing and equipment shall be properly sized for the wearer.
- (D) Personal protective clothing and equipment that is damaged or otherwise defective to the point of voiding its intended protection shall be removed from service.
- (E) Employers shall develop and require use of a written plan covering the safe use, limitations, care, inspection, maintenance, and replacement of the clothing and equipment required by this rule, and all affected employees shall be trained in accordance with such plan.
- (F) Employers shall develop and retain records for the life of the protective clothing and equipment.
- (G) Employer shall provide for the cleaning of personal protective clothing.
- (H) Where employees choose to provide their own protective clothing and equipment, such clothing and equipment shall give equal or greater protection than that provided by the employer.
- (I) It shall be the responsibility of the employee to properly use the equipment provided by the employer, as required in this rule.
- (J) Body protection.
 - (1) Body protection shall consist of a protective coat and trousers, or equivalent protection.
 - (2) Protective clothing shall be flame-resistant, durable, light-weight, water-resistant, nonirritating to the skin, and cleanable as set forth in paragraph (J) of this rule.
 - (3) Protective clothing shall be cleaned per the manufacturer's recommendations.
 - (4) Protective clothing for structural fire fighting shall be repaired in accordance with manufacturer's requirements. ~~If protective clothing cannot be repaired properly without decreasing the protective qualities, it shall be replaced.~~
If protective clothing cannot be repaired properly without decreasing the protective qualities, it shall be replaced.
 - (5) Protective clothing shall be designed to give minimum interference to physical movement, the use of fire-fighting tools, and protective breathing apparatus.
 - (6) There shall be at least a two inch overlap of all layers of the protective coat and the protective trousers so there is no gaping of the total thermal protection when the protective garments are worn. The minimum overlap shall be determined by measuring the garments on the wearer, without SCBA, in both of the following positions:

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- (a) "Position A:" standing, hands together, reaching overhead, as high as possible.
 - (b) "Position B:" standing, hands together, reaching overhead, with body bent forward, to the side, and to the back, as much as possible.
- (7) Employers that provide protective coats with protective resilient wristlets secured through a thumb opening shall be permitted to provide gloves of the gauntlet type for use with these protective coats. Employers that do not provide such wristlets attached to the protective coats shall provide gloves of the wristlet type for use with these protective coats.
- (8) Design requirements.
- (a) Protective clothing shall consist of an outer shell, moisture barrier, and thermal barrier.
 - (b) A means shall be provided to secure the moisture barrier and thermal barrier to the outer shell.
 - (c) Garments, including the front closure, shall be constructed in a manner that provides secure and complete moisture and thermal protection. Closure systems shall be secured with positive locking fasteners including, but not limited to, hooks and dees or zippers. Nonpositive fasteners, such as snaps or hook and pile tape, shall not be used as positive locking fasteners but shall be permitted to be utilized as supplementary garment closure devices.
 - (d) Moisture barriers and thermal barriers shall extend to within three inches (seventy-five mm) of the outer shell at the cuffs and hems of protective garments. At the neck, the coat moisture barrier and thermal barrier shall extend to the neckline seam. At the waist, the trouser moisture barrier and thermal barrier shall extend to the waistline seam. In coats, the moisture barriers and thermal barriers shall also extend to within one inch (twenty-five mm) of the sleeve end of the outer shell, and in trousers shall extend to within three inches (seventy-five mm) of the bottom outer shell hems. The liner system shall be attached at or adjacent to the end of the coat sleeves or the end of the trouser legs. Any mechanism used to attach the liner system at or adjacent to the end of the coat sleeves and the end of the trouser legs shall not be greater than one inch (twenty-five mm) between the attachment points, and shall not be expandable. Moisture barriers and thermal barriers shall be configured in a manner that provides continuous moisture and thermal protection.
 - (e) Cargo pockets, where provided, shall have a means of drainage of water and shall have flaps with a means of fastening them in the closed position.
 - (f) Trim used to meet visibility requirements shall be no less than two inches (fifty mm) wide and shall have retroreflective and fluorescent areas. Retroreflective areas of trim shall be no less than five-eighths inch (sixteen mm) wide. Fluorescent areas of trim shall have a minimum surface of two inches²/linear inch (fifty mm²/linear mm). Fluorescent and retroreflective areas of trim shall appear to be continuous at a distance of one hundred feet (30.5 m) for the length of the trim, with gaps between areas of retroreflectivity of no more than one-eighth inch (3mm).
 - (g) Trim affixed to protective garments for the purpose of meeting visibility requirements specified in paragraph (J)(12)(q) of this rule may be obscured by garment components such as, but not limited to, pockets, storm flaps, and reinforcing patches, as long as the minimum trim required in paragraphs (J)(8)(f), (J)(9)(e), and (J)(10)(c) of this rule is not obscured.
 - (h) The outer shell and each separable layer of protective garments shall have a label permanently and

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conspicuously attached to the inside upon which at least the following warnings and information are printed:

- (i) "This structural fire fighting garment meets the garment requirements of NFPA 1971, ~~2007~~ [2013](#) Edition.
 - (ii) Manufacturer's name, identification, or designation.
 - (iii) Manufacturer's address.
 - (iv) Country of manufacture.
 - (v) Manufacturer's ~~garment~~ [element](#) identification number, lot number, or serial number.
 - (vi) Date of manufacture (not coded).
 - (vii) Model name, number, or design.
 - (viii) Size.
 - (ix) Principal material(s) of construction.
 - (x) Cleaning precautions.
 - (xi) Certification organization's label, symbol, or identifying mark.
- (9) Additional requirements for protective coats.
- (a) Protective coats shall provide protection to the upper torso, neck, arms, and wrists, excluding the hands and head.
 - (b) Protective coat hardware shall not penetrate through the outer shell, moisture barrier, and thermal barrier to contact the wearer's body when the coat is worn with closures fastened, unless the hardware is completely covered by external closure flaps.
 - (c) Each protective coat sleeve shall have a permanent protective wristlet, made of an inherently flame-resistant fiber, meeting requirements as specified in paragraph (J)(12) of this rule. The wristlet shall be attached to the protective coat sleeve in a manner that will not permit a gap in the thermal protection.
 - (d) Protective coats shall have a composite collar no less than three inches (seventy-five mm) in height at any point with a closure system. The collar and closure system shall consist of an outer shell, moisture barrier, and thermal barrier that meet all performance requirements as specified in paragraph (J)(12) of this rule.
 - (e) Each protective coat shall have a drag rescue device (DRD) installed in the upper torso portion of the coat. It shall be accessible from the exterior of the garment. It shall be designed so that when deployed, the DRD secures the fire fighter by the upper torso or shoulders so that the DRD pulls directly on the body and shall not pull only the garment.

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(f) The trim configuration for the coat shall be in accordance with figure 1. The minimum trim pattern for the coat shall have one circumferential band of trim or a staggered three hundred sixty-degree visibility pattern meeting or exceeding the surface area of a continuous circumferential band around the bottom of the coat. Where a staggered pattern is used in the lower circumferential trim band, the lower edge of the upper trim piece shall not be higher than the upper edge of the lower trim piece. The lower edge of the circumferential band on the lower part of the coat shall be within one inch (twenty-five mm) of the coat hem's highest point. The front of the coat shall also have at least one band of horizontal trim at the chest level. No vertical stripes of trim shall be permitted on the front of the coat. The back of the coat shall also have a minimum of either two vertical stripes of trim, perpendicular to the bottom band and with one strip located on both the left and right sides of the of the back of the coat, or a minimum of one horizontal band of trim at the chest/shoulder blade level. The minimum trim configuration for each sleeve shall be one circumferential band, or a staggered three hundred sixty-degree visibility pattern meeting or exceeding the surface area of a continuous circumferential band, between the wrist and elbow level. Where trim on the coat intersects a zipper, a maximum gap in the trim of one inch (twenty-five mm) shall be permitted.

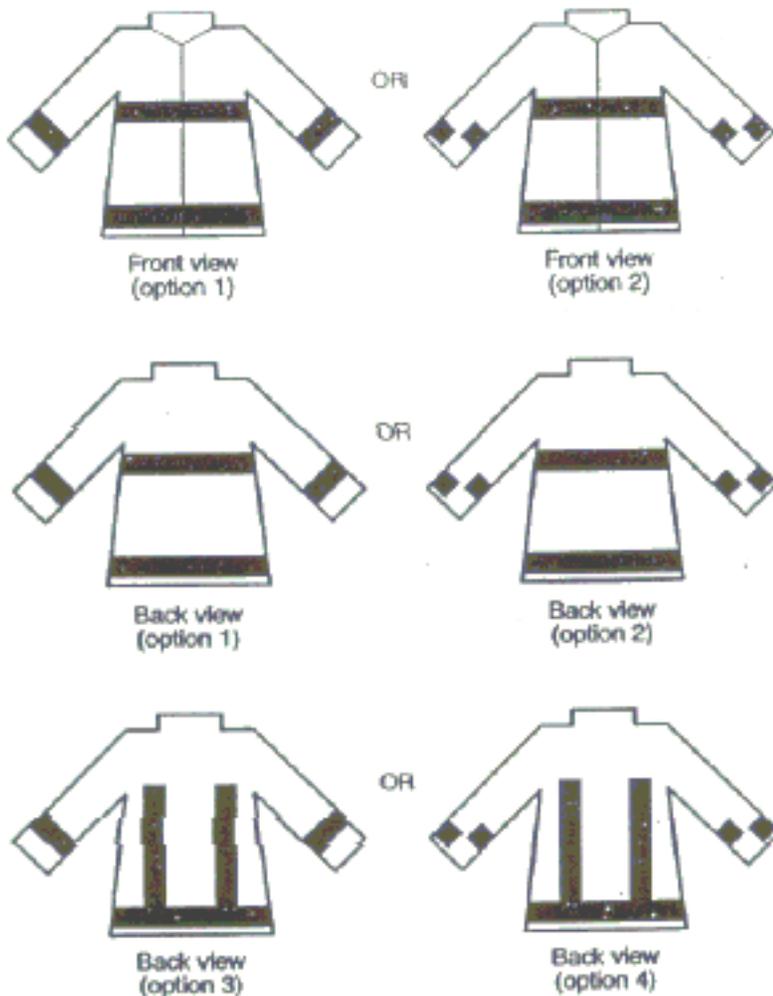


FIGURE 1 Minimum required coat trim patterns

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(10) Additional requirements for protective trousers.

- (a) Protective trousers shall provide protection to the lower torso and legs, excluding the ankles and feet.
- (b) Protective trouser hardware shall not penetrate through the outer shell, moisture barrier, and thermal barrier to contact the wearer's body when the trouser is worn with closures fastened, unless the hardware is located on or above the waistline or the hardware is completely covered by external closure flaps.
- (c) The trim configuration for the trousers shall be in accordance with figure 2. Protective trouser trim shall include a circumferential band around each leg between the hem and knee. Where trim on the trousers intersects a zipper, a maximum gap in the trim of one inch (twenty-five mm) shall be permitted.



FIGURE 2 Minimum required trouser trim patterns

(11) Additional requirements for protective coveralls.

- (a) That portion of the protective coverall which corresponds to the protective coat shall meet all requirements of paragraph (J)(9) of this rule.
- (b) That portion of the protective coverall which corresponds to the protective trouser shall meet all requirements of paragraph (J)(10) of this rule.

(12) Performance requirements.

Protective garments shall be capable of withstanding all tests specified in NFPA 1971, "Protective Ensemble for Structural Fire Fighting, ~~2007~~ 2013 Edition," ~~with the following results:~~

~~(a) (a) Thermal insulation:~~

~~The protective garment fabric composite consisting of outer shell, moisture barrier, and thermal barrier shall have an average thermal protective performance (tpp) of no less than thirty-five. Wristlets shall have a tpp of no less than twenty.~~

~~(b) (b) Seam strength:~~

~~Woven, knit, or combination garment seam assemblies shall demonstrate a sewn seam strength equal to or greater than one hundred fifty lbf force for "Major A" seams, and forty lbf force for minor seams. Knit wristlet seams shall have a breaking strength of not less than forty-one lbf (one~~

*****DRAFT - NOT FOR FILING*****

hundred eighty-one N).

~~(e) (c) Flame resistance.~~

- ~~(i) (i) The outer shell, moisture barrier, thermal barrier, collar linings, wristlets, drag rescue devices (DRD) winter liner fabric where provided, trim, lettering, and other materials used in garment construction including, but not limited to, padding, reinforcement, interfacing, binding, hanger loops, emblems, patches, and labels (if placed on the exterior of the garment) shall have an average char length of no more than four inches (101.6 mm), an average afterflame of no more than two seconds, and shall not melt or drip.~~
- ~~(ii) (ii) Zippers and seam-sealing materials shall meet the requirements of paragraph (J)(11)(c)(i) of this rule only where located on the exterior of the garment or located where they will directly contact the wearer's body.~~
- ~~(iii) (iii) Elastic and hook and pile fasteners shall meet the performance requirements of paragraph (J)(11)(c)(i) only where located where they will directly contact the wearer's body.~~

~~(d) (d) Thermal shrinkage.~~

~~The outer shell, moisture barrier, thermal barrier, collar linings, wristlets, and winter liner fabric, where provided, shall not shrink more than ten per cent in any direction.~~

~~(e) (e) Heat resistance.~~

- ~~(i) (i) The outer shell, moisture barrier, thermal barrier, collar linings, DRDs, and winter liner fabric, where provided, and other materials used in construction, including, but not limited to, padding, reinforcement, wristlets, labels, interfacing, binding, hanger loops, and emblems or patches, but excluding elastic and trim and hook and pile fasteners when not placed in direct contact with the body, shall not melt, separate, or ignite.~~
- ~~(ii) (ii) Garment moisture barrier seams shall not drip or ignite.~~
- ~~(iii) (iii) Garment outer shells and collar linings shall not char.~~
- ~~(iv) (iv) All garment hardware, excluding hook and pile fasteners, where placed so that they will not directly contact the wearer's body, shall not ignite and shall remain functional.~~

~~(f) (f) Cleaning shrinkage.~~

~~The outer shell, moisture barrier, thermal barrier, collar linings, wristlets, and winter liner fabric shall not shrink more than five per cent in any direction.~~

~~(g) (g) Total heat loss.~~

~~Garment composite consisting of outer shell, moisture barrier, and thermal barrier shall have a total heat loss of not less than two hundred five W/m².~~

~~(h) (h) Whole garment liquid penetration.~~

~~Garment composite shall be tested for overall liquid penetration resistance and shall allow no liquid penetration.~~

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~~(i) (i) Tear strength.~~

~~(i) (i) The outer shell fabric and collar linings shall have a tear strength of no less than twenty two lbf (ten kg).~~

~~(ii) (ii) Garment moisture barriers, thermal barriers, and winter liners, where provided, shall have a tear strength of not less than five lbf.~~

~~(j) (j) Water absorption.~~

~~The outer shell fabric and collar linings shall have a water absorption of no more than thirty per cent~~

~~(k) (k) Viral penetration resistance.~~

~~Garment moisture barriers and moisture barrier seams shall be tested for resistance to liquid or blood borne pathogens and shall allow no penetration of the PHI-X-174 bacteriophage for at least one hour.~~

~~(l) (l) Water penetration resistance.~~

~~The moisture barrier fabric shall have a minimum water penetration resistance of twenty five psi.~~

~~(m) (m) Liquid penetration resistance.~~

~~Garment moisture barrier materials and seams shall show no penetration of the test liquids for at least one hour.~~

~~(n) (n) Breaking strength.~~

~~Garment outer shells and collar linings shall be individually tested for strength after washing and shall have a breaking strength of not less than one hundred forty lbf (six hundred twenty three N).~~

~~(o) (o) Burst strength.~~

~~Knit wristlet material(s) shall be tested for material strength and shall have a burst strength of not less than fifty one lbf (two hundred twenty five N).~~

~~(p) (p) Thread melting test.~~

~~All sewing thread utilized in the construction of garments and DRDs shall be made of an inherently flame resistant fiber and shall not melt below five hundred degrees Fahrenheit (two hundred sixty degrees Celsius).~~

~~(q) (q) Retroreflectivity and fluorescence.~~

~~Garment trim shall be tested for retroreflectivity and fluorescence and shall have a coefficient of retroreflection of not less than one hundred cd/fe/ft² (one hundred cd/lux/m²) and shall have the color fluorescent yellow-green, fluorescent orange-red, or fluorescent red.~~

~~(r) (r) Conductive and compressive heat resistance.~~

~~The garment composite from the shoulder areas and the knee areas shall be tested for resistance to heat transfer and shall have a minimum echr (conductive and compressive heat resistance) rating of~~

DRAFT - NOT FOR FILING

~~twenty five for the shoulder area and for the knee areas.~~

~~(s) (s) Label durability.~~

~~Labels shall be tested for durability and legibility and shall remain in place and shall be legible.~~

~~(t) (t) DRD tests.~~

~~(i) (i) DRD materials, seams, splices, and joints shall be tested for material strength and have a minimum tensile strength of one fifteen thousand seventy three lbf.~~

~~(ii) (ii) DRD shall be tested for functionality and shall allow for the mannequin (rescue randy model 1475) to be dragged for a minimum of ninety eight inches and the DRD deployed within ten seconds.~~

~~(u) (u) Moisture barrier light degradation.~~

~~Garment moisture barrier shall be tested for light degradation and water shall not appear on the surface.~~

~~(v) (v) Corrosion resistance.~~

~~All garment metal hardware and specimens of all garment hardware that include metal parts shall be individually tested for corrosion. Metals inherently resistant to corrosion including, but not limited to, stainless steel, brass, copper, aluminum, and zinc, shall show no corrosion of the base metal and shall remain functional.~~

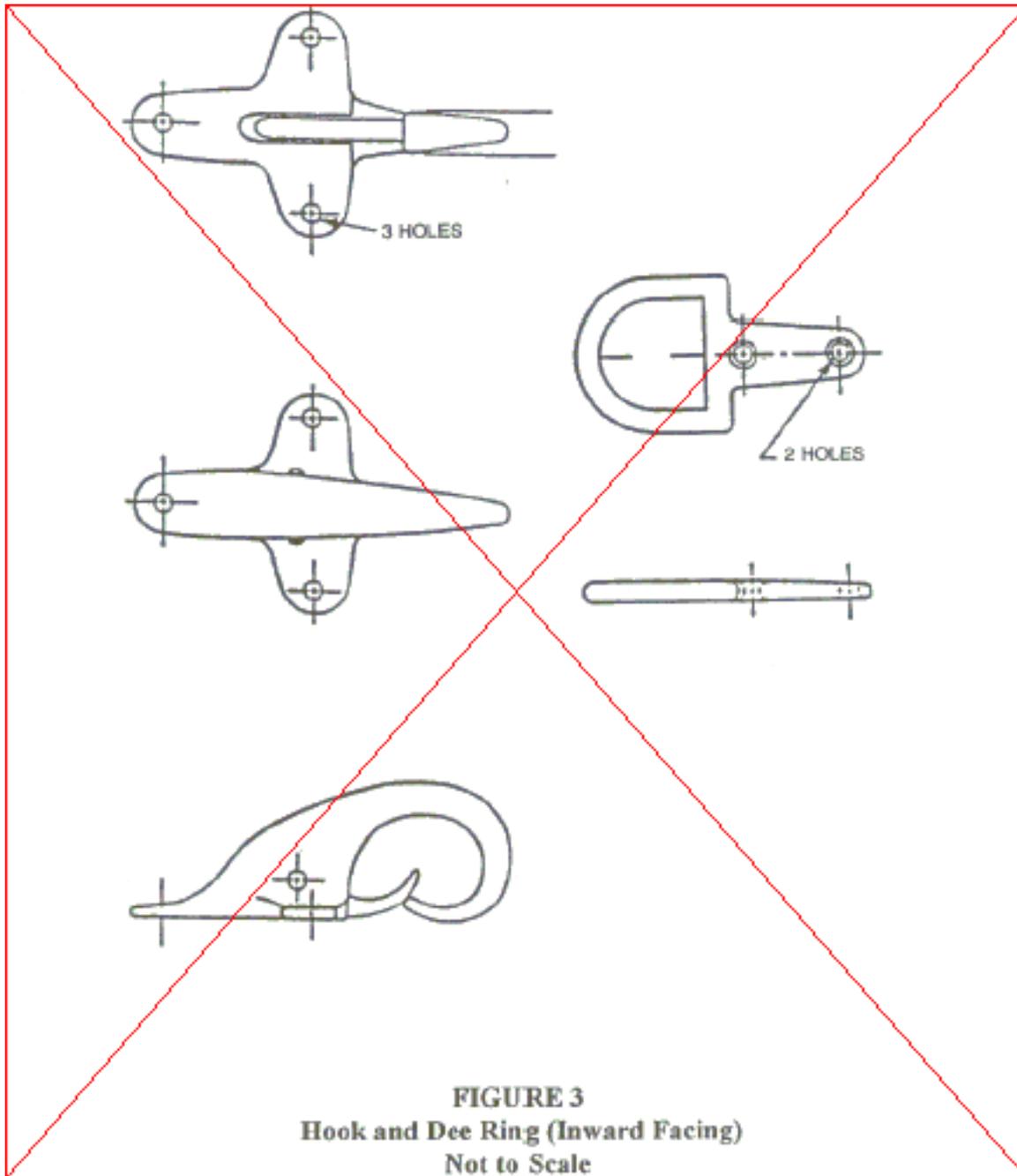
~~(w) (w) All hardware finish shall be free of rough spots, burrs, or sharp edges.~~

~~(x) (x) Snaps shall meet the requirements of MIL F 10884F "Fastener, Snap."~~

~~(y) (y) Aramid hook and pile fastener tapes shall not be permitted.~~

~~(z) (z) Zippers shall meet the requirements of A-A 55634, Commercial Item Description, Zippers "Fasteners, Interlocking, Slide." Zippers shall be size nine or larger when measured in accordance with A-A 55634.~~

~~(aa) (aa) Hooks and dees shall be non ferrous and shall conform to the design of figure 3 of this rule.~~



(K) Foot protection.

(1) Design requirements.

- (a) Protective footwear shall consist of a sole with heel, upper with lining, an insole, a puncture-resistant device, a ladder shank or whole sole equivalent and an impact and compression-resistant toecap permanently attached.
- (b) Protective footwear shall be no less than ten inches in height when measured from the plane of the wear surface at the heel to the lowest point of the throat.

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- (c) The heel breast shall be no less than one-half inch or more than one inch. The heel breasting angle shall be no less than ninety degrees or more than one hundred thirty-five degrees. The edges shall not be less than, or extend more than, one-half inch laterally from the upper at any point. The width of the footwear heel shall be equal to or greater than the width of the sole at the intersection of the heel breast and the sole bottom.
- (d) Metal parts shall not penetrate from the outside to the lining or insole at any point. All hardware and external fittings shall be free of rough spots, burrs, or sharp edges.
- (e) No metal parts, including but not limited to nails or screws, shall be present or used in the construction or attachment of the sole (with heel) to the puncture-resistant plate, insole, or upper.
- (f) The puncture-resistant device shall cover the maximum area of the insole.

(2) Performance requirements.

Protective footwear shall be capable of withstanding all tests specified in NFPA 1971, "Protective Ensemble for Structural Fire Fighting, 2007 2013 Edition," ~~with the following results:~~

~~(a) (a) Heat resistance.~~

~~No part of the footwear shall melt, separate, or ignite, and all accessories shall remain functional and show no water penetration.~~

~~(b) (b) Corrosion resistance.~~

~~Metal parts of protective footwear, including but not limited to the toecap, ladder shank, puncture resistant plate and accessories, shall show no sign of corrosion or oxidation, and accessories shall remain functional, after individual exposure to a five per cent saline solution for no less than twenty hours.~~

~~(c) (c) Puncture resistance.~~

~~(i) (i) Protective footwear shall not allow puncture through the sole with heel when tested to no less than two hundred seventy-two lbf.~~

~~(ii) (ii) The footwear upper shall not puncture under an average applied force of thirteen lbs.~~

~~(iii) (iii) The footwear puncture resistance device shall be tested for resistance to flex cracking and show no signs of cracking.~~

~~(d) (d) Electrical resistance.~~

~~Protective footwear shall have an electrical leakage of less than three milliamperes when tested to fourteen thousand volts.~~

~~(e) (e) Compression and impact resistance.~~

~~(i) (i) Compression: two thousand five hundred pounds.~~

~~(ii) (ii) Impact: seventy-five foot-pounds.~~

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~~(f)~~ (f) Upper cut resistance.

~~Protective footwear shall have a cut distance resistance of more than 0.8 inch (twenty mm).~~

~~(g)~~ (g) Liquid penetration liquid resistance.

~~Protective footwear shall not allow liquid penetration through the lining at any point for at least one hour.~~

~~(h)~~ (h) Flame resistance.

~~Protective footwear shall have an afterflame of no more than two seconds and shall not melt or drip, and shall not exhibit any burn-through.~~

~~(i)~~ (i) Abrasion resistance.

~~The sole with heel shall have an abrasion resistance rating of no less than one hundred.~~

~~(j)~~ (j) Conductive heat resistance.

~~(i) (i) The temperature of the insole surface in contact with the foot shall not exceed one hundred eleven degrees Fahrenheit.~~

~~(ii) (ii) The temperature of the upper lining surface in contact with skin shall have a second degree burn time of not less than ten seconds and shall have a pain time of not less than six seconds.~~

~~(k)~~ (k) Radiant heat resistance.

~~The temperature of the upper lining surface in contact with the skin shall not exceed one hundred eleven degrees Fahrenheit.~~

~~(l)~~ (l) Viral penetration resistance.

~~The footwear upper material composite, upper seams, and vamp seams shall allow no penetration of the test liquids for at least one hour.~~

~~(m)~~ (m) Ladder shank bend resistance.

~~The ladder shank shall not deflect more than one-fourth inch.~~

~~(n)~~ (n) Thread melting test.

~~All sewing thread utilized in the construction of the footwear shall be made of an inherently flame resistant fiber. All sewing thread utilized shall not melt below five hundred degrees Fahrenheit (two hundred sixty degrees Celsius).~~

~~(o)~~ (o) Slip resistance.

~~The soles shall have a static coefficient of 0.75 or greater in a dry condition.~~

~~(p)~~ (p) Attachment.

~~Footwear stud posts and eyelets shall have a minimum detachment strength of sixty six lbf.~~

DRAFT - NOT FOR FILING

~~(q) (q) Label durability.~~

~~Labels shall remain in place and shall be legible to the unaided eye.~~

(3) Labeling requirements.

(a) Labels shall be legible to the naked eye and permanently affixed to all protective footwear by stamping, embossing, gluing, or stitching.

(b) Labels shall state:

- (i) "This structural fire fighting protective footwear meets the footwear requirements of NFPA 1971, ~~2007~~ 2013 Edition. Do Not Remove This Label."
- (ii) Manufacturer's name, identification, or designation.
- (iii) Manufacturer's address.
- (iv) Country of manufacture.
- (v) Size or size range.
- (vi) Model or stock number.
- (vii) Manufacturer's element identification number, lot or serial number.
- (viii) Month and year of manufacture.
- (ix) Principle material(s) of construction.
- (x) Cleaning precautions.
- (xi) Certification organization's label, symbol, or identifying mark.

(L) Head protection.

- (1) Head protection shall consist of a fire fighters' helmet and a protective hood. The helmet shall consist of a shell, an energy-absorbing system, a retention system, retroreflective and fluorescent markings, ear covers, and either a faceshield, or goggles, or both.
- (2) Each helmet shall be durably and legibly labeled in a manner such that the label can be easily read without removing any permanent helmet part. Each label shall include the following information:
 - (a) This structural fire fighting protective helmet meets the helmet requirements of NFPA 1971, ~~2007~~ 2013 Edition. Do not remove this label.
 - (b) Name, identification, or designation of manufacturer.
 - (c) Manufacturer's address.
 - (d) Country of manufacture.
 - (e) Manufacturer's element identification number, lot number, or serial number.

*****DRAFT - NOT FOR FILING*****

- (f) Model number, name, or design.
 - (g) Month and year of manufacture (not coded).
 - (h) Cleaning precautions.
 - (i) Helmet size or size range.
 - (j) Principle material(s) of construction.
 - (k) Certification organization's label, symbol, or identifying mark.
- (3) The helmet manufacturer shall place a unique manufacturer's part number, the symbol of the certification organization, and the words "NFPA 1971, ~~2007~~ 2013 Edition" permanently on each replaceable critical part of the goggle lens or faceshield.
- (4) The helmet with faceshield/goggle component(s) stowed shall provide peripheral vision clearance of at least ninety-four degrees to each side when measured from the center of the eye with the helmet positioned according to its helmet positioning index on the Alderson fiftieth-percentile male headform.
- (5) Where the goggle component is selected, the goggles shall be permitted to be unattached, not assembled, to the helmet
- ~~(5)-(6) The~~ When the faceshield or faceshield/goggle component ~~shall be attached to the helmet. When is~~ deployed in accordance with its helmet eye/face-positioning indexes on the Alderson fiftieth-percentile male headform, the faceshield or faceshield/goggle component shall provide at least the following field of vision when measured from the center of the eye:
- (a) A dihedral angle of at least eighty-five degrees.
 - (b) An upper dihedral angle of at least ten degrees.
 - (c) A lower dihedral angle of at least forty degrees.
- ~~(6) (6) Where the goggle component is selected, the goggles shall be permitted to be unattached, not assembled, to the helmet.~~
- (7) There shall be no openings penetrating the shell except those provided by the manufacturer for mounting energy-absorbing systems, retention systems, and accessories.
- (8) The addition of helmet accessories shall not interfere with the function of the helmet or its component parts and shall not degrade the helmet's performance below the requirements of this rule.
- (9) The retention system shall include a chin strap and a nape device. The chin strap shall have a minimum width of three-fourths inch (nineteen mm).
- (10) The helmet ear covers or portion of the helmet providing the coverage of the ears, when deployed with the helmet positioned on the ISO J headform according to its helmet positioning index, shall provide at least the following coverage from the reference plane downward to the lower edge of the ear covers:
- (a) Three and three-fourths inches (ninety-five mm) where measured two inches (fifty mm) forward of

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the coronal plane.

- (b) Four and three-fourths inches (one hundred twenty mm) where measured one inch (twenty-five mm) forward of the coronal plane.
- (c) Five and ~~one-eighth~~ one-eighth inches (one hundred thirty mm) where measured at the coronal plane.
- (d) Five and ~~one-eighth~~ one-eighth inches where measured at the midsagittal plane at the rear of the headform.

(11) All sewing thread used in the construction of helmets shall be made of inherently flame-resistant thread.

(12) Performance requirements.

Helmets shall be capable of withstanding all tests specified in NFPA 1971, "Protective Ensemble for Structural Fire Fighting, ~~2007~~ 2013 Edition," ~~with the following results:~~ "

Label durability and legibility.

Labels shall remain in place and shall be legible.

~~(a) (a) Top impact requirement: force transmission.~~

~~No sample shall transmit an average force of more than eight hundred fifty pounds.~~

~~(b) (b) Top, front, side, and back impact requirement: acceleration.~~

~~(i) (i) The maximum acceleration shall be as indicated in table 1 of this rule.~~

Table 1

	Maximum accelerations		
Impact Location	Maximum Acceleration*	(M/Sec/Sec)	(FT/Sec/Sec)
Top	150 x Gn	(1471.5)	(4830)
Front	300 x Gn	(2943.0)	(9660)
Side	300 x Gn	(2943.0)	(9660)
Back	300 x Gn	(2943.0)	(9660)

~~[Comment: *Gn denotes "gravitational acceleration" which is defined as 9.81 meters per second per second (32.2 feet per second per second.)]~~

~~(ii) (ii) Acceleration durations above two hundred Gn shall not exceed three milliseconds; acceleration durations above one hundred fifty Gn shall not exceed six milliseconds.~~

~~(c) (c) Penetration resistance.~~

~~Helmets shall exhibit no electrical or physical contact between the penetration test striker and the headform.~~

*****DRAFT - NOT FOR FILING*****

~~(d) (d) Heat resistance.~~

~~(i) (i) Helmets shall be conditioned for both radiant and convected heat (heat and thermal shrinkage test) and shall meet the requirements of paragraphs (L)(12)(a) to (L)(12)(c) of this rule.~~

~~(ii) (ii) When subjected to heat resistance test conditions, helmets shall:~~

~~(a) (a) Have no part of the helmet shell touch the headform.~~

~~(b) (b) Have no shell distortion in the back of the head extend more than one and five eighths inches below the original position of the helmet.~~

~~(c) (c) Have no distortion of the front and side of the headform extend more than one and three sixteenths inches below the original position of the helmet.~~

~~(d) (d) Have no separation, melting, nor dripping of the retention system, energy absorbing system, or ear covers.~~

~~(e) (e) Have no dysfunctional chin strap closure device.~~

~~(f) (f) Have no ignition of any part of the helmet assembly.~~

~~(g) (g) Have no ignition nor melting of the product labels.~~

~~(h) (h) Have no part of the faceshield/goggle component that was below the brim line prior to the test be below the brim line after the test.~~

~~(i) (i) Have no dripping of the faceshield/goggle component.~~

~~(e) (e) Flame resistance.~~

~~Helmets shall show no visible flame or glow five seconds after removal from the test flame.~~

~~(f) (f) Electrical insulation.~~

~~Helmets shall not have a leakage current exceeding three milliamperes.~~

~~(g) (g) Corrosion resistance.~~

~~All helmet metal hardware shall show no more than light surface type corrosion or oxidation and shall remain functional. Ferrous metals shall show no corrosion of the base metal and shall remain functional.~~

~~(h) (h) Label durability and legibility.~~

~~Labels shall remain in place and shall be legible.~~

~~(i) (i) Retention system.~~

~~(i) (i) The retention system shall not break or slip or stretch more than thirteen sixteenths inches.~~

~~(ii) (ii) The suspension system shall not separate from the helmet shell during testing.~~

~~(iii) (iii) The helmet shell shall not separate from the helmet suspension and retention systems.~~

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~~(j)~~ (j) Ear covers and chin straps:

- ~~(i)~~ (i) Materials used for ear covers and chin straps shall have a maximum char length of four inches, an afterflame of two seconds, and shall not melt or drip.
- ~~(ii)~~ (ii) Materials used for ear covers and chin straps shall not shrink more than ten per cent in any direction, and shall not melt, separate, or ignite. Helmet chin strap material shall meet the thermal shrinkage requirement for the length dimension only.
- ~~(iii)~~ (iii) All sewing thread used in the construction of helmets shall be of inherently flame resistant fiber and shall not melt below five hundred degrees Fahrenheit (two hundred sixty degrees Celsius).
- ~~(iv)~~ (iv) Helmet ear covers shall have an average TPP rating of at least 20.0.

~~(k)~~ (k) Faceshield/goggles:

- ~~(i)~~ (i) Faceshield/goggle components shall have no contact with an eye of the headform nor shall any parts or fragments be ejected from the component that could contact the eye of the headform from the impact resistant test.
- ~~(ii)~~ (ii) Faceshield/goggle components and all attachment hardware shall not show any visible afterflame for five seconds.
- ~~(iii)~~ (iii) All fabrics used in the construction of faceshield/goggle components shall not have a char length of more than four inches average and shall not have an afterflame of more than five seconds.
- ~~(iv)~~ (iv) Faceshield/goggle component lenses shall not exhibit a delta haze of greater than twenty five per cent.
- ~~(v)~~ (v) Clear lenses shall transmit no less than eighty five per cent of the incident visible radiation. Colored lenses shall transmit a minimum of forty three per cent of the incident visible radiation.

~~(l)~~ (l) Fluorescent retroreflective markings:

- ~~(i)~~ (i) Helmets shall have fluorescent retroreflective markings on the shell exterior. A minimum of four square inches of the retroreflective markings shall be visible when the helmet, with the faceshield/goggle component in the stowed position, is viewed at the intersection of the midsagittal plane and the coronal plane at a distance of eight feet (2.4 m).
- ~~(ii)~~ (ii) Helmet trim shall have a coefficient of retroreflection of not less than one hundred cd/ft candle/ft² (cd/lux/m²) and shall have the color be fluorescent yellow-green, fluorescent orange-red, or fluorescent red.

(M) Primary eye protection.

- (1) Primary eye protection appropriate for a given specific hazard shall be provided for and used by employees exposed to that specific hazard.
- (2) Primary eye protection shall meet the requirements of ~~ANSO~~ ANSI Z87.1, practice for occupational and educational eye and face protection.

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(3) The helmet faceshield, or flip-down eye shields, alone shall not be considered and shall not be used as primary eye protection.

(4) The full facepiece of SCBA, with the regulator attached, shall constitute face and primary eye protection.

(N) Protective hood

(1) The hood shall be designed to cover and provide the limited protection to the head, face, and neck areas that do not receive primary protection from the helmet or the "SCBA" facepiece.

(2) The hood shall be donned properly, in accordance with the manufacturer's instructions for wearing.

(3) The hood shall provide a minimum coverage (as measured on the ISO size J headform) as follows:

(a) On each side measured downward from the reference plane at the coronal plane of nine inches (two hundred thirty mm).

(b) In the back measured downward from the reference plane at the rear midsagittal plane of thirteen inches (three hundred thirty mm).

(c) In the front measured downward from the reference plane at the front midsagittal plane, excluding the face opening, of twelve inches (three hundred mm).

(4) The hood shall be designed with a face opening. Other than where the hood face opening is designed to interface with a specific "SCBA" facepiece or where the hood face opening is designed to be adjustable, the opening shall measure five and five-eighths inches, plus zero/minus one inch (one hundred forty-five mm, plus zero/minus twenty-five mm) in any direction when the hood is laid out in a relaxed condition on a flat surface, smoothed out, and with the face opening up.

(5) Where the hood face opening is provided with manual adjustment, the hood face opening shall be adjustable to achieve a face opening of five and five-eighths inches (one hundred forty-five mm).

(6) Where the hood face opening is designed to interface with a specific "SCBA" facepiece, the hood face opening shall overlap the outer edge of the specific "SCBA" facepiece-to-face seal perimeter by not less than one-half inch (thirteen mm).

(7) The hood shall have a label(s) permanently and conspicuously attached upon which the following information is legibly printed:

(a) "This structural fire fighting hood meets the hood requirements of NFPA 1971, ~~2007~~ [2013](#) Edition. Do Not Remove this label."

(b) Manufacturer's name, identification, or designation.

(c) Manufacturer's address.

(d) Country of manufacture.

(e) Manufacturer's element identification number, lot number, or serial number.

(f) Month and year of manufacture (not coded).

DRAFT - NOT FOR FILING

- (g) Model name, number or design.
 - (h) Size or size range.
 - (i) Principle material(s) of construction.
 - (j) Cleaning precautions.
 - (k) Certification organization's label, symbol, or identifying mark.
- (8) Where the hood is designed to be used with a specific "SCBA" facepiece(s), the hood manufacturer shall add to the hood product label the following statement: "This hood is designed to be used only with (Manufacturer to insert specific SCBA facepiece(s), model(s), and size(s) in this space) for compliance with NFPA 1971. This hood can only be used with the above noted facepiece(s)."
- (9) Hoods shall be capable of withstanding all tests specified in NFPA 1971, "Protective Ensemble for Structural Fire Fighting, 2007 2013 Edition," ~~with the following results:~~

Label durability and legibility.

Labels shall remain attached to the hood and shall be legible to the unaided eye

~~(a) (a) Hood opening size retention.~~

- ~~(i) (i) Hood face openings that are not manually adjustable or that are not designed for interface with a specific "SCBA" facepiece shall retain at least eighty per cent of the original face opening size but shall not exceed five and five eighths inches (one hundred forty five mm).~~
- ~~(ii) (ii) Where hood openings are designed to interface with a specific "SCBA" facepiece, the hood shall overlap the outer edge of the specific "SCBA" facepiece to face seal perimeter by not less than one half inch (thirteen mm).~~

~~(b) (b) Thermal protective performance.~~

~~Hoods shall have a tpp of not less than twenty.~~

~~(c) (c) Flame resistance.~~

~~Hood material(s), including labels but excluding hook and pile fasteners and elastic when placed in direct contact with the body, shall not have a char length of more than four inches (one hundred mm) average, shall not have an afterflame of more than two seconds average, and shall not melt or drip.~~

~~(d) (d) Heat and thermal shrinkage.~~

- ~~(i) (i) Hood material(s), excluding labels, hook and pile fasteners and elastic, shall not shrink more than ten per cent in any direction.~~
- ~~(ii) (ii) Hood material(s), including labels but excluding hook and pile fasteners and elastic when these items are placed where they will not directly contact the wearer's body, shall not melt, separate, or ignite.~~

DRAFT - NOT FOR FILING

~~(e) (e) Cleaning shrinkage.~~

~~Hood material(s), including labels but excluding hook and pile fasteners and elastic when these items are placed where they will not directly contact the wearer's body, shall not shrink more than five per cent in any direction.~~

~~(f) (f) Thread melting test.~~

~~All sewing thread utilized in the construction of hoods shall be made of an inherently flame-resistant fiber and shall not melt below five hundred degrees Fahrenheit (two hundred sixty degrees Celsius).~~

~~(g) (g) Burst strength.~~

~~Knit hood material(s) shall have a burst strength of not less than fifty one lbf (two hundred twenty five N).~~

~~(h) (h) Seam breaking strength.~~

~~Knit hood seams shall have a burst strength of not less than forty one lbf (one hundred eighty one N).~~

~~(i) (i) Label durability and legibility.~~

~~Labels shall remain attached to the hood and shall be legible to the unaided eye.~~

(O) Personal alert safety system ("PASS").

- (1) Each member shall be provided with, use, and activate his\her "PASS" device in all emergency situations that could jeopardize that person's safety due to atmospheres that could be IDLH, incidents that could result in entrapment, structural collapse of any type, or as directed by the incident commander or incident safety officer.
- (2) Each "PASS" device shall be tested at least weekly and prior to each use.
- (3) Each "PASS" device shall be maintained in accordance with the manufacturer's instructions.
- (4) Each "PASS" device shall have a product label(s) permanently and conspicuously attached upon which the following information is legibly printed:
 - (a) "This PASS meets the requirements of NFPA 1982, Standard on Personal Alert Safety Systems (PASS), ~~2007~~ 2013 Edition. Do not remove this label."
 - (b) Manufacturer name, identification, or designation.
 - (c) Country of manufacture.
 - (d) Model name, number, or design.
 - (e) Identification, lot, or serial number.
 - (f) Month and year of manufacture (not coded).
 - (g) Recommended power source type and size if user replaceable.

*****DRAFT - NOT FOR FILING*****

- (h) Certification organization's label, symbol, or identifying mark.
 - (i) "PASS" also shall meet the labeling requirements for Class I, Division I Hazardous Locations of ANSI/UL 913, "Standard for Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III, Division I Hazardous Locations."
- (5) "PASS" devices can be designed to be either a stand-alone "PASS," or a "SCBA-integrated PASS.", which can be removable/non-removable.
- (6) PASS shall incorporate data logging in nonvolatile memory and, at a minimum, the following events shall be identified and recorded with the data log and shall also have a date and time stamp for each event in the data log:
- (a) When the PASS is turned on;
 - (b) When the PASS activates any alarm or pre-alarm;
 - (c) When the PASS alarm is activated by the user;
 - (d) When the PASS alarm was reset;
 - (e) When the PASS was turned off;
 - (f) When the PASS low power source warning signal activates.
- The data logging information shall be downloadable by the employer.
- (7) "PASS" shall incorporate a mode selection device or devices to allow for operation in at least three modes: "Off," "Alarm," and "Sensing."
- (a) All mode selection devices shall be capable of being switched to the alarm or sensing mode by a single gloved hand.
 - (b) Only one action shall be required to switch the mode selection device(s) from any mode to alarm.
 - (c) When "PASS" is sounding the alarm signal it shall require at least two separate and distinct manual actions to silence the alarm signal.
- (8) PASS shall be provided with a light source capable of providing a visual indication of mode status as well as an audible source capable of providing an aural indication of a change in the mode selection when switching from "off" to "sensing," "off" to "alarm," and "alarm" to sensing."
- (9) "PASS" shall incorporate a motion detector, and while in the sensing mode, shall sound the alarm signal when the "PASS" is motionless for thirty seconds, plus five/minus zero seconds. The alarm signal shall be preceded by a pre-alarm signal that shall sound ten seconds, plus three/minus zero seconds, before the sounding of the alarm signal.
- (a) The motion detector shall be operable regardless of the angle of deployment of the "PASS."
 - (b) Any failure of the motion detector shall cause the "PASS" to sound the alarm signal within thirty seconds, plus five/minus zero seconds, of such failure.
- (10) "PASS" shall emit an audible operational signal within one second of being switched to sensing mode,

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indicating to the user that the device is functioning properly.

- (11) "PASS" shall have at least an audible primary pre-alarm signal. The primary pre-alarm signal shall be a distinct and different sound from the alarm signal. This signal shall sound no more than ten seconds prior to the sounding of the alarm signal.
- (12) "PASS" shall sound the alarm signal when switched to the alarm mode. The alarm signal shall have a duration of at least one hour at a sound pressure level of not less than ninety-five dBa.
- (13) While in the sensing mode, "PASS" shall emit a recurrent audible low power source warning signal when the battery voltage is depleted to the level that will maintain the alarm signal level of at least ninety-five dBa for at least one hour. This sound shall be distinct and different from the pre-alarm and alarm signals. The low power source warning signal shall have an interval of not greater than thirty seconds.
- (14) The cancellation of the pre-alarm signal or the silencing of the alarm signal shall automatically reset the "PASS" to the sensing mode.
- (15) "PASS" devices shall be capable of withstanding all performance requirement tests specified in NFPA 1982, "Personal Alert Safety Systems (PASS), ~~2007~~ 2013 Edition," ~~with the following results:~~ "

Product label durability.

Product labels shall remain attached to the "PASS" and shall be legible to the unaided eye.

~~(a) (a) Primary pre-alarm signal.~~

~~The primary pre-alarm signal shall have an initial sound pressure level of at least eighty dBa to ninety-five dBa. Within six to ten seconds the sound pressure level shall increase, in at least two distinct sound pressure level increments, to at least one hundred dBa and shall remain at or above one hundred dBa for an additional three to five seconds. The entire primary pre-alarm signal shall not sound for more than thirteen seconds.~~

~~(b) (b) Alarm signal.~~

~~The alarm signal shall have the sound pressure level be not less than ninety five dBa for an uninterrupted duration of not less than one hour. The alarm signal, once activated, shall not be deactivated by the motion detector.~~

~~(c) (c) Low power source warning signal.~~

~~The low power source warning signal shall have the sound pressure level be between seventy and one hundred dBa and shall have the signal continue to sound until the power source voltage is depleted to the level that will no longer operate the "PASS," but not less than one hour.~~

~~(d) (d) Signal frequency.~~

~~(i) (i) The primary pre-alarm signal shall consist of a minimum of two primary frequencies, shall not be less than one thousand hertz nor more than two thousand hertz, and shall have these frequencies sounded either sequentially or simultaneously.~~

~~(ii) (ii) The alarm signal shall consist of a minimum of three primary frequencies, at least one of~~

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~~which shall be five hundred hertz, , plus/minus twenty hertz, and at least two other frequencies shall not less than one thousand hertz nor more than four thousand hertz, and shall have these frequencies be sounded either sequentially or simultaneously.~~

~~(e) (e) Electronic temperature stress.~~

~~"PASS" shall be subjected to a series of three temperature stress tests: elevated temperature, low operating temperature, and temperature shock. "PASS" shall be evaluated for proper functioning and meet the requirements as specified in paragraphs (O)(6) to (O)(14) of this rule and shall have the data logging functions operating properly.~~

~~(f) (f) Corrosion resistance.~~

~~"PASS" shall be tested for resistance to corrosion and shall be evaluated for proper functioning and meet the requirements as specified in paragraphs (O)(6) to (O)(14) of this rule and shall have the data logging functions operating properly.~~

~~(g) (g) Immersion/leakage resistance.~~

~~"PASS" shall be tested for resistance to leakage by covering the uppermost point of the "PASS" with a depth of 4.9 feet (1.5 m) of water. There shall be no water inside the battery compartment(s) and shall have no water in the electronics compartment(s). "PASS" shall be evaluated for proper functioning and meet the requirements as specified in paragraphs (O)(6) to (O)(14) of this rule and shall have the data logging functions operating properly.~~

~~(h) (h) Case integrity.~~

~~"PASS" shall support the test weight of four hundred forty two pounds (two hundred kg) on all surfaces of the pass case for one minute, plus fifteen/minus zero seconds, without affecting case integrity or causing visible damage. "PASS" shall be evaluated for proper functioning and meet the requirements as specified in paragraphs (O)(6) to (O)(14) of this rule and shall have the data logging functions operating properly.~~

~~(i) (i) Shock sensitivity.~~

~~"PASS" shall be tested for signal cancellation sensitivity and the pre-alarm signal shall not cancel.~~

~~(j) (j) Impact and vibration resistance.~~

~~"PASS" shall be tested for resistance to vibration and resistance to impact, and shall be evaluated for proper functioning and meet the requirements as specified in paragraphs (O)(6) to (O)(14) of this rule and shall have the data logging functions operating properly. Nonremovable SCBA integrated PASS shall not be required to meet the impact acceleration resistance test.~~

~~(k) (k) Retention system.~~

~~The retention system shall withstand a static force of not less than one hundred lbf (four hundred forty five n) without separating. Nonremovable "SCBA" integrated pass shall not be required to meet this requirement.~~

~~(l) (l) Water drainage.~~

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~~"PASS" shall be tested for water drainage and shall have the sound pressure level of the alarm signal be not less than ninety-five dBA at the sixty-second mark.~~

~~(m)~~ (m) Heat resistance.

~~"PASS" shall be tested at five hundred degrees Fahrenheit, plus ten degrees/minus zero degrees Fahrenheit (two hundred sixty degrees Celsius, plus five degrees/zero degrees Celsius) for a minimum of thirty minutes and shall not melt, drip, or ignite.~~

~~(n)~~ (n) Heat and flame resistance.

~~(i)~~ (i) The afterflame shall not exceed 2.2 seconds.

~~(ii)~~ (ii) Nothing shall fall off the "PASS," and the "PASS" shall not fall from its mounted position.

~~(iii)~~ (iii) "PASS" shall be evaluated for proper functioning and meet the requirements as specified in paragraphs ~~(O)(6) to (O)(14)~~ of this rule and shall have the data logging functions operating properly.

~~(o)~~ (o) Intrinsic safety.

~~"PASS" shall be tested for intrinsic safety as specified in ANSI/UL 913, standard for intrinsically safe apparatus and associated apparatus for use in class I, II, and III, division I hazardous locations, and shall meet the requirements for class I, division I hazardous locations and shall meet the requirements for class I, groups C and D, and class II groups E, F, and G, division I hazardous locations.~~

~~(p)~~ (p) Product label durability.

~~Product labels shall remain attached to the "PASS" and shall be legible to the unaided eye.~~

~~(q)~~ (q) Alarm signal muffle test.

~~PASS shall be tested for resistance to sound pressure level deadening or muffling and shall have the sound pressure level not be less than ninety-five dBA.~~

(P) Respiratory protection.

- (1) All fire fighters exposed to hazardous atmospheres from fires and other emergencies, or where the potential for such exposure exists, shall be provided with self-contained breathing apparatus ("SCBA") approved by the national institute for occupational safety and health (NIOSH) and the ~~mine safety and health administration (MSHA)~~ [national fire protection association \(NFPA\)](#).
- (2) The fire department shall adopt and maintain a respiratory protection program that addresses the selection, inspection, safe use, and maintenance of respiratory protection equipment, training in its use, and the assurance of air quality testing.
- (3) All members who might be required to use respiratory protection equipment shall be medically certified by a physician, or by a state of Ohio licensed health care professional who can perform medical evaluations under the supervision of a physician, on an annual basis. Medical certification can be obtained by a medical examination, or by using the medical questionnaire as referenced in CFR

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1910.134 Appendix C.

- (4) The facepiece seal capability of each member qualified to use "SCBA" shall be verified by qualitative quantitative fit testing on an annual basis and whenever new types of "SCBA" or facepieces are issued. Each new member shall be tested before being permitted to use SCBA in a hazardous atmosphere. Only members with a properly fitting facepiece shall be permitted by the fire department to function in a hazardous atmosphere with "SCBA."
- (5) Only "SCBA" with an approved service life of thirty minutes or more shall be considered acceptable.
- (6) The following "SCBAs" shall be considered to meet the requirements of this rule:
 - (a) Open circuit "SCBA" of the positive-pressure type that operate only in the pressure demand mode.
 - (b) Open circuit "SCBA" of the positive-pressure type, equipped with an air flow control device for doffing and donning purposes only. Such air flow control device shall not permit the continued use of the "SCBA" in the demand mode after donning.
 - (c) Closed circuit "SCBA" with a rated service life of more than two hours and a minimum protection factor of five thousand, as determined by an acceptable quantitative fit test performed on each individual. Such "SCBA" are acceptable only when long-duration respiratory protection is deemed necessary by the employer. Closed circuit "SCBA" shall operate in the positive-pressure mode only.
- (7) Open circuit "SCBA" approved by NIOSH/~~MSHA~~ for use in the demand mode or for use in both the demand mode and the pressure demand mode are prohibited.
- (8) Breathing air ~~supplied for a "SCBA" shall be of at least grade D quality as specified in "Compressed Gas Association Commodity Specification for Air, Pamphlet G-7.1" and shall have a dew point level of minus sixty five degrees Fahrenheit (minus fifty four degrees Celsius) or dryer (twenty four v/v or less) and a maximum particulate level of 5 mg/m³ air~~ used to fill SCBA cylinders shall meet the requirements specified in NFPA 1989, "Standard on Breathing Air Quality for Emergency Services Respiratory Protection".
- (9) Breathing air quality shall be tested quarterly by an accredited testing laboratory and shall meet the requirements of paragraph (P)(8) of this rule. This shall also apply to vendor-supplied and other fire department-supplied compressed breathing air. The department receiving supplied air shall require the supplier to provide documentation that the air received has been tested quarterly and that it meets the requirements of paragraph (P)(8) of this rule. Written records shall be maintained.
- (10) The employer shall not permit any known interference with the facepiece-to-face seal or with the operation of the exhalation valve on the full facepiece of an "SCBA" on employees who are exposed to hazardous atmospheres from fires and other emergencies or where the potential for such exposure exists.
- (11) Respiratory equipment shall be inspected, maintained, and repaired in accordance with the manufacturer's recommendations. Maintenance shall include at least:
 - (a) A written record of such inspection and maintenance for each piece of equipment.

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(b) Regulator calibration performed by a manufacturer-authorized person at no more than twelve-month intervals.

(12) ~~Approved self-contained compressed air breathing apparatus may be used with approved cylinders from other approved self-contained compressed air breathing apparatus, provided that such cylinders are of the same capacity and pressure rating.~~ All compressed air cylinders used with self-contained breathing apparatus shall meet department of transportation (DOT) and NIOSH criteria.

(13) SCBA cylinders shall be hydrostatically tested within the periods specified by the manufacturer and by DOT and NIOSH/~~MSHA~~.

(14) ~~The practice of buddy breathing by any means is strictly prohibited. Buddy breathing is the practice of sharing a single SCBA breathing air source between two persons.~~ The practice of buddy breathing, also known as an emergency escape breathing support system (EEBSS), may be utilized where it is accomplished through the use of an NFPA and NIOSH-approved connection that does not compromise the system integrity of either of the users giving or receiving air.

(15) The use of a universal air connection ~~will be permitted to replenish the breathing air cylinder of an SCBA user from an independent rescue breathing air supply source. An independent rescue breathing air supply source does not include the breathing air from an SCBA being worn by another firefighter.~~ for rapid refilling of SCBA while being worn by the user shall only be done under the following conditions:

(a) Manufacturer permitted, NIOSH-approved fill options are used.

(b) An imminent life threatening situation occurs that requires immediate action to prevent the loss of life or serious injury.

(c) Prior to a life threatening situation occurring that could require immediate action to prevent the loss of life or serious injury.

(d) The risk assesment process has identified procedures for limiting personnel exposure during the refill process and has provided for adequate equipment inspection and member safety.

(Q) Hand protection.

(1) Hand protection shall consist of properly sized protective gloves or a glove system which allows dexterity of hand movement and a sense of feel for objects.

(2) ~~Gloves of the gauntlet type shall be allowed if the protective coat provided has a protective resilient wristlet with a thumb opening.~~ Gloves of the wristlet type or other interface component shall be required if the protective coat does not provide a protective resilient wristlet with a thumb opening.

Gloves of the gauntlet type shall be allowed if the protective coat provided has a protective resilient wristlet with a thumb opening.

(3) Gloves shall be maintained and repaired in accordance with the manufacturer's requirements. If gloves cannot be repaired properly without decreasing the protective qualities required by this rule, they shall be replaced with gloves that meet the requirements of paragraph (Q) of this rule.

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- (4) A label which includes the following information shall be permanently attached to each glove:
- (a) "This structural fire fighting glove meets the glove requirements of NFPA 1971, Standard on Protective Ensemble for Structural Fire Fighting, ~~2007~~ 2013 Edition. Do Not Remove This Label."
 - (b) Manufacturer's name, identification, or designation.
 - (c) Manufacturer's address.
 - (d) Manufacturer's element, identification , lot or serial number.
 - (e) Month and year of manufacture (not coded).
 - (f) Size or size range.
 - (g) Principle material(s) of construction.
 - (h) Cleaning precautions.
 - (i) Certification organization's label, symbol, or identifying mark.
- (5) Design requirements.
- (a) Gloves for structural fire fighters shall be made of durable outer material designed to withstand the effects of flame, heat, vapor, liquids, sharp objects, and other hazards that are encountered during structural fire fighting.
 - (b) Gloves shall be designed to give minimum interference to physical movement, the use of fire fighting tools, and "SCBA."
 - (c) Wrist protection shall be designed to prevent burns or injury by providing complete covering under all conditions to the wrist area.
 - (d) Wrist protection may be provided by either of the following methods:
 - (i) Gloves, including wristlets, that extend no less than two inches above the wrist crease as shown in figure 4 to this rule; or
 - (ii) Wristlets attached to the sleeves of the protective coat that extend to fit around the palm of the hand (see figure 4).

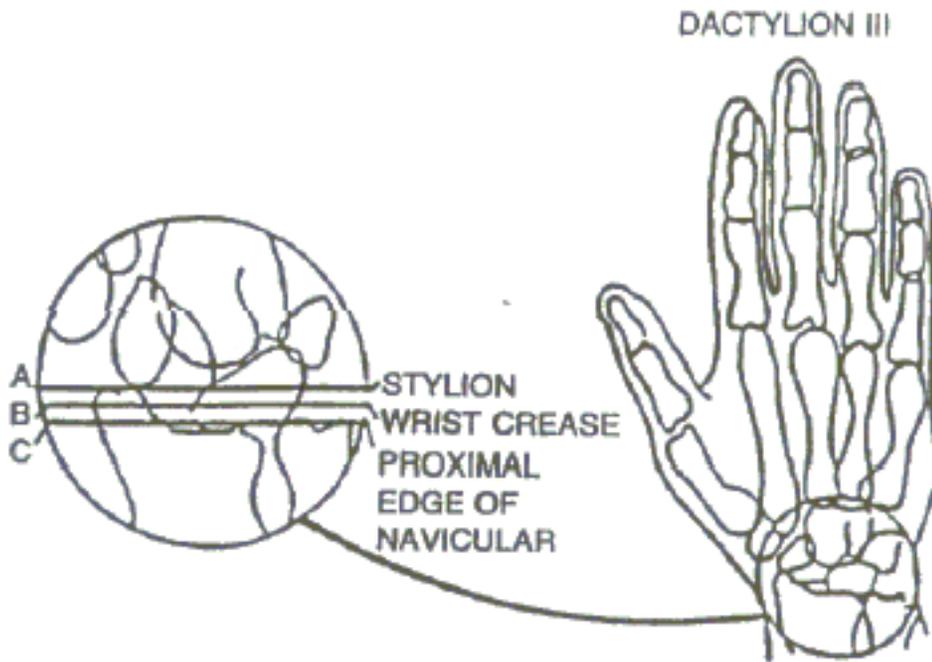


FIGURE 4
Anatomical Landmarks
at Base of Hand

(e) Gloves shall be close-fitting above the wrist to restrict entry of liquids, embers, and other foreign particles.

(f) The glove material in contact with the skin shall be nonirritating.

(6) Performance requirements.

Gloves shall be capable of withstanding all tests specified in NFPA 1971, "Protective Ensemble For Structural Fire Fighting, ~~2007~~ 2013 Edition," ~~with the following results:~~

Label durability and legibility.

Labels shall remain in place, and shall be legible.

~~(a) (a) Thermal protective performance.~~

~~(i) (i) The glove body shall have an average tpp rating of at least thirty five.~~

~~(ii) (ii) Glove gauntlet or glove wristlet composite shall have an average tpp of at least twenty.~~

~~(b) (b) Heat and thermal shrinkage resistance.~~

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~~(i) (i) Gloves shall not separate, melt, or ignite. Gloves shall not shrink more than eight per cent in length and width, and shall be donnable and flexible. Wristlet material shall not shrink five percent in any direction.~~

~~(ii) (ii) The innermost separable layer of the glove body composite that is designed to come into contact with the wearer's skin shall not melt, separate, or ignite.~~

~~(iii) (iii) Wristlet material shall not shrink more than ten per cent in any direction.~~

~~(e) (c) Flame resistance.~~

~~Gloves and wristlet material shall not melt or drip. Gloves and wristlet material shall not exceed the following average values:~~

~~(i) (i) Afterflame: two seconds.~~

~~(ii) (ii) Char length: four inches.~~

~~(iii) (iii) Original weight: five per cent.~~

~~(d) (d) Conductive heat resistance.~~

~~The glove shall have a second degree burn time of not less than ten seconds and shall have a pain time of not less than six seconds.~~

~~(e) (e) Thread melting test.~~

~~All sewing thread utilized in the construction of gloves and wristlet material shall be made of an inherently flame resistant fiber and shall not melt below five hundred degrees Fahrenheit (two hundred sixty degrees Celsius).~~

~~(f) (f) Liquid penetration.~~

~~Gloves shall allow no penetration of test liquids for at least one hour.~~

~~(g) (g) Viral penetration.~~

~~Gloves shall be tested for liquid or blood born pathogens and shall allow no penetration of the PHI-X-174 "Bacteriophage" for at least one hour.~~

~~(h) (h) Cut resistance.~~

~~Gloves shall have a cut distance resistance of more than 0.8 inch (twenty mm).~~

~~(i) (i) Puncture resistance.~~

~~Gloves shall not be punctured under an average applied force of 8.8 foot pounds (four N).~~

~~(j) (j) Hand function.~~

~~Gloves shall have an average percent of barehand control not exceeding three hundred per cent.~~

~~(k) (k) Grip test.~~

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~~Gloves shall have a weight pulling capacity not less than ninety per cent of the bare handed control valve.~~

~~(l) (l) Burst strength.~~

~~Knit glove wristlet materials shall have a burst strength of not less than fifty foot pounds (two hundred twenty five N).~~

~~(m) (m) Seam breaking strength.~~

~~Knit glove wristlet seams shall have a burst strength of not less than forty one foot pounds (one hundred eighty two N).~~

~~(n) (n) Liner retention.~~

~~Gloves shall have no detachment of the inner liner or moisture barrier.~~

~~(o) (o) Donning.~~

~~Gloves shall have:~~

~~(i) (i) Dry hand donning time not exceed ten seconds;~~

~~(ii) (ii) Wet hand donning time not to exceed fifteen seconds;~~

~~(iii) (iii) No detachment of the inner liner and moisture barrier;~~

~~(iv) (iv) Shall allow full insertion of all digits.~~

~~(p) (p) Overall liquid integrity.~~

~~Gloves shall show no leakage of water.~~

~~(q) (q) Corrosion test.~~

~~Any glove metal hardware that is inherently resistant to corrosion including, but not limited to, stainless steel, brass, copper, aluminum, and zinc shall show no more than light surface type corrosion or oxidation and shall remain functional. Ferrous metals shall show no corrosion of the base metal and shall remain functional.~~

~~(r) (r) Label durability and legibility.~~

~~Labels shall remain in place, and shall be legible.~~

(R) Fall protection.

(1) Life safety rope.

- (a) ~~Light~~Technical-use life safety rope shall have a diameter of three-eighths inch (9.5 mm) or greater and less than one-half inch(12.5 mm). It shall have a minimum breaking strength of not less than four thousand four hundred ninety-six lbf (twenty kn). The minimum elongation shall be less than one per cent at ten per cent of breaking strength, and the maximum elongation shall not be more than ten

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per cent at ten per cent of breaking strength.

- (b) General-use life safety rope shall have a diameter ~~one-half~~ seven-sixteenths inch (~~thirteen~~ eleven mm) or greater and not more than ~~seven-sixteenths~~ five-eighths inch (~~eleven~~ sixteen mm). It shall have a minimum breaking strength of not less than eight thousand nine hundred ninety-two lbf (forty kn). The minimum elongation shall not be less than one per cent at ten per cent of breaking strength, and the maximum elongation shall not be more than ten per cent at ten per cent of breaking strength.
- (c) Life safety rope shall be constructed of virgin fiber and shall be of block creel construction. Load-bearing elements shall be constructed of continuous filament fiber.
- (d) Fiber used for life safety rope shall have a melting point of no less than four hundred degrees Fahrenheit.
- (e) Each life safety rope shall have a product label. The label shall be permitted to be a hang tag affixed to each individual life safety rope or shall be permitted to be printed on a sheet that is inserted and sealed in the packaging that contains the life safety rope. At least the following information shall be legibly printed on the label:
 - (i) "This rope meets the life safety rope requirements of NFPA 1983, Standard on Life Safety Rope and Equipment for Emergency Services, ~~2006~~ 2012 Edition."
 - (a) Class: manufacturer to insert specific information regarding use rope.
 - (b) Minimum breaking strength: manufacturer to insert specific information regarding pound/(Kn).
 - (c) Diameter: manufacturer to insert specific information regarding inch/(mm).
 - (d) Type of fiber(s).
 - (ii) Manufacturer's name, identification, or designation.
 - (iii) Manufacturer's address.
 - (iv) Country of manufacturer.
 - (v) Manufacturer's product identification.
 - (vi) Manufacturer's model, style, serial, or lot number.
 - (vii) Certification organization's label, symbol, or identifying mark.
 - (viii) Elongation at three hundred lbf (1.35 kN), at six hundred lbf (2.7 kN), and at one thousand lbf (4.4 kN).
- (f) In addition to the product label specified in paragraph (R)(5)(e) of this rule, each life safety rope shall be marked for its full length by insertion of a continuous identification tape. At least the following statement and information shall be legibly printed on the tape not less than once every thirty-nine inches (one meter):

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- (i) "Meets requirements for life safety rope of NFPA 1983."
 - (ii) Certification organization's label, symbol, or identifying mark.
 - (iii) Name of manufacturer.
 - (iv) Year and quarter of manufacturer (not coded).
- (g) The manufacturer of life safety rope shall furnish the purchaser with at least use criteria, inspection procedures, maintenance procedures, and retirement criteria.
- (h) Life safety rope shall be inspected after being used for rescue at fires or other emergency incidents or for training. It may be reused if inspected before and after each such use in accordance with the manufacturer's instructions and provided that:
- (i) The rope has not been visually damaged by exposure to heat, direct flame impingement, chemical exposure, or abrasion; and
 - (ii) The rope has not been subjected to any impact load; and
 - (iii) The rope has not been exposed to chemical liquids, solids, gases, mists, or vapors of any material known to deteriorate rope; and
 - (iv) The rope passes inspection when inspected by a qualified person following the manufacturer's inspection procedures.
- (2) Life safety harness.
- (a) Life safety harnesses shall be designed and designated in accordance with one of the following classes:
- ~~(i) (i) Harness that fastens around waist and around thighs or under buttocks and designed to be used for emergency escape with a design load of three hundred lbf shall be designated as class I life safety harness.~~
 - ~~(ii) (i) Harness that fastens around the waist and around thighs or under buttocks and designed for rescue with a design load of six hundred lbf shall be designated as class II life safety harness.~~
 - ~~(iii) (ii) Harness that fastens around waist, around thighs or under buttocks, and over shoulders, designed for rescue with a design load of six hundred lbf shall be designated as class III life safety harness. Class III life safety harness shall be permitted to consist of one or more parts.~~
- (b) Life safety harness shall be permitted to be adjustable within a range of sizes, provided in a range of sizes, or custom-fitted for individuals.
- (c) Load-bearing textile materials used to construct life safety harness shall be constructed of virgin, synthetic, continuous filament fiber.
- (d) All webbing ends shall be secured by heat-sealing or by another method that prevents unraveling.
- (e) All thread shall be compatible with webbing used, shall meet the strength and heat resistance requirements specified in paragraph (R)(2)(k) of this rule, and shall allow for ease of inspection. All

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stitching breaks or ends shall be backtacked no less than one one-half inch (thirteen mm).

- (f) Life safety harness shall have at least one load bearing attachment point located at the front waist or sternal location of the harness.
- (g) Castings shall meet class I, grade A requirements of SAE-STD 2175A, "castings, classification and inspection of."
- (h) Where a buckle is an integral part of a life safety harness, the buckle manufacturer shall provide written evidence that all load-bearing buckles have been proof-loaded to at least two thousand four hundred seventy-three lbf (eleven kN).
- (i) Each life safety harness shall have permanently affixed a product label embossed, printed, sewn, stapled, riveted, or otherwise permanently attached with a metal label plate. At least the following compliance statement shall be on the product label:
 - (i) "This life safety harness meets the harness requirements of NFPA 1983, "Life Safety Rope and Equipment for Emergency Services, ~~2006~~ 2012 edition"; class: (manufacturer to insert specific information regarding class)."

The class designation shall be as determined by the certification organization.

- (ii) Name, identification, or designation of manufacturer.
 - (iii) Manufacturer's address.
 - (iv) Country of manufacture.
 - (v) Manufacturer's product identification.
 - (vi) Manufacturer's lot, model, style, or serial number.
 - (vii) Certification organization's label, symbol, or identifying mark.
- (j) In addition, for harnesses, at least the following information shall be provided on the label:
 - (i) For class ~~I and~~ II harnesses: "Fits waist size (manufacturer to insert specific size(s))."
 - (ii) For one-piece class III harnesses: "Fits waist size (manufacturer to insert specific size(s)); fits height (manufacturer to insert specific height(s))."
 - (iii) For multiple-piece class III harnesses: "Fits waist size (manufacturer to insert specific size(s)); fits height or chest size (manufacturer to insert specific height(s) or chest size(s)); fits height (manufacturer to insert specific height(s). This is one part of a multiple-piece harness and must be used in conjunction with component part number (manufacturer to insert specific component part number[s]) in order to fully meet the criteria of class III harness."
 - (k) Life safety harness shall be capable of withstanding all tests specified in NFPA 1983, " Life Safety Rope and Equipment for Emergency Services, ~~2006 edition~~ 2012 Edition," with the following results:

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- (i) Static test - upright (for class ~~I~~, II, and III).
- (ii) Static test - horizontal (for class II and III).
- (iii) Static test - head down (for class III).

Class ~~I~~, II, and III life safety harness shall not release from the test torso, the harness buckles and adjusting devices shall not slip more than one inch (twenty-five mm), and the harness shall show no visible signs of damage that would affect its function.

- (iv) For class III life safety harness that includes shoulder attachment points, such shoulder attachment points shall be tested only during the static test - upright. The shoulder attachment points shall not release from the test torso, and shall show no signs of damage that would affect their function.
 - (v) Fiber and thread used in the construction of life safety harness shall have a melting point of no less than four hundred degrees Fahrenheit.
 - (vi) Where class ~~I~~, II, and III life safety harness include side ~~d-rings~~ "D-rings" and attachment points designated by the manufacturer as positioning attachments only, these attachments shall show no visible signs of damage that affect its function.
 - (vii) All metal hardware and parts shall show no more than light surface-type corrosion or oxidation, and remain functional.
- (l) The manufacturer of life safety harness shall furnish the purchaser with at least use criteria, inspection procedures, maintenance procedures, and retirement criteria for the product.

(3) Belt system.

- (a) Belts shall be designed and designated in accordance with one of the following types:
 - (i) A belt that fastens only around the waist and is intended for use as a positioning device for a person on a ladder shall be designated as a ladder belt.
 - (ii) A belt that fastens only around the waist and is intended for use as a positioning device for a person on a ladder and also intended for use only by the wearer as an emergency self-rescue device shall be designated as a ladder/escape belt.
- (b) All belts shall be permitted to be adjustable within a range of sizes, provided in a range of sizes, or custom-fitted for individuals.
- (c) Load-bearing textile materials used in the construction of all belts shall be made of virgin, synthetic, continuous filament fiber.
- (d) All belts shall have webbing ends secured by heat sealing or by another method that prevents unraveling.
- (e) All thread utilized in the construction of all belts shall be compatible with the webbing used and shall allow for ease of inspection. All stitching breaks or ends shall be backtacked not less than one-half (thirteen mm).

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- (f) The ladder belt tether or device that connects the wearer to a ladder shall be permanently affixed to the ladder belt and shall not be greater than twenty-four inches (six-hundred ten mm) in length. This requirement applies only to ladder belts as defined in paragraph (R)(3)(a)(i) of this rule.
- (g) Each belt shall have permanently affixed a product label embossed, printed, sewn, stapled, riveted, or otherwise permanently attached with a metal plate. At least the following compliance statement shall be on the product label:
- (i) "This belt meets the belt requirement of NFPA 1983, "Life Safety Rope and Equipment for Emergency Services, ~~2006 edition~~ 2012 Edition"; type (manufacturer to insert specific type)."
The belt type designation shall be determined by the certification organization.
 - (ii) "Fits waist size (manufacturer to insert specific waist size(s))."
 - (iii) Name, identification, or designation of manufacturer.
 - (iv) Manufacturer's address.
 - (v) Country of manufacture.
 - (vi) Manufacturer's product identification.
 - (vii) Manufacturer's lot, model, style, or serial number.
 - (viii) Certification organization's label, symbol, or identifying mark.
- (h) All ladder belts and ladder/escape belts shall be capable of withstanding all tests specified in NFPA 1983, " "Life Safety Rope and Equipment for Emergency Services, ~~2006 edition, 2012 Edition .~~"- ~~with the following results:~~
- ~~(i) (i) Static test—upright; static test—horizontal.~~
~~All belts shall not release from the test torso, the belt buckles and adjusting devices shall not slip more than one inch (twenty five mm), and the belt shall show no visible signs of damage that would affect its function.~~
 - ~~(ii) (ii) Ladder belts and ladder/escape belts with side d-rings and attachment points designated by the manufacturer as positioning attachments only, shall show no visible signs of damage that would affect its function.~~
 - ~~(iii) (iii) Metal hardware and metal parts shall show no more than light surface type corrosion or oxidation. Ferrous metals shall show no base metal corrosion. All hardware shall remain functional.~~
 - ~~(iv) (iv) All fiber and thread used in the construction of all belts shall not have a melting point of less than four hundred degrees Fahrenheit (two hundred four degrees Celsius).~~
- (i) The manufacturer of belts shall furnish the purchaser with at least use criteria, inspection procedures, maintenance procedures, and retirement criteria for the product.

(4) Auxiliary equipment.

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- (a) Auxiliary equipment shall be designated by the manufacturer for its intended use and design load as either escape, light-use, or general-use.
 - (i) Escape shall apply to equipment intended for the sole use of the rescuer for personal escape or self-rescue.
 - (ii) ~~Light~~Technical-use shall apply to equipment intended for a design load of three hundred lbf (1.33 kN).
 - (iii) General-use shall apply to equipment intended for design loads of six hundred lbf (2.67 kN).
- (b) Load-bearing hardware shall be constructed of forged, machined, stamped, extruded, or cast metal. Castings shall meet Class I, Grade A requirements of SAE-STD 2175A, "Castings, Classification and Inspection of."
- (c) Rope grab devices shall be designated for either ~~light~~ technical use or for general use.
- (d) All load-bearing buckles shall have been proof loaded to at least two thousand four hundred seventy-three lbf (eleven kn).
- (e) Snap-link and carabiner gates shall be self-closing and of a locking design.
- (f) Webbing used to construct auxiliary equipment software shall be constructed of virgin, synthetic, continuous filament fiber.
- (g) All webbing ends shall be secured by heat sealing or by another method that prevents unraveling.
- (h) All thread used to construct auxiliary equipment software shall be compatible with webbing used and shall allow ease of inspection. All stitching breaks or ends shall be backtacked not less than one-half inch (thirteen mm).
- (i) Each item of auxiliary equipment shall be permitted to have a hang tag affixed to each individual auxiliary equipment item or shall be permitted to be printed on a sheet that is inserted and sealed in the packaging that contains the item. At least the following compliance statements shall be on the product label:
 - (i) "This (insert name of equipment item here) meets the auxiliary equipment requirements of NFPA 1983, Life Safety Rope and Equipment for Emergency Services, ~~2006~~ 2012 Edition."
 - (ii) Name, identification, or designation of manufacturer.
 - (iii) Manufacturer's address.
 - (iv) Country of manufacture.
 - (v) Manufacturer's product identification.
 - (vi) Manufacturer's lot, model, style, or serial number.
 - (vii) Certification organization's label, symbol, or identifying mark.
 - (viii) Auxiliary equipment shall also be stamped, engraved, or otherwise permanently marked with a

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"G" for general-use; ~~"L"~~ "T" for ~~light~~technical-use; "E" for escape, as designated in paragraphs (R)(4)(a)(i) to (R)(4)(a)(iii) of this rule.

- (ix) Portable anchor devices shall add to the product label: "Minimum breaking strength and rating are determined at the configuration of lowest strength per manufacturer's instructions."
- (x) Rigging and anchor straps shall add to the product label: "Minimum breaking strength and rating are determined using a basket (U) configuration. In addition, this strap has a minimum breaking strength of: [enter number here] kN in a choker configuration; [enter number here] kN when pulled end to end."
- (xi) Where detachable components must be used with the auxiliary equipment in order for the auxiliary equipment to be compliant, shall add to the product label: "To be compliant with NFPA 1983, the following additional components must be used in conjunction with this (insert type of auxiliary equipment here)."
- (j) All auxiliary equipment shall be capable of withstanding all tests specified in NFPA 1983, "Life Safety Rope and Equipment for Emergency Services, ~~2006~~ 2012 Edition," ~~with the following results:~~
 - ~~(i) (i) Light use carabiners and snap links shall have a major axis minimum breaking strength (mbs), with gate closed, of at least six thousand sixty nine lbf (twenty seven kn). The major axis mbs, with gate open, and the minor axis mbs shall be of at least fifteen hundred seventy four lbf (seven kn) (see figures 5 & 6).~~
 - ~~(ii) (ii) General use carabiners and snap links shall have a major axis minimum breaking strength (mbs), with gate closed, of at least eight thousand nine hundred ninety two lbf (forty kn). The major axis mbs, with gate open, and the minor axis mbs shall be of at least two thousand four hundred seventy three lbf (eleven kn). (see figures 5 & 6).~~

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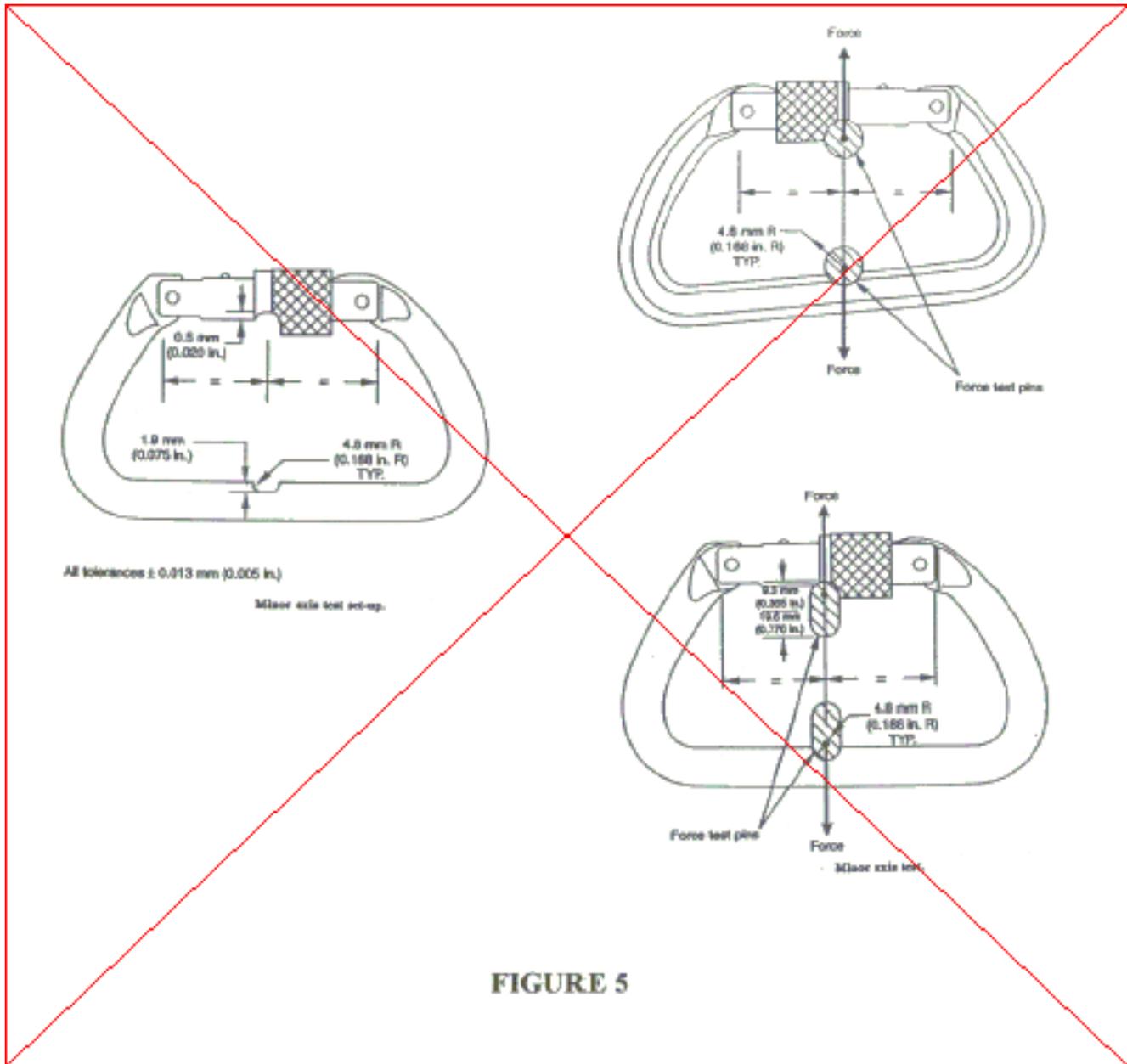


FIGURE 5

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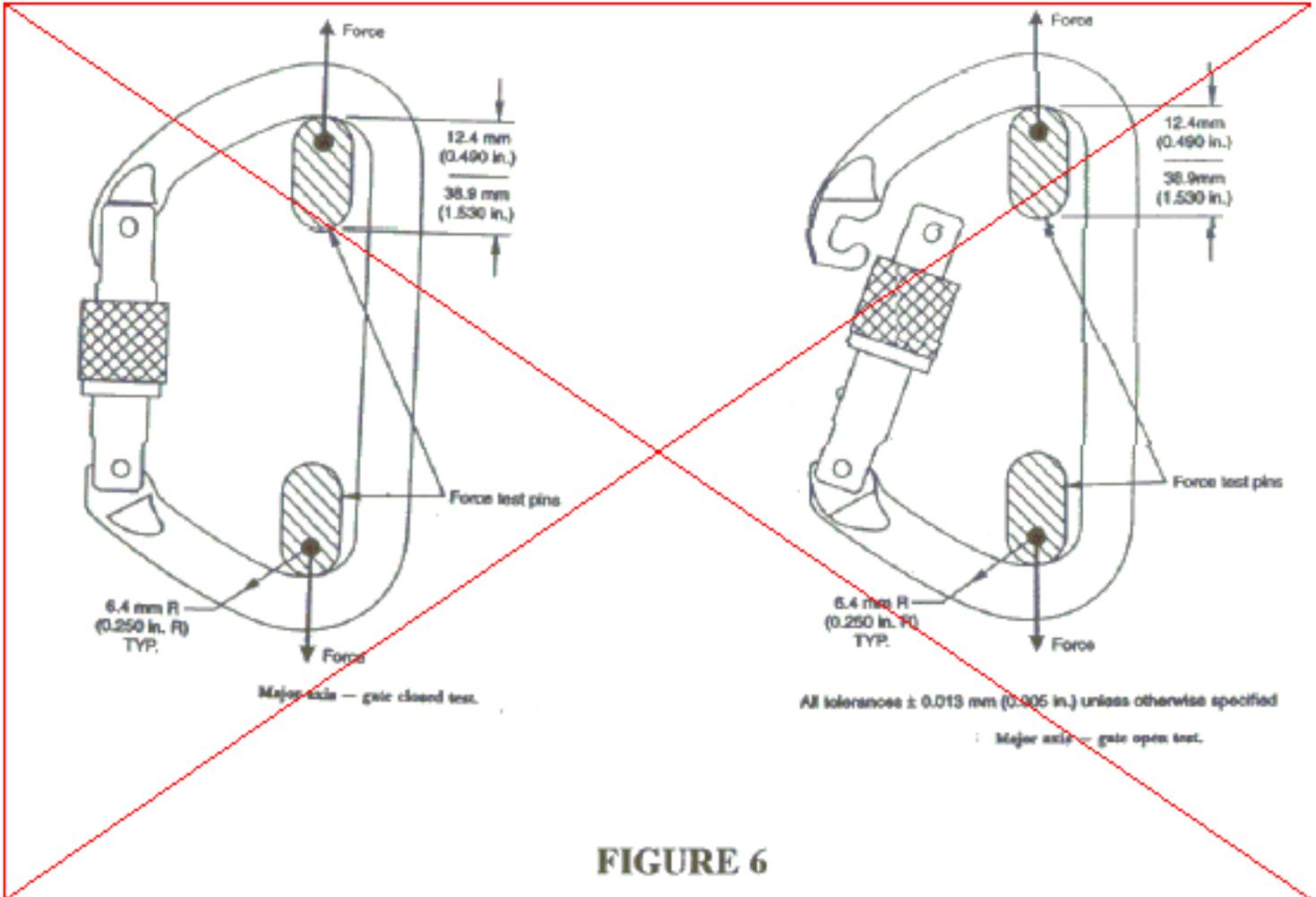


FIGURE 6

- ~~(iii) (iii) Ascending devices shall withstand a minimum test load of at least one thousand one hundred twenty four lbf (five kn) without permanent damage to the device or damage to the rope.~~
- ~~(iv) (iv) General use rope grab devices shall withstand a minimum test load of at least two thousand five hundred lbf (eleven kn) without permanent damage to the device or damage to the rope.~~
- ~~(v) (v) Escape descent control devices shall withstand a minimum test load of at least one thousand one hundred twenty four lbf (five kn) without permanent damage or visible deformation to the general shape of the device or damage to the rope; and of at least two thousand twenty three lbf (nine kn) without failure, when tested in manner of function.~~
- ~~(vi) (vi) Light use descent control devices shall withstand a minimum test load of at least one thousand one hundred twenty four lbf (five kn) without permanent damage or visible deformation to the general shape of the device or damage to the rope; and of least three thousand thirty four lbf (13.5 kN) without failure when tested in manner of function.~~
- ~~(vii) (vii) The holding force for escape descent and light use control devices that incorporates a passive braking feature, shall not slip more than one inch (twenty five mm) when a three hundred pound load is applied.~~
- ~~(viii) (viii) General use descent control devices shall withstand a minimum test load of at least one~~

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- ~~thousand one hundred twenty four lbf (five kn) without permanent damage or visible deformation to the general shape of the device or damage to the rope; and of least four thousand nine hundred forty six lbf (twenty two kn) without failure when tested in manner of function.~~
- ~~(ix) (ix) The holding force for general use descent devices,, that incorporate a passive breaking feature, shall not slip more than one inch (twenty five mm) when a six hundred pound load is applied.~~
- ~~(x) (x) Light use portable anchor devices shall withstand a minimum load of at least one thousand one hundred twenty four lbf (five kn) without permanent damage or visible deformation to the general shape device; and of at least four thousand nine hundred forty six lbf (twenty two) without failure.~~
- ~~(xi) (xi) General use portable anchor devices shall withstand a minimum load of at least two thousand nine hundred twenty three lbf (thirteen kn) without permanent damage to the device or visible deformation to the general shape of the device; and of at least eight thousand ninety three lbf (thirty six kn) without failure.~~
- ~~(xii) (xii) Light use pulleys shall have a minimum tensile strength of at least one thousand one hundred twenty four lbf (five kn) without permanent damage to the device or damage to the rope; and of least four thousand nine hundred forty six lbf (twenty two kn) without failure.~~
- ~~(xiii) (xiii) General use pulleys shall have a minimum tensile strength of at least four thousand nine hundred forty six lbf (twenty two kn) without permanent damage to the device or damage to the rope; and at least eight thousand ninety three lbf (thirty six kn) without failure.~~
- ~~(xiv) (xiv) Pulley efficiency shall be tested and the rating provided on the product label.~~
- ~~(xv) (xv) The becket on light use pulleys shall have a minimum tensile strength of at least two thousand ninety eight lbf (twelve kN) without failure. The becket on general use pulleys shall have a minimum tensile strength of at least four thousand three hundred eighty three lbf (19.5 kN) without failure.~~
- ~~(xvi) (xvi) Light use auxiliary equipment and light use manufactured systems shall have a minimum tensile strength of at least one thousand one hundred twenty four lbf (five kn) without permanent damage to the device or visible deformation to the general shape of the device or associated equipment; and at least four thousand nine hundred forty six lbf (twenty two kn) without failure.~~
- ~~(xvii) (xvii) -General use auxiliary equipment and general use manufactured systems shall have a minimum tensile strength of at least two thousand nine hundred twenty three lbf (thirteen kN) without permanent damage to the device or visible deformation to the general shape of the device or associated equipment; and at least eight thousand ninety three lbf (thirty six kN) without failure.~~
- ~~(xviii) (xviii) Light use rigging and anchor straps shall have a minimum breaking strength of seven thousand one hundred ninety four lbf (thirty two kN) without failure.~~
- ~~(xix) (xix) General use rigging and anchor straps shall have a minimum breaking strength of ten thousand one hundred twenty three lbf (forty five kN) without failure.~~

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~~(xx) (xx) Light use pick-off straps shall have a minimum breaking strength of four thousand five hundred lbf (twenty kN) without failure.~~

~~(xxi) (xxi) General use pick-off straps shall have a minimum breaking strength of six thousand seventy lbf (twenty seven kN) without failure.~~

~~(xxii) (xxii) Where the anchor strap includes an adjustment device, the adjustment device shall not slip more than two inches (fifty mm).~~

~~(xxiii) (xxiii) All auxiliary equipment metal hardware and hardware that includes metal parts shall show no more than light surface type corrosion or oxidation. Ferrous metals shall show no corrosion of the base metal. All hardware shall remain functional as specified in the manufacturer's operating instructions.~~

~~(xxiv) (xxiv) All fiber and thread utilized in the construction of all auxiliary equipment software shall not have a melting point of less than four hundred degrees Fahrenheit (two hundred four degrees Celsius).~~

(k) The manufacturer of auxiliary equipment shall furnish the purchaser with at least use criteria, inspection procedures, maintenance procedures, and retirement criteria for the product.

(5) Escape rope.

(a) Escape rope shall be constructed of virgin fiber and shall be of block creel construction. Load-bearing elements shall be constructed of continuous filament fiber.

(b) Escape rope shall have a diameter of 0.295 inch (19/64th inch) (7.5 mm) or greater and less than three-eighths inch (9.5 mm).

(c) Escape rope shall have a minimum breaking strength of not less than three thousand thirty-four lbf (13.5 kN).

(d) Elongation of all new escape rope shall be less than one per cent and not more than ten per cent at ten per cent of breaking strength.

(e) Fiber utilized for all escape rope shall not have a melting point of less than four hundred degrees Fahrenheit (two hundred four degrees Celsius).

(f) Each escape rope shall have a product label. The product label shall be permitted to be a hang tag affixed to each individual escape rope or shall be permitted to be printed on a sheet that is inserted and sealed in the packaging that contains the rope. At least the following information shall be legibly printed on the label:

(i) "This rope meets the escape rope requirements of NFPA 1983, Life Safety Rope and Equipment for Emergency Services, ~~2006 edition~~ 2012 Edition."

(a) Minimum breaking strength: (manufacturer will insert specific information regarding lbf/(kn).

(b) Diameter: (manufacturer will insert specific information regarding inch/(mm).

(c) Type of fiber(s).

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- (ii) Manufacturer's name, identification, or designation.
- (iii) Manufacturer's address.
- (iv) Country of manufacture.
- (v) Manufacturer's product identification.
- (vi) Manufacturer's product identification.
- (vii) Certification organization's label, symbol, or identifying mark.
- (viii) Elongation at three hundred lb (1.35 kN), at six hundred lb (2.7 kN), and at one thousand lb (4.4 kN).

(g) In addition to the product label specified in paragraph (R)(5)(f) of this rule, each escape rope shall be marked for its full length by insertion of a continuous identification tape. At least the following statement and information shall be legibly printed on the tape not less than once every thirty-nine inches (one meter):

- (i) "Meets requirements for escape rope of NFPA 1983."
- (ii) Certification organization's label, symbol, or identifying mark.
- (iii) Name of manufacturer.
- (iv) Year and quarter of manufacturer (not coded).

(h) The manufacturer of escape rope shall furnish the purchaser with at least use criteria, inspection procedures, maintenance procedures, and retirement criteria.

(6) Throwline.

- (a) Throwline shall be constructed of virgin fiber and shall be of block creel construction. Load-bearing elements shall be constructed of continuous filament fiber.
- (b) Throwline shall have a diameter of 19/64th inch (seven mm) or greater, but less than 3/8th inch (9.5 mm).
- (c) The minimum breaking strength for new throwline shall not be less than two thousand nine hundred twenty-three lbf (thirteen kn).
- (d) New throwline shall be tested for the ability to float and shall float.
- (e) Each throwline shall have a product label. The throwline product label shall be permitted to be a hang tag affixed to each individual throwline or shall be permitted to be printed on a sheet that is inserted and sealed in the packaging that contains the throwline. At least the following information shall be legibly printed on the label:
 - (i) "This rope meets the throwline requirements of NFPA 1983, Life Safety Rope and Equipment for Emergency Services, ~~2006~~ 2012 Edition."
 - (a) Minimum breaking strength: (manufacturer to insert specific information regarding lbf/(kn)).

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- (b) Diameter: (manufacturer to insert specific information regarding inch/(mm).
 - (c) Type of fiber(s),
 - (ii) Manufacturer's name, identification, or designation.
 - (iii) Manufacturer's address.
 - (iv) Country of manufacture.
 - (v) Manufacturer's product identification.
 - (vi) Manufacturer's model, style, serial, or lot number.
 - (vii) Certification organization's label, symbol, or identifying mark.
- (f) In addition to the product label specified in paragraph (R)(6)(e) of this rule, each throwline shall be marked for its full length by insertion of a continuous identification tape. At least the following statement and information shall be legibly printed on the tape not less than once every thirty-nine inches (one meter):
- (i) "Meets requirements for throwline of NFPA 1983."
 - (ii) Certification organization's label, symbol, or identifying mark;
 - (iii) Name of manufacturer;
 - (iv) Year and quarter of manufacture.

4123:1-21-03 Personal protective clothing and equipment for wildland fire fighting.

- (A) The employer shall provide and require the use of all personal protective clothing and equipment specified in this rule whenever employees are required to work in a hazardous environment that may be encountered during wildland fire-fighting activities, prescribed fire activities, or under similar conditions during training activities.
- (B) The employer shall assure that protective clothing protects the head, body, and extremities and consists of at least the following components: foot protection, hand protection, body protection, and head and eye protection.
- (C) Personal protective clothing and equipment shall be properly sized for the wearer.
- (D) Personal protective clothing and equipment that is damaged or otherwise defective to the point of voiding its intended protection shall be removed from service.
- (E) Employers shall develop and require use of a written plan covering the safe use, care, maintenance, inspection, limitations, and replacement of the clothing and equipment required by this rule, and all affected employees shall be trained in accordance with such plan.
- (F) Where employees choose to provide their own protective clothing and equipment, such clothing and equipment shall give equal or greater protection than that provided by the employer.
- (G) It shall be the responsibility of the employee to properly use the equipment provided by the employer as required in this rule.
- (H) Body protection.
 - (1) Body protection shall consist of a protective shirt or coat and trousers, or equivalent protection.
 - (2) Protective clothing shall be melt-resistant, durable, lightweight, nonirritating to the skin, and cleanable.
 - (3) The protective shirt, jacket, or one-piece garment shall have long sleeves and shall not have turned-up cuffs. Sleeve cuffs shall have a closure system that can be adjusted to provide a snug and secure fit around the wrist while wearing a glove.
 - (4) All collars on jackets, shirts, and one-piece garments shall remain upright after extension into a vertical position.

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- (5) Any pass-through openings in garments shall have a means of fastening them in a closed position.
- (6) All pockets that open to the exterior of garments, other than front waist pockets, shall have a cover or closure system.
- (7) All garments that encompass the neck area shall have a closure system at the neckline.
- (8) All closure systems shall not come into contact with the body. Hardware of any garment shall not come into direct contact with the wearer's body.
- (9) Protective clothing for wildland fire fighting shall be repaired in accordance with manufacturer's requirements. If protective clothing cannot be repaired without decreasing the protective qualities, it shall be replaced.
- (10) Protective clothing shall be designed to give minimum interference to physical movement and to the use of fire-fighting tools.
- (11) Where wildland fire fighting protective clothing is required, a fire shelter shall be included.
- (12) Performance requirements.

Protective garments shall be capable of withstanding all tests specified in NFPA 1977, "Protective Clothing and Equipment for Wildland Fire Fighting, ~~2005~~ 2011 Edition," ~~with the following minimum results:~~

~~(a) Flame resistance.~~

~~(i) Clothing directly exposed to fire environment and subject to flame impingement shall meet the following minimum flame resistance requirements.~~

~~(a) 2.0 seconds afterflame;~~

~~(b) 4.0 inches average char length;~~

~~(c) Shall not melt or drip.~~

~~(ii) Small clothing specimens such as labels, hanger loops, emblems, and patches that are not large enough to meet the specimen test size shall meet the following minimum flame resistant requirements:~~

~~(a) Shall not be totally consumed;~~

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~~(b) 2.0 seconds afterflame;~~

~~(c) Shall not melt or drip.~~

~~(b) Radiant protective performance.~~

~~Clothing shall have an average radiant protective performance (rpp) value of not less than seven.~~

~~(c) Heat and thermal shrinkage.~~

~~Clothing shall not shrink more than ten per cent in any direction and shall not melt, drip separate, or ignite. In addition, garment textile fabrics shall not char.~~

~~(d) Total heat loss.~~

~~Garment composites shall have a total heat loss of not less than 450 W/m².~~

~~(e) Thread heat resistance.~~

~~All sewing thread used in the construction of garments shall not ignite, melt, or char.~~

~~(f) Tear resistance test.~~

~~Garment composites shall have a tear strength of not less than five lbf (twenty two N).~~

~~(g) Cleaning shrinkage resistance test.~~

~~Clothing shall not shrink more than five per cent in any direction.~~

~~(h) Seam breaking strength.~~

~~(i) Woven garment seam assemblies, containing at least one woven material, shall demonstrate a sewn seam strength equal to or greater than seventy lbf (three hundred fifteen N) for major seams and fifty lbf (two hundred twenty five N) for minor seams.~~

~~(ii) All knit garment seam assemblies shall demonstrate a sewn seam strength equal to or greater than forty lbf (one hundred eighty N).~~

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~~(iii) Where fabric strength is less than the required seam strength, providing that the fabric fails without failure of the seam below the applicable forces, the seam breaking strength shall be considered acceptable.~~

~~(i) Garment product label test. Garment product labels shall be tested for legibility and shall not be torn, shall remain in place, and shall be legible to the unaided eye.~~

~~(j) Retroreflectivity and fluorescence test.~~

~~Where trim is used on garments, trim shall be tested for retroreflectivity and fluorescence and shall have a coefficient of retroreflection of not less than one hundred cd/fe/ft/ sq.~~

~~(k) The thermal and moisture barriers required for structural fire fighting in paragraph (J) of rule 4123:1-21-02 of the Administrative Code are not required for wildland fire fighting.~~

The thermal and moisture barriers required for structural fire fighting in paragraph (J) of rule 4123:1-21-02 of the Administrative Code are not required for wildland fire fighting.

(13) Each garment shall have a product label(s) permanently and conspicuously attached. At least the following information shall be on the product label:

(a) "This wildland fire-fighting protective garment meets the garment requirements of NFPA 1977, Standard on Protective Clothing and Equipment for Wildland Fire Fighting, ~~2005~~ 2011 Edition. Do not remove this label."

(b) Manufacturer's name, identification, or designation;

(c) Manufacturer's address;

(d) Country of manufacture;

(e) Manufacturer's garment identification number, lot number, or serial number;

(f) Month and year of manufacture (not coded);

(g) Model or style name, number, or design;

(h) Size;

(i) Garment materials and percent content;

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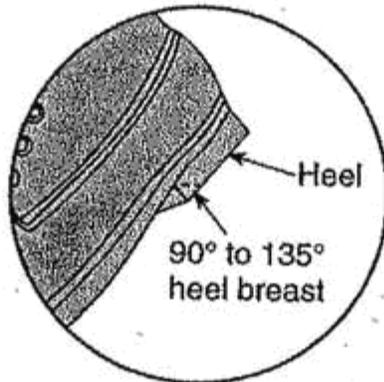
- (j) Certification organization's label, symbol, ;or identifying mark;
- (k) Cleaning precautions.

(14) The garment manufacturer shall provide a user manual that describes the care, use, inspection, maintenance, limitations, and replacement of protective clothing.

(I) Foot protection.

- (1) Foot protection shall be achieved by protective workstyle boots worn in combination with protective trousers that meet the requirements of paragraph (H) of this rule.
- (2) Footwear shall consist of a sole with heel, upper, insole, and shank. The quarter section of the boot shall be designed to provide an adjustable, snug fit for support around the ankle and lower leg.
- (3) Heel breast shall not be less than one-half inch (thirteen mm). Heel breasting angle shall not be less than ninety degrees nor more than one hundred thirty-five degrees relative to the sole (see figure 1).

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- (4) Protective footwear shall extend at least eight inches above the bottom of the heel and shall be equipped with skid-resistant outer soles.
- (5) All thread used to manufacture footwear shall be made of inherently flame-resistant fiber.
- (6) Protective footwear meeting the requirements of paragraph (K) of rule 4123:1-21-02 of the Administrative Code shall be considered to be in compliance with this rule.
- (7) Performance requirements.

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Footwear shall be capable of withstanding all tests specified in NFPA 1977, "Protective Clothing and Equipment for Wildland Fire Fighting, ~~2005~~ 2011 Edition," ~~with the following minimum results:~~

~~(a) Flame resistance.~~

~~Footwear, excluding laces, shall not have an afterflame greater than two seconds, and shall not ignite, melt, or char.~~

~~(b) Heat and thermal shrinkage resistance.~~

~~Footwear, excluding laces, shall not melt, shall have no delamination of any part of the footwear, and shall have all accessories remain functional.~~

~~(c) Cut resistance.~~

~~Footwear shall have a distance of blade travel greater than one inch (twenty five mm).~~

~~(d) Puncture resistance.~~

~~Footwear shall have a puncture force of not less than thirteen lbf (fifty nine N).~~

~~(e) Conductive heat resistance.~~

~~The footwear inside sole surface temperature shall not exceed one hundred eleven degrees Fahrenheit (forty four degrees Celsius).~~

~~(f) Thread heat resistance.~~

~~All sewing thread used in the construction of footwear shall not melt, drip, or ignite.~~

~~(g) Corrosion resistance.~~

~~Metals inherently resistant to corrosion shall show no more than light surface type corrosion or oxidation. Ferrous metals shall show no corrosion of the base hardware. Hardware shall remain functional.~~

~~(h) Abrasion resistance.~~

~~Footwear sole and heel composites, excluding the sole and heel composites of caulked boots, shall have an abrasion resistance rating of not less than one hundred NBS index.~~

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~~(i) Slip resistance.~~

~~Footwear sole composites shall have a minimum static coefficient of friction value of 0.5.~~

~~(j) Eyelet and stud post attachment test.~~

~~Eyelets and stud hooks shall have a minimum detachment strength of sixty-six lbf (two hundred ninety four N).~~

~~(k) Label durability and legibility test.~~

~~Footwear labels shall not be torn, shall remain in place, and shall be legible to the unaided eye.~~

(8) Labeling.

Each footwear pair shall have a product label(s) permanently and conspicuously attached to each boot half pair. At least the following information shall be on the product label:

- (a) "This wildland fire-fighting protective footwear meets the footwear requirements of NFPA 1977, Standard on Protective Clothing and Equipment for Wildland Fire Fighting, ~~2005~~ 2011 Edition. Do not remove this label."
- (b) Manufacturer's name, identification, or designation;
- (c) Manufacturer's address;
- (d) Country of manufacture;
- (e) Manufacturer's footwear identification number, lot number, or serial number;
- (f) Month and year of manufacture (not coded);
- (g) Model, style name, number, or design;
- (h) Footwear size and width;
- (i) Certification organization's label, symbol, or identifying mark;
- (j) Cleaning precautions.

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- (9) The footwear manufacturer shall provide a user information guide that describes the care, use, inspection, maintenance, limitations, and replacement criteria.

(J) Head protection.

- (1) Wildland fire fighters' helmets shall consist of a shell with brim or peak, an energy-absorbing system, suspension system with sweatband, chin strap, nape device, goggle clips, and retroreflective markings. Provisions shall be made for ventilation between the head and the helmet shell.
- (2) The helmet shall be generally dome shaped. The area under the peak or the front of the brim shall be permitted to be covered only with a non-conducting, non-flammable, anti-glare material. Clips for headlamps or goggles shall be permanently attached with at least one clip at the rear of the helmet, and one clip on each side of the helmet.
- (3) Helmets shall meet as a minimum the requirements for type 1, class G helmets as specified in ANSI Z89.1, ~~"Protective Headware for Industrial Workers."~~ "Industrial Head Protection." The complete helmet, with energy-absorbing system, suspension system with sweatband, chin strap, nape device, goggle clips, and retroreflective markings shall not weigh more ~~than~~ than twenty oz (five hundred seventy g).
- (4) Chin straps shall be provided that attach to the helmet shell. Both chin and nape straps shall not be less than one-half inch (thirteen mm) in width.
- (5) All helmets shall have retroreflective markings on the exterior of the shell. A minimum of four inches² of retroreflective markings shall be visible when the helmet is viewed from the sides, front, and rear. The retroreflective markings shall be placed above the goggle or headlamp clips so as not to be obscured by any clip, or the strap retained by the clips.
- (6) There shall be no openings penetrating the shell except those provided by the manufacturer for mounting energy-absorbing systems, retention systems, and accessories.
- (7) The addition of helmet accessories shall not interfere with the function of the helmet or its component parts and shall not degrade the helmet's performance below the requirements of this rule.
- (8) Performance requirements.

Helmets shall be capable of withstanding all tests specified in NFPA 1977, "Protective Clothing and Equipment for Wildland Fire Fighting, ~~2005~~ 2011 Edition."

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~~(a) Winter liners.~~

~~All winter liners, if used, shall be fabricated of materials that will comply with paragraph (H)(12) of this rule.~~

~~(b) Impact resistance.~~

~~Five specimen helmets shall be tested and shall have no specimen transmit an average force of more than eight hundred fifty lbf. (three thousand seven hundred eighty N). No individual specimen shall transmit a force of more than one thousand lbf (four thousand four hundred fifty N).~~

~~(c) Penetration resistance.~~

~~The penetration striker shall not make contact with the headform as indicated by the contact indicator.~~

~~(d) Helmet antiglare flammability.~~

~~Helmets, and any antiglare material provided, shall not show any visible afterflame time greater than five seconds.~~

~~(e) Heat and thermal shrinkage.~~

~~Helmets shall not have any deformation of the brim or peak exceed twenty-five per cent of its length.~~

~~(f) Suspension system retention.~~

~~The force required to separate any individual attachment point of the suspension assembly from the helmet shell and each adjusting mechanism of the suspension system assembly, shall not be less than five lbf (twenty-two N). There shall not be any failure of any adjusting mechanism to function properly.~~

~~(g) Retroreflectivity.~~

~~Helmet trim shall have a coefficient of retroreflection of not less than 100cd/lux/m² (100cd/ft²).~~

~~(h) Chin strap retention.~~

~~Helmet chin strap shall have no failure of any mechanism to function properly, shall not exhibit any breakage, and shall not stretch or slip more than one and one-half inches.~~

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~~(i) Goggle/headlamp clip attachment.~~

~~Helmet goggle or headlamp clips shall not release from the shell and shall not deflect more than one fourth inch from their original position.~~

~~(j) Thread heat resistance.~~

~~All sewing thread utilized in the construction of the helmet, excluding that used on the crown straps, shall not ignite, melt, or char.~~

~~(k) Label durability.~~

~~Helmet labels shall not be torn, shall remain in place, and shall be legible to the unaided eye.~~

(9) Helmets shall have a product label permanently and conspicuously attached. At least the following information shall be on the product label(s):

(a) "This wildland firefighting protective helmet meets the helmet requirements of NFPA 1977, Standard on Protective Clothing and Equipment for Wildland Fire Fighting, ~~2005~~ 2011 Edition. Do not remove this label."

(b) Manufacturer's name, identification, or designation;

(c) Country of manufacture;

(d) Manufacturer's helmet identification, lot, or serial number;

(e) Month and year of manufacture (not coded);

(f) Model or style name, number, or design;

(g) Helmet size or size range;

(h) Nominal weight of helmet;

(i) Certification organization's label, symbol, or identifying mark;

(j) Cleaning precautions.

(10) The wildland helmet manufacturer shall provide a user information guide that describes the care, use, inspection, maintenance, limitations, and replacement criteria.

(11) Eye protection shall be provided by goggles. Goggles may be attached to the helmet within the constraints of paragraphs (J)(6) and (J)(7) of this rule.

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(K) Hand protection.

- (1) Gloves shall be designed such that they closely conform to the wrist or are adjustable at the wrist and shall extend a minimum ~~on~~ one inch (twenty-five mm) past the wrist crease.
- (2) All thread used to manufacture gloves shall be made of inherently flame-resistant fiber.
- (3) Gloves shall be maintained and repaired in accordance with the manufacturer's requirements. If gloves cannot be repaired properly without decreasing the protective qualities required by this rule, they shall be replaced with gloves that meet the requirements of paragraph (K) of this rule.

(4) Performance requirements.

Gloves shall be capable of withstanding all tests specified in NFPA 1977, Protective Clothing and Equipment for Wildland Fire Fighting, ~~2005~~ 2011 Edition, ~~with the following minimum results:~~.

~~(a) Heat resistance test.~~

~~Gloves shall not separate, melt, ignite, or drip, and shall not shrink more than ten per cent in either direction and shall be flexible.~~

~~(b) Flame resistance test.~~

~~(i) Gloves shall not melt or drip.~~

~~(ii) Gloves shall not have any afterflame of more than two seconds.~~

~~(iii) Gloves shall not have any char length in excess of four inches.~~

~~(iv) The consumed materials shall not exceed fifty per cent of the specimen's original weight.~~

~~(c) Conductive heat resistance.~~

~~Gloves shall have a second degree burn time of not less than seven seconds, and the pain time shall not be less than four seconds.~~

~~(d) Thermal protective performance.~~

~~Gloves shall have an average tpp of not less than twenty.~~

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~~(e) Cut resistance.~~

~~Gloves shall have a distance of blade travel greater than one inch (twenty-five mm).~~

~~(f) Puncture resistance.~~

~~Gloves shall have a puncture force of not less than 8.8 lbf (forty N).~~

~~(g) Dexterity.~~

~~Gloves shall have an average per cent of bare handed control not exceeding two hundred per cent.~~

~~(h) Grip.~~

~~Gloves shall demonstrate a weight pulling capacity of not less than ninety per cent of the bare handed control valves.~~

~~(i) Thread heat resistance.~~

~~All sewing thread shall not ignite, melt, or char.~~

~~(j) Label durability.~~

~~Glove labels shall not be torn, shall remain in place, and shall be legible to the unaided eye.~~

(5) Gloves shall have a product label permanently and conspicuously attached. At least the following information shall be on the product label:

(a) "This wildland fire fighting protective glove meets the glove requirements of NFPA 1977, Standard on Protective Clothing and Equipment for Wildland Fire Fighting, ~~2005~~ 2011 Edition. Do not remove this label."

(b) Manufacturer's name, identification, or designation;

(c) Manufacturer's address;

(d) Country of manufacture;

(e) Manufacturer's glove identification, lot, or serial number;

(f) Month and year of manufacture (not coded);

(g) Model or style name, number, or design;

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- (h) Glove size or size range;
 - (i) Certification organization's label, symbol, or identifying mark;
 - (j) Cleaning precautions.
- (6) The glove manufacturer shall provide a user information guide that describes the care, use, inspections, maintenance, limitations, and replacement criteria.
- (L) Face/neck shroud.
- (1) Face/neck shrouds shall be designed to cover and provide the limited protection to the face and neck areas that do not receive primary protection from the helmet.
 - (2) The shroud shall attach to an NFPA 1977 compliant helmet.
 - (3) Shrouds shall have a closure system. The closure system shall not come into contact with the face or neck.
 - (4) Shrouds shall be measured to determine the areas of coverage (measured on an ISO size J headform). The shroud shall provide a minimum coverage on each side, measured downward from the reference plane at the coronal plane, of eight inches. In the back, measured downward from the reference plane at the rear mid-sagittal plane, of eight and three-eighths inches. In the front, measured downward from the reference plane at the front mid-sagittal plane, of eight inches. The face opening shall not be considered as a gap in coverage.
 - (5) The shroud shall be designed with a face opening. The face opening shall not exceed six and three-fourths inches when measured along the reference plane. The bottom of the face opening shall not exceed ~~one and one-half~~ two inches when measured downward from the reference plane at the front mid-sagittal plane.
 - (6) All snaps shall meet the requirements of ~~MS27980F~~ NASM 27980, "Fasteners, Snap, Style 2 ~~of Fasteners, Snap, MIL-F-10884G and MIL-DTL-10884H~~, Fastener, Snap."
 - (7) Fastener tape shall meet the requirements of ~~A-A-55126~~ A-A-55126B, "Fastener Tapes, Hook and ~~Pile~~ Loop, Synthetic."
 - (8) Zippers shall meet the requirements of ~~V-F-106F~~ A-A-55634A, "Fasteners, Slide, Interlocking."

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(9) All thread used to manufacture face/neck shrouds or shroud components shall be made of inherently flame-resistant fiber.

(10) Performance requirements.

Face/neck shrouds shall be capable of withstanding all the tests specified in “NFPA 1977, Protective Clothing and Equipment for Wildland Fire Fighting, 2005 2011 Edition, .” ~~with the following minimum results:~~

~~(a) Radiant protective performance.~~

~~Shrouds shall have an average rpp value of not less than seven.~~

~~(b) Flame resistance.~~

~~(i) Shrouds shall not have a char length of more than four inches.~~

~~(ii) Shrouds shall not have an afterflame of more than two seconds average.~~

~~(iii) Shrouds shall not melt or drip.~~

~~(c) Heat and thermal shrinkage resistance.~~

~~(i) Shrouds shall not shrink more than ten per cent in any direction.~~

~~(ii) Shrouds shall not melt, drip, separate, or ignite.~~

~~(iii) Garment textile fabric shall not char.~~

~~(iv) Hardware shall not ignite and remain functional.~~

~~(d) Tear resistance.~~

~~Shrouds shall have a tear strength of not less than five lbf (twenty three N).~~

~~(e) Cleaning/shrinkage resistance.~~

~~Shrouds shall not shrink more than five per cent in any direction.~~

~~(f) Seam breaking strength.~~

~~(i) Seam assemblies that contain at least one woven material shall demonstrate a seam strength equal to or greater than fifty lbf (two hundred twenty five N).~~

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~~(ii) Where the fabric strength is less than the required seam strength specified in paragraph (L)(10)(f)(i) of this rule, providing the fabric fails without failure of the seam below the force specified, the seam breaking strength shall be considered acceptable.~~

~~(g) Thread heat resistance.~~

~~All sewing thread shall not ignite, melt, or char.~~

~~(h) Label durability.~~

~~Labels shall not be torn, shall remain in place, and shall be legible to the unaided eye.~~

(11) Protective face/neck shrouds shall have a product label permanently and conspicuously attached. At least the following information shall be on the product label:

(a) "This wildland fire fighting protective face/neck shroud meets the shroud requirements of NFPA 1977, Standard on Protective Clothing and Equipment for Wildland Fire Fighting, ~~2005~~ 2011 Edition. Do not remove this label."

(b) Manufacturer's name;

(c) Manufacturer's address;

(d) Manufacturer's number, lot, or serial number;

(e) Month and year of manufacture (not coded);

(f) Identification of the compliant helmet or helmets with which the face/shroud was certified;

(g) Certification organization's label, symbol, or identifying mark.

(h) Model or style name, number, or design.

(12) The face/neck shroud manufacturer shall provide a user information guide that describes the care, use, inspection, maintenance, limitations, and replacement criteria.

(M) Protective goggles.

(1) Goggles shall be designed to consist of at least a frame, a lens or lenses, and a retention strap or means of attachment to an NFPA 1977 compliant helmet.

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- (2) Goggles shall meet the requirements for high impact protection of ANSI Z87.1, "Occupational and Educational Eye and Face Protection."
- (3) All materials in goggle construction that are designed to come in contact with the wearer's head or skin shall be known to be nonirritating to normal skin.
- (4) All hardware shall be free of rough spots, burrs, or sharp edges.
- (5) Where positioned on the helmet, the goggles shall not interfere with the function of the helmet or its component parts and shall not degrade the helmet's performance below the requirements of this rule.
- (6) Performance requirements.

Goggles shall be capable of withstanding all tests specified in NFPA 1977, "Protective Clothing and Equipment for Wildland Fire Fighting, ~~2005~~ 2011 Edition," ~~with the following minimum results:~~

~~(a) Heat and thermal shrinkage.~~

~~(i) Goggles shall not drip, melt or ignite;~~

~~(ii) Lens shall not separate from the frame;~~

~~(iii) Goggles shall remain above the brim of the helmet;~~

~~(iv) Retention strap shall not dislodge from the goggles and shall be capable of securing the goggles to the headform in the area surrounding the eyes;~~

~~(v) Test subject shall be able to read 20/100 on the standard eye chart with each eye;~~

~~(b) Thread heat resistance.~~

~~Thread shall not ignite, melt, or char.~~

- (7) Goggles shall have a product label configured and attached to the goggles. At least the following information shall be on the product label:
 - (a) This wildland fire fighting protective goggle meets the requirements of NFPA 1977, Standard on Protective Clothing and Equipment for Wildland Fire Fighting, ~~2005~~ 2011 Edition."
 - (b) Manufacturer's name, identification, or designation;

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- (c) Manufacturer's address;
 - (d) ~~Date of manufacture (not coded)~~ Country of manufacture;
 - (e) ~~Cleaning instructions and precautions~~ Manufacturer's number, lot, or serial number;
 - (f) Certification organization's label, symbol, or identifying mark-;
 - (g) Month and year of manufacture;
 - (h) Model or style name, number, or design.
- (8) In addition to the goggles product label, each goggles lens shall bear the following:
- (a) Manufacturer's identifying mark or symbol;
 - (b) Certification organization's label, symbol, or identifying mark;
 - (c) The statement "NFPA 1977, ~~2005 edition~~ 2011 Edition ."
- (9) The goggle manufacturer shall provide a user information guide that describes the care, use, inspection, maintenance, limitations, and replacement criteria.
- (N) Chain saw protector.
- (1) Chain saw protectors shall be designed as leg protectors.
 - (a) Chain saw protectors that are designed to protect the legs shall meet the requirements of section 4 and 5 of ASTM F 1897, "Standard Specification for Leg Protection for Chain Saw Users";
 - (b) Chain saw protectors that are designed to protect the legs and that are configured as pants or trousers shall meet the requirements of 5.2.1 of ASTM F 1897;
 - (c) Chain saw protectors that are designed to protect the legs and that are configured as chaps or leggings shall meet the requirements of ~~5.2.1~~ 5.2.2 of ASTM F 1897.
 - (2) All thread used to manufacture chain saw protectors shall be made of inherently flame resistant fiber.

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(3) All hardware, brackets, and snaps, or other fasteners shall be free of rough spots, burrs, or sharp edges.

(4) Performance requirements.

Chain saw protectors shall be capable of withstanding all tests specified in NFPA 1977, "Protective Clothing and Equipment for Wildland Fire Fighting, 2005 2011 Edition." ~~with the following minimum results:~~

~~(a) Cut resistance.~~

~~Protectors shall not be cut through.~~

~~(b) Heat and thermal resistance.~~

~~Fabrics used shall not melt, drip, separate, or ignite. All hardware used shall not melt, drip, separate, or ignite and shall remain functional.~~

~~(c) Thread heat resistance.~~

~~Sewing thread shall not ignite, melt, or char.~~

(5) Chain saw protectors shall have a product label permanently and conspicuously attached. At least the following information shall be on the product label:

(a) "This wildland fire fighting chain saw protector meets the requirements of NFPA 1977, Standard on Protective Clothing and Equipment for Wildland Fire Fighting, 2005 2011 Edition. Do not remove this label."

(b) Manufacturer's name, identification, or designation;

(c) Manufacturer's address;

(d) Country of manufacture;

(e) Manufacturer's lot number or serial number;

(f) Month and year of manufacture (not coded);

(g) Model or style name, number, or design;

(h) Size;

(i) Certifying organization's label, symbol, or identifying mark;

(j) Cleaning precautions:

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- (6) The chain saw protector manufacturer shall provide a user information guide that describes the care, use, inspection, maintenance, limitations, and replacement criteria

(O) Load carrying protective equipment.

- (1) The design of the load carrying protective equipment items shall allow the mounting of the fire shelter carrier on the outside as to be readily available to the user and able to be opened with one gloved hand;
- (2) The design of the load carrying protective equipment items shall allow the carrying of the fire fighters' personal water supply in the form of canteens, water bottles, or bladders;
- (3) All hardware, brackets, and snaps or other fasteners of any accessories shall be free of rough spots, burrs, or sharp edges;
- (4) Performance requirements:

Load carrying protective equipment shall be capable of withstanding all tests specified in NFPA 1977, "Protective Clothing and Equipment for Wildland Fire Fighting, ~~2005~~ 2011 Edition. Do not remove this label."

~~(a) Heat and thermal shrinkage.~~

~~(i) Load carrying equipment shall not melt, drip, separate, or ignite.~~

~~(ii) Hardware and closure systems shall not melt, drip, separate, ignite and shall have hardware and closure systems that release the item from the "as worn" position remain functional.~~

~~(b) Thread heat resistance.~~

~~All sewing thread shall not ignite, melt, or char.~~

~~(c) Retroreflectivity and fluorescence.~~

~~Where retroreflective and fluorescence trim is used, they shall have a total coefficient of retroreflection of not less than one hundred cd/ft²/ft square.~~

- (5) Load carrying equipment shall have a product label permanently and conspicuously attached.

(a) At least the following information shall be on the product label: "This wildland fire fighting load carrying equipment meets the requirements of

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NFPA 1977, Standard on Protective Clothing and Equipment for Wildland Fire Fighting, ~~2005 edition~~ 2011 Edition. Do not remove this label.";

- (b) Manufacturer's name, identification, or designation;
 - (c) Manufacturer's address;
 - (d) Country of manufacture;
 - (e) Manufacturer's identification number, lot number, or serial number;
 - (f) Month and year of manufacture (not coded);
 - (g) Model or style name, number, or design;
 - (h) Size;
 - (i) Certifying organization's label, symbol, or identifying mark;
 - (j) Cleaning precautions.
- (6) The load carrying equipment manufacturer shall provide a user information guide that describes the use, care, inspection, maintenance, limitations, and replacement criteria.
- (P) Fire protective shelter.
- (1) The fire shelter shall conform to USDA Forest Service Specification 5100 - 606B, "Fire Shelter."
 - (2) The fire shelter shall be enclosed in a carrying case liner. The liner shall conform to ~~USDA~~ USDA Forest Service Specification 5100 - 610, "Liner, Fire Shelter, Carrying Case."
 - (3) The fire shelter, enclosed in a carrying case liner, shall be enclosed in a carrying case. The carrying case shall conform to USDA Forest Service Specification 5100 - 609, "Case, Carrying, Fire Shelter."

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4123:1-21-04 Automotive fire apparatus.

(A) New automotive fire appartaus shall meet the requirements of the applicable NFPA Standards: NFPA 1901, Standard for Automotive Fire Apparatus; NFPA 1906, Standard for Wildland Fire Apparatus; NFPA 1917, Standard for Automotive Ambulances.

- ~~(A)~~ (1) Two copies of a complete operation and maintenance manual covering the completed apparatus, including but not limited to the truck, pump, wiring and piping diagrams, lubrication charts, operating instructions for the chassis, any major component such as pump or aerial device or other fire fighting equipment; precautions related to multiple configurations of aerial devices; instructions regarding the frequency and procedure for recommended maintenance; and parts replacement information, shall be available. Also, all manufacturers' operations and maintenance documents supplied with components and equipment that are installed by the contractor shall be supplied and made available.
- (B) GAWR, GCWR, and GVWR adequate to carry a full water tank, other tanks full the specified hose load, ground ladders and a personnel weight and miscellaneous equipment allowance shall be provided on the apparatus.
- (C) Automatic engine shutdown systems are prohibited unless they are an integral part of the standard engine management system, which cannot be disabled.
- (D) An engine speed control device shall be installed to allow an increase in the engine speed when the apparatus is parked. An interlock shall prevent the operation of this engine speed control device unless the parking brake is fully engaged and the transmission is in neutral or park, or ~~unless the engine speed control device is used with chassis engine driven components, in which case, it shall be interlocked with the engagement of those components~~ the parking brake is engaged and the engine is disengaged from the drive wheels.
- (E) Fuel system, gasoline or diesel.
- (1) The fuel line(s) shall be so located or protected as not to be subjected to excessive heating from any portion of a vehicle exhaust system. The line(s) shall be protected from mechanical injury.
 - (2) Fuel tank and fill piping shall be so placed as to be protected from mechanical injury and shall not be exposed to heat from exhaust or other source of ignition.
 - (3) The tank fill opening shall be marked with a label indicating the proper fuel.
- (F) Exhaust system, gasoline or diesel.
- (1) The exhaust piping and discharge outlet shall be so located as not to expose any portion of the apparatus or equipment to excessive heating.
 - (2) Exhaust pipe discharge shall not be directed toward any operator's position.
 - (3) Silencing devices shall be provided.
 - (4) When parts of the exhaust system are exposed to operating personnel, protective guards shall be provided.
 - (5) If the apparatus is equipped with stabilizers, the exhaust piping discharge shall be directed away from the

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contact area between the stabilizer and the ground when the stabilizer is deployed.

(G) Low voltage (twelve/twenty-four volt) electrical system and warning devices.

- (1) All electrical circuit wiring shall be made with stranded conductors of a carrying capacity of one hundred twenty-five per cent of the anticipated maximum circuit loading. Insulation shall be in accordance with the recommended standards of the society of automotive engineers for such loading at the potential employed. Overall covering of conductors shall be of the moisture-resistant type and have a minimum continuous temperature rating of one hundred ninety-four degrees Fahrenheit (ninety degrees Celsius). All connections shall be made with lugs or terminals mechanically secured to the conductors. Wiring shall be restrained to prevent damage caused by chafing or ice buildup, and protected against heat, liquid contaminants, or other environmental factors.
- (2) Circuits shall be provided with overload protective devices. Such devices shall be readily accessible and protected against heat, physical injury, and water spray.
- (3) Power supply.
 - (a) A twelve-~~or twenty-four~~ volt or greater electrical alternator shall be provided. It shall have a minimum output at idle to meet the minimum continuous electrical load of the apparatus as defined in NFPA 1901 at two hundred degrees Fahrenheit (ninety-three degrees Celsius) ambient temperature within the engine compartment, and shall be provided with full automatic regulation.
 - (b) The condition of the low-voltage electrical system shall be monitored by a system that provides an audible and visual warning to the driver or operator of the apparatus.
 - (c) A voltmeter shall be mounted on the driver's instrument panel to allow direct observation of the system voltage.
 - (d) If the total-~~connected~~ continuous electrical load exceeds the minimum continuous electrical output rating of the installed alternator(s) operating under the conditions specified in paragraph (G)(3)(a) of this rule, an automatic electrical load management system shall be required.

(4) Batteries.

Batteries shall be securely mounted and protected against physical injury and vibration, water spray, and engine and exhaust heat. When an enclosed battery compartment is provided, it shall be adequately ventilated, and the batteries shall be readily accessible for examination, test, and maintenance.

(5) Lights and warning devices.

- (a) The rear stop, tail, and directional lights shall be so mounted that they will not be obscured by equipment carried on the rear step. Turn signals shall be visible from front, sides, and rear. On apparatus thirty feet or longer in length, a turn signal shall be mounted approximately midway along the apparatus at approximately running board height.
- (b) All apparatus shall have upper and lower optical warning devices. The upper and lower warning levels shall each be divided into four warning zones. The four zones shall be determined by drawing lines through the geometric center of the apparatus at forty-five degrees to a line lengthwise of the apparatus through the geometric center. The four zones shall be designated A, B, C, and D in a

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clockwise direction with zone A to the front of the apparatus (see figure 1).

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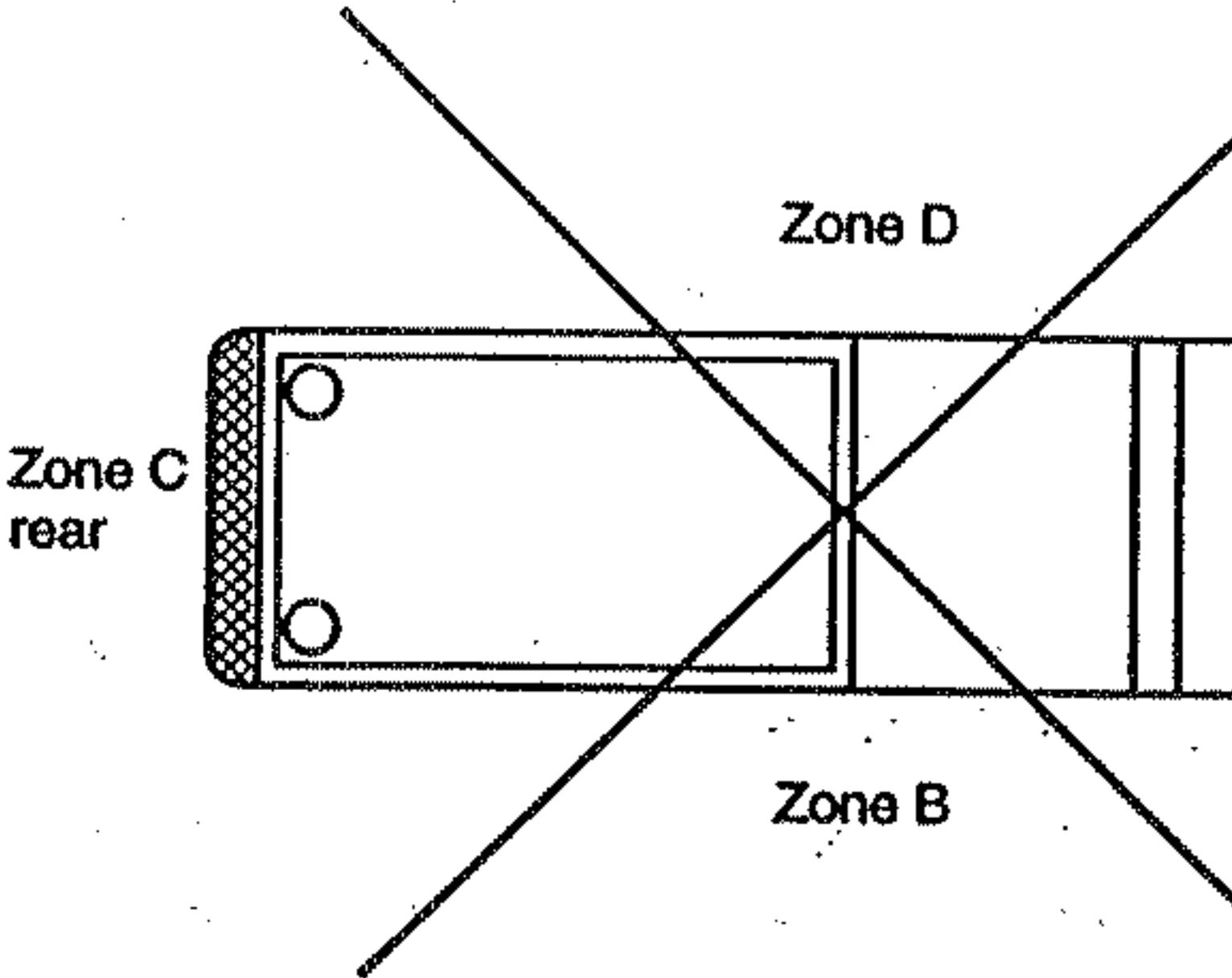


FIGURE 1
Warning Zones for
Optical Warning Devices

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- (i) The front optical warning devices shall be placed so as to maintain the maximum possible separation from the headlights.
- (ii) A midship optical warning device shall be mounted on both the right and left sides of the apparatus with the optical center of the device at a distance between eighteen and sixty-two inches above level ground if the distance between the front and rear lower-level optical devices exceeds twenty-five feet.
- (c) Apparatus shall have hooded lights, with individual switches, providing illumination of the pump operating panel, tool and equipment compartments, steps, and walkways. Switches shall be located within easy reach of the operator.
- (d) The work area immediately behind the vehicle shall be illuminated to a level of at least three footcandles (thirty lux) within a ten feet by ten feet square to the rear of the vehicle. If a hose bed is provided, lighting on this hosebed shall be at a level of three footcandles (thirty lux) or higher.
- (e) The apparatus shall be equipped with lighting that is capable of providing illumination at a minimum level of ~~one~~ two footcandle (~~ten~~ twenty lux) on the ground area within thirty inches of the edge of the apparatus in areas designed for personnel to climb onto or descend from the apparatus to the ground level. Lighting designed to provide illumination on areas under the driver and crew riding area exits shall be activated automatically when the exit doors are opened. All other ground area lighting shall be switchable.
- (f) A red flashing or rotating light, located in the driving compartment, shall be illuminated automatically whenever the apparatus's parking brake is not fully engaged and any of the following conditions exist:
 - (i) Any passenger or equipment door is open.
 - (ii) Any ladder or equipment rack is not in the stowed position.
 - (iii) Stabilizer system not in its stowed position.
 - (iv) Powered light tower is extended.
 - (v) Any other device is opened, extended, or deployed that creates a hazard or is likely to cause damage to the apparatus if the apparatus is moved.

The light shall be marked with a sign that reads: "Do Not Move Apparatus When Light is On."

- (g) Audible warning equipment in the form of one automotive horn and one electric or electronic siren shall be provided. Control for operating the siren shall be provided for the right and left seat positions.
- (h) Where furnished, air horns, electric siren(s), and electronic siren speaker(s) shall be mounted as low and as far forward on the apparatus as practical. Audible warning equipment shall not be mounted on the roof of the apparatus.
- (i) An electric or electronic backup alarm shall be provided that meets the type D (87 dBA) requirements

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of SAE J994.

(H) Vehicle components.

(1) Line voltage (one hundred ten/two hundred twenty volts).

- (a) The generating system shall be installed in accordance with the grounding requirements of Section 250-34 of NFPA 70, "National Electric Code."
- (b) When receptacles or other facilities providing one hundred ten volt AC or DC power are installed, such receptacles and other facilities shall be of the weatherproof type, and all circuits or associated wiring shall have at the source of one hundred ten volt supply overload protection rated at the carrying capacity of the conductor. Circuits shall be three-wired and installed in accordance with Section 250-34 of NFPA 70, "National Electric Code." Those receptacles shall conform to the appropriate NEMA configuration for the voltage and capacity of the circuit.
- (c) All fixed auxiliary engine-driven generators shall comply with article 445, "Generators," of NFPA 70, NEC.
 - (i) They shall be installed so that fumes, vapors, heat, and vibrations do not enter the interior passenger compartment. They also shall have the exhaust outlet piped to the exterior and located so that exhaust is directed away from any operator's position.
 - (ii) Where parts of the exhaust system are exposed so that they can cause injury to operating personnel, protective guards shall be provided.
- (d) Portable generator installations shall comply with article 445, "Generators," of NFPA 70, NEC.
- (e) If the apparatus is equipped with a fixed power inlet (shoreline inlet), it shall be a permanently mounted, flanged surface inlet (male-recessed-type receptacle with cover) sized in accordance with the anticipated load and wired directly to the system or device to be powered; or wired to a transfer switch to isolate one power source from the other where a circuit(s) is intended to be supplied from more than one power source.
 - (i) The apparatus shall have a label permanently affixed at the power inlet that indicates the following:
 - (a) Shore power inlet.
 - (i) Type of line voltage (manufacturer to insert specific voltage of one hundred twenty/two hundred forty, AC/DC).
 - (ii) Current rating in amps (manufacturer to insert specific amp rating).

(2) Braking system.

- (a) Apparatus shall be equipped with an all-wheel antilock braking system if such system is available from the chassis manufacturer.
- (b) Service and parking brakes shall be independent and separate systems. All brakes shall be readily accessible for adjustment.

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- (c) The service brake application valve, when applied, shall operate all the service brakes on the vehicle or combination of vehicles.
 - (d) Parking brakes shall control the rear wheels, or all wheels, and shall be of a positive, mechanically actuated type with provision for securely holding in position when applied. The parking brake system shall hold the fully loaded apparatus on at least a twenty per cent grade. Neither a lock-up device to retain applied pressure on hydraulically actuated service brake system nor a "park" position on an automatic transmission as a substitute for a separate parking brake system is acceptable.
 - (e) Where air-actuated braking systems are provided, they shall include the following:
 - (i) an automatic moisture ejector;
 - (ii) an air dryer;
 - (iii) a pressure protection valve to prevent the use of all air-operated accessories except air-operated windshield wipers and air-assist steering, if provided, when the system air pressure drops below eighty psi (five hundred fifty kPa);
 - (iv) a quick buildup section in the air reservoir system arranged so that if the apparatus has a completely discharged system, it is able to move within sixty seconds of startup.
 - (a) The quick buildup system shall provide sufficient air pressure so that the apparatus has no brake drag and is able to stop under the intended operating conditions following the sixty second buildup time.
 - (b) On a chassis that cannot be equipped with a quick buildup air brake system, an onboard automatic electric compressor or a fire station compressed air shoreline hookup shall be permitted in order to maintain full operating air pressure while the vehicle is not running.
 - (f) Two or more wheel chocks, mounted in readily accessible locations, that meet or exceed the requirements of SAE J348, "Standard for Wheel Chocks," for the wheel diameter on which the chocks are to be used, shall be provided and used when the apparatus is not being driven but being operated in a stationary position.
 - (g) Service brakes shall be capable of bringing a fully laden apparatus to a complete stop from an initial speed of twenty mph in a distance not exceeding thirty-five feet by actual measurement on a substantially hard surface road that is free from loose material, oil, or grease.
- (3) Suspension and wheels.
- (a) Each load-bearing tire and rim of the apparatus shall carry a weight not in excess of the tire manufacturer's rating.
 - (b) An angle of approach and an angle of departure of at least eight degrees shall be maintained at the front and rear of the vehicle when normally loaded.
 - (c) Fenders and guards shall be braced and firmly secured.
 - (d) The steering mechanism for front axles shall be capable of turning the front wheels to an angle of at

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least twenty-eight degrees front axles and thirty degrees for nondriving front axles to both right and left. Power or power-assisted steering shall be provided.

(4) Body.

- (a) A bumper shall be provided on the front of the chassis, and the bumper mounting brackets shall be attached to the frame.
- (b) Holders, boxes, compartments, or other attachments shall be provided for all tools, equipment, play-pipes, and other items on the apparatus. Equipment holders shall be firmly attached and designed so that equipment will remain in place under all running conditions but be quickly removable for use.
- (c) Steps, platforms, or secure ladders shall be provided so that fire fighters have access to all working and storage areas of the apparatus. The maximum stepping height shall not exceed eighteen inches with the exception of the ground to first step. When the ground to first step, platform, or ladder rung exceeds twenty-four inches, a permanently attached supplemental means of access/egress from the ground to these steps, platforms, or secure ladders shall be provided. The supplemental access means shall consist of step(s), platform(s), or ladder(s). The ground to first step height shall be determined with the apparatus on level ground. When the apparatus is supplied with stabilizers, the ground to first step height shall be determined with the apparatus on level ground and the stabilizers deployed according to the manufacturer's instructions.
 - (i) All steps, platforms, or ladders shall be capable of sustaining a minimum static load of five hundred pounds without deformation.
 - (ii) All exterior surfaces designated as stepping, standing, and walking areas shall have a minimum average slip resistance of 0.68 in accordance with ASTM F 1679. All interior steps shall provide an average minimum slip resistance of 0.52. Where the fuel fill is located at or near a stepping surface, the surface shall be constructed of an open grate-type material.
 - (iii) All steps shall have a minimum area of thirty-five square inches and be arranged to provide at least eight inches of clearance between the front of the step and any obstruction. All ladders shall have at least ~~seven~~ eight inches of clearance between any rung and the body of the apparatus.
- (d) Access handrails shall be provided at all entrances to the driving or crew compartment and at any location where the fire fighter is required to climb up on the apparatus for access to equipment. Exterior access handrails shall be constructed of a slip-resistant, non-corrosive material. Rails shall be between one inch and one and five-eighths inches in diameter and have a minimum clearance between the rails and any surface of at least two inches. All rails shall be designed and mounted to reduce the possibility of hand slippage and to avoid snagging of hose, equipment, or clothing.
- (e) A reflective stripe(s) shall be affixed to the perimeter of the apparatus. The stripe or combination of stripes shall be a minimum of four inches in total width and shall conform to the minimum requirements of ASTM D 4956. At least fifty percent of the cab and body length on each side, at least fifty percent of the width of the rear, and at least twenty-five percent of the width of the front of the apparatus shall have the reflective material affixed to it. A graphic design meeting the reflectivity requirements of this paragraph shall be permitted to replace all or part of the required

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striping material if the design or combination thereof covers at least the same perimeter length(s) required within.

(5) Driving and crew compartment.

- (a) A fully enclosed driving or crew compartment with seating for no fewer than two persons shall be provided. Seat belts shall be provided and shall be utilized by each occupant of the cab.
- (b) ~~Employees shall be required to be seated and belted while the apparatus is in motion, except while loading hose.~~ In wildland fire fighting, employees shall be required to ride ~~inside the compartment, unless they are provided with seats, seat belts, and rollover protection~~ within a fully enclosed personnel area.
- (c) The noise in the compartment shall not be in excess of ninety dBA without any warning devices in operation and while the vehicle is traveling at a steady speed of forty-five mph on a level, hard, smooth surface road.
- (d) All interior crew and driving compartment door handles shall be designed and installed to protect against accidental or inadvertent opening.
- (e) Head height at any suspension-style seat shall be at least thirty-seven inches from the seat H-point to the ceiling. For nonsuspension-style seats it shall be thirty-five inches. Each seating space shall have a minimum width of twenty-two inches at the shoulder level. Seat cushions shall be a minimum of eighteen inches in width and fifteen inches from the front of the cushion to the face of the seat back. A back cushion that extends from the face of the seat vertically at least eighteen inches and that is a minimum of eighteen inches wide shall be provided. The back cushion shall be permitted to be split to accommodate a fully recessed SCBA and bracket. Where the back cushion is split, a headrest shall be supplied.
- (f) Where SCBA units are mounted within the crew compartment, a positive, mechanical means of holding the SCBA in its stowed position shall be provided. The bracket holding device and its mounting shall retain the SCBA unit when subjected to a nine-G force and shall be installed in accordance with the bracket manufacturer's requirements. If the SCBA cylinder is mounted in a vertical position with the valve down, it shall be supported with a brace or yoke under the cylinder or valve area to prevent downward movement.
- (g) All equipment within the driving or crew area, shall be securely fastened ~~within the driving or crew area.~~ All equipment not required to be used during an emergency response, with the exception of SCBA units shall be contained in a fully enclosed and latched compartment, or ~~the equipment is~~ mounted in a bracket(s) that is capable of containing the contents when a nine-G force is applied in the longitudinal axis of the vehicle or a three-G force is applied in any other direction.
- (h) The driver's seat shall be readily adjustable by the driver.
- (i) Where the crew compartment and the driving compartment are separated, prohibiting direct voice communication, a two-way voice communication system shall be provided.
- (j) A speedometer/odometer shall be provided.

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- (k) All driving and crew compartment doors shall have at least ninety-six square inches of reflective material affixed to the inside of each door.
- (l) The apparatus shall have sufficient lighting to provide an average level of two footcandle (twenty lux) in the driving and crew compartments.
- (m) Each engine compartment and pump compartment shall have a light of at least twenty candlepower (two hundred fifty lumens).

(6) Tractor-drawn vehicles.

- (a) A tractor-drawn vehicle shall consist of a tractor with a permanent, non-kingpinned "fifth wheel" mounted upon the rear of the chassis to carry the forward end of the aerial ladder trailer unit. The fifth wheel and body design shall be of a type that permits full ninety degree jackknifing of the tractor-trailer combination with the stabilizers in the stored position.
- (b) A tiller steering wheel shall be provided to steer the rear wheels of the trailer unit. The steering shall be of the power or power-assisted type.
- (c) A fully enclosed [tiller](#) driving compartment with seating for one person shall be provided at the rear wheel's steering position. Tiller seats shall have a lap belt.
- (d) A control at the tiller driver's position shall be provided to prevent starting of the engine if the tiller driver is not in place.
- (e) A two-way voice communication system shall be provided for communication between the drivers.
- (f) A heater or ventilation system, a defroster, and a windshield wiper and washer shall be provided.
- (g) The following instrumentation and controls shall be mounted in the [tiller](#) driving compartment and shall be clearly identified and visible to the driver while seated:
 - (i) Heater/defroster controls;
 - (ii) Turn signal indicator lights;
 - (iii) Starter control;
 - (iv) Windshield wiper control.
- (h) Mirrors that provide side and rear visibility shall be provided on both sides of the tiller enclosure.
- (i) If the sides of the trailer are not visible from the tiller seat, a device shall be installed as a point of reference for the tillerman to judge clearance distance.
- (j) If the manufacturer's design requires that the load from the aerial device not be transferred to the rear springs of the tractor, a device shall be installed that will prevent such a weight transfer.

(I) Pumps.

(1) Construction.

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- (a) The pump shall be designed and constructed to withstand a hydrostatic test of five hundred psig minimum for ten minutes. A certificate documenting this test shall be furnished.
- (b) When an auxiliary pump is provided in combination with an attack pump and when the pumps are interconnected so that pressure from one pump may be transmitted to the other pump, check valves, intake and/or discharge relief valves, pump drive gear ratios, or other automatic means shall be provided to avoid pressurizing either pump beyond its maximum rated hydrostatic pressure.
- (c) The entire discharge and intake piping system, valves, drain cocks and lines, and intake and outlet closures, excluding the tank fill and tank to pump lines on the tank side of the valves in those lines, shall be designed for five hundred psig.

(2) Pump intake and discharge.

- (a) Where a three-inch or larger intake or discharge valve is provided, except the tank to pump intake, the valve mechanism shall be slow-operating to permit changing the position of the flow regulating element of the valve from full close to full open, or vice versa.
- (b) Each gated intake or discharge shall be equipped with a three-fourths-inch bleeder valve located in close proximity to the intake or discharge to bleed off air or water from a hose connected to the intake or discharge. The valve shall be operational without the operator's having to get under the apparatus. If a siamese is attached to an intake, it shall be equipped with a three-fourths-inch bleeder valve on each inlet.
- (c) An adjustable two-and-one-half-inch or larger intake pressure relief system shall be permanently installed. The system shall be designed to self-restore automatically to a nonrelieving position when excessive pressure is no longer present. The minimum range of pressure adjustment shall permit control of the intake pressure relief point from ninety psi to at least one hundred eighty-five psi.

(3) Pump controls.

- (a) Adequate illumination shall be provided for all gages and controls located at the pump operator's position.
- (b) All markings required at the pump operator's position shall be permanent, capable of withstanding the effects of extremes of weather and temperature, and securely attached.
- (c) Provisions shall be made for quickly and easily placing the pump in operation. The lever or other device shall be marked to indicate when it is correctly positioned for pumping.
- (d) Any control device used in the pumping system power train between the engine and pump shall be equipped with a means to prevent unintentional movement of the control device from its set position.
- (e) A nameplate indicating the chassis transmission shift selector position to be used for pumping shall be provided in the cab and located so that it can be easily read from the driver's position.
- (f) When the pump is driven by a split shaft PTO, an indicator light shall be located in the driving compartment. This indicator light shall be energized when the pump shift has been completed and shall be labeled "Pump Engaged." When an automatic chassis transmission is provided, a second indicator light in the driving compartment and an indicator light located at the pump operator's

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position shall be provided and energized when the pump shift has been completed, the chassis transmission is engaged in pump gear and the parking brake engaged. The light in the driving compartment shall be labeled "OK to Pump." The light on the pump operator's panel shall be positioned adjacent to and preferably above the throttle control and shall be labeled: "Throttle Ready."

- (g) When an automatic or manual chassis transmission is provided and when the pump is driven by a transmission mounted (SAE) PTO, front-of-engine crankshaft PTO, or engine flywheel PTO and is used for stationary pumping with the chassis transmission in neutral, or is used for pump and roll with the chassis transmission in any forward or reverse gear, shift indicator lights shall be provided as required in paragraphs (H)(3)(g)(i) and (H)(3)(g)(ii) of this rule.
 - (i) There shall be two indicator lights in the driving compartment. One of the lights shall be energized when the pump drive has been engaged and shall be labeled "Pump Engaged." The second light shall be energized when both the pump drive has been engaged the chassis transmission is in neutral and the parking brake engaged and shall be labeled "OK to Pump."
 - (ii) For pump-and-roll apparatus, an additional "OK to Pump and Roll" indicator light shall be provided in the driving compartment and shall be energized when the pump is engaged, the chassis transmission is on road gear, and the parking brake is released. When the "OK to Pump and Roll" indicator is energized, the "OK to Pump" indicator shall not be energized.
 - (iii) A "Throttle Ready" indicator shall be provided at the pump operator's panel that is energized when the "OK to Pump" indicator is energized, or when the chassis transmission is neutral, and the parking brake is engaged.
- (h) With parallel-series centrifugal pumps, the control positions for parallel operation (volume) and series operation (pressure) shall be clearly indicated. The control for changing the pump from series to parallel and vice versa shall be operable at the pump operator's position.
- (i) Means shall be provided for controlling pressure at the pump either through an automatic relief valve or a pressure regulator controlling the speed of the pump. The device shall be capable of operation over a range of ninety to three hundred psig discharge pressure and shall limit the pressure rise upon activation to a maximum of thirty psi. A relief valve shall be equipped with an amber light that indicates when the valve is open. A pressure regulator shall be equipped with a green light that indicates when the regulator is activated. The means provided shall be controllable by one person in the pump operator's position.

If the system discharges water to the atmosphere, the discharge shall be in a manner that will not expose personnel to high-pressure water steams.

(4) Engine controls.

A ~~hand~~ throttle control that will hold its set position shall be provided to control the engine speed and located not higher than seventy-two inches nor lower than forty-two inches from the pump operator's position with all instrumentation in full view.

(J) Tanks.

- (1) All water tanks shall be constructed of noncorrosive material or other materials that are protected against

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corrosion and deterioration. The water tanks shall have a means to permit ~~complete cleaning~~ flushing of the tank.

- (2) Tanks shall be securely fastened and cushioned or cradled to avoid stress when the apparatus is traveling over uneven terrain.
- (3) Tanks shall be provided with at least one swash or baffle partition. Each tank shall have a sufficient number of swash partitions so that the maximum dimension of any space in the tank, either transverse or longitudinal, shall not exceed forty-eight inches.
- (4) The overflow outlet on water tanks shall be designed so that, while the vehicle is in motion, the overflow shall direct any water behind the rear axle so as not to interfere with rear tire traction.
- (5) Pressure vessel foam concentrate or foam solution tanks.
 - (a) The tank shall be of welded construction and designed, fabricated, and stamped in accordance with the requirements of the ASME "Boiler and Pressure Vessel Code," Section VIII, Division I, for the required pressure. All pressure tanks and associated piping shall be designed to a minimum of one and one-half times working pressure.
 - (b) The pressure vessel tank shall be protected against corrosion from the foam concentrate stored in the tank.
 - (c) The fill cap shall be equipped with non-tapered threads and a compressible gasket.
 - (d) A safety vent hole shall be located in the fill cap so that it will vent the tank pressure while at least three and one-half threads are still engaged.
 - (e) A minimum one-half inch valved vent shall be provided on all pressure vessel tanks.
 - (f) An approved ASME relief valve, properly set, shall be provided on the tank to prevent tank pressure from exceeding one hundred ten per cent of the maximum allowable working pressure.
 - (g) A ~~gauge~~ device indicating the internal pressure of the pressure vessel shall be provided and located at the operator's position.
 - (h) A minimum one inch inside diameter full flow drain valve and piping shall be provided on all pressure vessel tanks.
- (6) Compressed air source.
 - (a) Holding, surge, or separator tanks (DOT tank or ASME pressure vessel) shall comply with 29 CFR 1910.169 "Air Receivers." or equal for the rated pressure.
 - (b) Transportable air tanks shall comply with 49 CFR 178.37 "Specification 3AA and 3AAX, Seamless Steel Cylinders" or 29 CFR 1910.169 "Air Receivers."
 - (c) Relief valves on transportable air tanks shall be of the ASME type on ASME cylinders and of the DOT type on DOT cylinders or equal for the rated pressure.
 - (d) Cylinders shall be securely mounted on the apparatus so that they will not shift during normal apparatus driving and operation.

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- (e) Valves installed on air tanks shall meet the requirements of the compressed air association or equivalent standards regarding pressure and usage with compressed air.
- (f) The compressed air system shall be equipped with an air pressure relief valve which is set to prevent the compressed air system from exceeding one hundred ten percent of the maximum allowance working pressure of the system. The outlet of the relief device shall be routed to an area that does not expose personnel to air blasts or cause the creation of dust.
- (g) If the installation utilizes cylinders that require periodic testing, a label shall be placed on the operator's panel indicating the test date stamped on the cylinders and the date the cylinders will next require testing.

(K) Water towers.

- (1) If the water tower is equipped with a ladder attached to the boom or sections for continuous egress, the ladder shall meet the requirements for aerial ladders in paragraphs (L)(1)(a) to (L)(1)(g) of this rule.
- (2) If the water tower is rated in multiple configurations, these configurations, including the rated load capacity of each, shall be clearly described in the operations manual and on the sign at the operator's station.
- (3) Operating mechanisms.
 - (a) Power-operated elevating and extending devices shall be provided. They shall be so designed and provided with adequate power to allow multiple movements of the water tower booms or sections simultaneously under all rated conditions of loading. An automatic locking device(s) shall be provided so that the desired elevated position can be maintained. Provisions shall be made to prevent damage at top and bottom limits.
 - (b) A lock shall be provided that will retain the water tower booms or sections in the bed when the vehicle is in motion.
 - (c) A power-operated turntable shall be provided that will permit continuous rotation in either direction under all the rated conditions of loading. The turntable rotation bearing shall be accessible for lubrication and retorquing of bolts.
 - (d) The turntable rotation mechanism shall be provided with an automatically applied brake or self-locking drive. It shall provide braking capacity with all power systems nonfunctioning to prevent turntable rotation under all rated conditions of loading.

(4) Stabilization.

- (a) The water tower shall be capable of sustaining a static load of one and one-half times its rated capacity in every position in which the water tower can be placed when the vehicle is on a firm and level surface with all normally removable items, such as water hose, ground ladders, loose equipment, etc., removed. If having stabilizers extended to firm footing is part of the definition of the configuration, they shall be extended for the purpose of determining whether the vehicle meets this stability requirement.
- (b) The water tower shall be capable of sustaining a static load of one and one-third times its rated capacity in every position in which the water tower can be placed when the vehicle is on a slope of

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five degrees downward in the direction most likely to cause overturning. If having the stabilizers extended to a firm footing is part of the definition of the configuration, they shall be extended to provide leveling for the purpose of determining whether the vehicle meets this stability requirement. If other facilities, such as a means of turntable leveling, are provided to minimize the effect of the sloping surface, then those facilities may be utilized for the purpose of determining whether the vehicle meets this stability requirement.

- (c) If stabilizers are power-operated, the controls shall be arranged so that the operator may view the stabilizers in motion. An audible alarm of no less than eighty-seven dBA shall sound when a stabilizer is moving.
- (d) The ground contact area for each stabilizer shall be such that a unit pressure of no greater than seventy-five PSI will be exerted over the ground contact area when the apparatus is fully loaded and the water tower is carrying its rated capacity in every position allowed by the manufacturer. This shall be permitted to be accomplished with stabilizer pads in conjunction with the permanently mounted stabilizer shoes to meet the loading requirement of seventy-five psi. The stabilizer shoe shall be capable of swiveling in at least one direction. If the shoe swivels in one direction only, it shall swivel on an axis parallel to the longitudinal axis of the apparatus..
- (e) All stabilizers that protrude beyond the body of the apparatus shall be striped or painted with reflective material to indicate a hazard or obstruction and shall be provided with at least one red warning light visible on the side of the vehicle where the stabilizer is located.

(5) Control devices.

- (a) Controls shall be provided at the driver's position to transfer power to the water tower. A visual signal shall be provided at the driver's position to indicate when the operating mechanisms are engaged.
- (b) An interlock shall be provided that prevents operation of the water tower until the parking brakes have been set and the transmission has been placed in neutral or the transmission is in the drive position with the drive line to the rear axle disengaged.
- (c) An interlock shall be provided that allows operation of the engine speed control only after the parking brakes have been set and the transmission is in neutral.
- (d) An interlock system shall be provided to prevent the lifting of the water tower from the travel position until all the stabilizers are in a configuration to meet the stability requirements of paragraphs (K)(4)(a) to (K)(4)(e) of this rule. The interlock system shall also prevent the moving of the stabilizers unless the water tower is in the travel position.
- (e) A water tower operator's position shall be provided on the apparatus so that the operator is not in contact with the ground. [Provisions If equipped with a pump, provisions](#) shall be made so that the pump operator is not in contact with the ground. Sign(s) shall be placed to warn the operator(s) of electrocution hazards.
- (f) All controls shall be lighted, clearly marked, and located within easy reach of the operator.
- (g) Means shall be provided to prevent unintentional movement of the water tower.
- (h) Controls shall be arranged so that each control can be operated by an operator with a gloved hand

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without disturbing any other control.

- (i) When a three lever system is used to control the basic functions of the water tower, the levers shall be distinctively different from the other controls on the panel and arranged adjacent to each other with the extension control being the left lever, the rotation control being the center lever, and the elevation control being the right lever.
- (j) The water tower shall extend when the extension control is pushed up or forward (away from the operator).
- (k) If the rotation control has a forward/backward orientation or an up/down orientation, the turntable shall rotate clockwise when the rotation control is pushed up or forward (away from the operator). Otherwise, the rotation control handle shall move in the direction of rotation.
- (l) The water tower shall lower when the elevation control is pushed up or forward (away from the operator).
- (m) All controls regulating movement of the aerial device shall automatically return to the neutral position upon release.
- (n) Indicating devices, lighted, clearly marked, and conveniently arranged, shall be visible from the operator's position to:
 - (i) Indicate that rungs are aligned for climbing, if applicable;
 - (ii) Indicate the alignment of the boom or sections with the travel bed;
 - (iii) Indicate elevation, extension, and capacity ratings or provide an equivalent load indicating system.
- (o) If the water tower incorporates a ladder, a second control station shall be provided near the water tower nozzle, accessible to personnel on the ladder for control of all nozzle functions.
- (p) If a second control station is provided at the water tower nozzle, a weather-resistant, two-way voice communication system shall be provided between the water tower operator's control stations and the control station at the nozzle. The speaker/microphone at the nozzle control station shall allow for hands-free operation.

(6) Safety.

- (a) If the operator's position is on the turntable, the turntable platform shall be provided with a railing no less than forty-two inches high. The railing design shall be capable of withstanding a two hundred twenty-five pound force applied at any point from any direction without permanent deformation..
- (b) When the water tower includes moving cylinders or other moving parts, these shall be arranged to provide adequate hand clearance, or hand guards shall be provided to prevent injury to the operator.
- (c) Lighting shall be provided at the base of the water tower arranged to illuminate the water tower in any position of operation.
- (d) A spotlight of no less than seventy-five thousand beam candlepower or a floodlight of not less than ten thousand five hundred lumens shall be provided on the apparatus by which the operator may

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observe the effect of the stream from the water tower nozzle.

- (e) An auxiliary source of power shall be readily available in the event of failure of the normal operating power source. The auxiliary power source shall be capable of returning the water tower to a road travel position.
- (f) When the operation of the water tower is accomplished by hydraulic means, the system shall be equipped with devices to prevent motion of the water tower in the event of any hydraulic hose failure.
- (g) When the operation of the water tower is accomplished by other than hydraulic means, the system shall be designed to prevent motion of the water tower in the event of a power failure.
- (h) All components used to stabilize the water tower apparatus shall be designed to prevent instability in the event of a hydraulic hose or power failure.
- (i) When the design of the water tower incorporates a knuckle, the knuckle shall be either equipped with position lights or continuously illuminated by boom lights. The knuckle shall be painted with reflective paint or provided with reflective striping.

(7) Hydraulic system.

- (a) The nonsealing moving parts of all hydraulic components whose failure results in motion of the water tower shall have a minimum bursting strength of four times the maximum operating pressure to which the component is subjected.
- (b) Dynamic sealing parts of all hydraulic components whose failure results in motion of the water tower shall not begin to extrude or otherwise fail at pressures at or below two times the maximum operating pressure to which the component is subjected.
- (c) Static sealing parts of all hydraulic components whose failure could result in motion of the water tower shall have a minimum bursting strength of four times the maximum operating pressure to which the component is subjected. All hydraulic hoses, tubing, and fittings shall have a minimum bursting strength of three times the maximum operating pressure to which the components are subjected. All other hydraulic components shall have a minimum bursting strength of two times the maximum operating pressure to which the components are subjected.
- (d) The hydraulic system shall be provided with an oil pressure gauge at the lower operating position.
- (e) Means shall be provided for readily checking and filling the hydraulic reservoir, which shall be conspicuously marked "Hydraulic Oil Only."
- (f) The hydraulic system components shall be capable of maintaining, under all operating conditions, proper oil cleanliness and temperature to comply with the hydraulic oil manufacturer's recommendations. The system shall have adequate cooling for the continuous operation of not less than two and one-half hours.

(8) Water delivery system.

- (a) When more than one set of controls are provided, the set at the water tower operator's position shall be capable of overriding all others.

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- (b) When the water tower is equipped with a ladder, the monitor and nozzle shall be arranged so that they do not extend past the last rung of the outermost fly section or so that they can swing completely out of the way of persons climbing onto and off the tip of the ladder when it is positioned up to a window or other location.
- (c) A preset relief valve capable of protecting the waterway system by relieving pressure, through the dumping of water to the environment, shall be provided. Such dumping shall be via a system of piping terminating in an area facing away from the operator's position. The discharge end of the piping shall not have a threaded connection.

(9) Structural safety factors.

- (a) All structural load supporting elements of the water tower that are made of a ductile material shall have a design stress of no more than fifty per cent of the minimum yield strength of the material, based on the combination of the live load and the dead load. This is equivalent to a 2:1 safety factor..
- (b) All structural load supporting elements of the water tower that are made of a nonductile material shall have a design stress of no more than twenty per cent of the minimum ultimate strength of the material, based on the combination of the live load and dead load of the supporting structure. This is equivalent to a 5:1 safety factor.
- (c) Wire ropes, chains, and attaching systems used to extend and retract a telescopic water tower shall have a safety factor of five, based on ultimate strength under normal operating conditions. The factor of safety for the wire rope shall remain above two during any extension or retraction system stall. The minimum ratio of the diameter of wire rope used to the diameter of the sheave shall be one to twelve.

(10) Instruction plates and signs.

- (a) Plates and signs that provide operational directions, warnings, and cautions shall be installed in positions visible to the operator(s).
- (b) Instruction plates shall describe the function and operation of each control.
- (c) Warning and caution signs shall indicate hazards inherent in the operation of the aerial device. These hazards shall include, but shall not be limited to the following:
 - (i) Electrical hazards involved where the aerial device does not provide protection to the personnel from contact with, or in proximity to, an electrically charged conductor.
 - (ii) Electrical hazards involved where the aerial device does not provide protection to ground personnel who contact the vehicle when it is in contact with energized electrical conductors.
 - (iii) Hazards from stabilizer motion.
 - (iv) Hazards that can result from failure to follow manufacturer's operating instructions.
- (d) Identification signs shall display the following information relative to the water tower:
 - (i) Make.
 - (ii) Model.

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- (iii) Insulated or noninsulated.
- (iv) Serial number.
- (v) Date of manufacture.
- (vi) Rated load capacity.
- (vii) Rated vertical height.
- (viii) Rated horizontal reach.
- (ix) Maximum hydraulic system pressure, if applicable.
- (x) Hydraulic oil requirements (change quantity and type), if applicable.

(11) The completed apparatus with the water tower shall be tested at the manufacturer's approved facility and certified by an independent testing organization approved by the manufacturer.

(L) Aerial devices.

(1) Aerial ladder requirements.

- (a) Ladder rungs shall be equally spaced on a maximum fourteen-inch centers and minimum eleven and three-fourth-inch centers and shall have a skid-resistant surface or covering. When covering is provided, it shall be attached in such a manner as to be secure from twisting and shall cover at least sixty per cent of the length of each rung. When round rungs are furnished, they shall have a minimum outside diameter of one and one-fourth inches, including the skid-resistant surface or covering. When other than round rungs are furnished, they shall have a cross-sectional area of no less than 1.2 square inches, a maximum outside dimension of the cross-sectional area (height or width) of 3.2 inches, including the skid-resistant surface or covering, and a minimum outside dimension of three-fourths inch, including the skid-resistant surface or covering. The minimum design load per rung shall be five hundred pounds distributed over a three and one-half-inch wide area at the center of the length of the rung with the rung oriented in its weakest position.
- (b) There shall be a minimum of eighteen inches width between the rails of an aerial ladder, measured at the narrowest point, excluding any mounted equipment.
- (c) When a solid obstruction below the ladder is wider than twelve inches, a minimum clearance of seven inches between the center line of the rung and the obstruction shall be provided. When the solid obstruction below the center line of the ladder is twelve inches or less in width, the standoff between the center line of the rung and the obstruction may be less than seven inches, provided that there is at least six inches of rung width and seven inches of depth below the center line of the rung on each side of the obstruction.
- (d) Top rails shall be provided on the ladder, shall have a minimum width of one inch, and shall be at a minimum height of twelve inches above the center line of the rungs.
- (e) Two folding steps with skid-resistant surfaces shall be provided on the ladder for the use of the ladder pipe-monitor operator. Each folding step shall have a minimum design load of five hundred pounds

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and shall be a minimum of thirty-five square inches in area. A single step that has a minimum design load of five hundred pounds and minimum area of one hundred square inches may be used in place of the two steps.

- (f) The ladder shall be provided with means for attaching fall protection, and persons working on the ladder shall be provided with fall protection.
- (g) The apparatus shall be equipped with skid-resistant steps or rungs that provide a path at any degree of elevation from the bottom rung of the aerial ladder to the ground. Steps or rungs, with the exception of the ground to the first step, shall be spaced on no more than eighteen-inch centers. Handrails shall also be provided within easy reach at each step location.
- (h) Capacity rating.
 - (i) The rated capacity of the aerial ladder shall be a minimum of two hundred fifty pounds carried on the outermost rung of the outermost fly section with the aerial ladder placed in the horizontal position at maximum extension. The aerial ladder shall be capable of operating in any position while carrying its rated capacity on the outermost rung of the outermost fly section. If the aerial ladder has a permanently mounted water delivery system, the two hundred fifty pound load capacity shall be determined without water in the system.
 - (ii) The rated capacity of the aerial ladder shall be a minimum of two hundred fifty pounds carried on the outermost rung of the outermost fly section with the aerial ladder at forty-five degrees to the horizontal and at maximum extension while discharging water through the full range of monitor or nozzle movements as permitted by the manufacturer.
 - (iii) All capacity ratings shall be stated in increments of two hundred fifty pounds and shall be in addition to any fire fighting equipment installed on the ladder by the manufacturer.
 - (iv) If the aerial ladder is rated in multiple configurations, these configurations, including the rated load capacity of each, shall be clearly described in both the operations manual and on a sign at the operator's control station.

(2) Aerial ladder operating position.

- (a) ~~An aerial ladder~~ A water tower operator's position shall be provided on the apparatus so that the operator is not in contact with the ground. If equipped with a pump, provisions shall be made so that the pump operator is not in contact with the ground. Sign(s) shall be placed to warn the operator(s) of electrocution hazards.
- (b) Indicating devices, lighted, clearly marked, and conveniently arranged, shall be visible from the operator's position to:
 - (i) Indicate that rungs are aligned for climbing;
 - (ii) Indicate the alignment of the aerial ladder with the travel bed;
 - (iii) Indicate elevation, extension, and capacity ratings or provide an equivalent load indicating system.
- (c) A weather-resistant, two-way, voice communication system shall be provided between the aerial

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ladder operator's position and the tip of the ladder. The speaker/microphone at the tip shall allow for hands-free operation.

(3) Aerial ladder operating mechanisms.

(a) Elevation.

- (i) A power-operated system for elevating and lowering the aerial ladder under all the rated conditions of loading shall be provided. Provisions shall be made to prevent damage at the top and bottom limits.
- (ii) An automatic locking device(s) shall be provided so that the desired elevated position can be maintained.
- (iii) A locking device that will retain the aerial ladder in the bed when the vehicle is in motion shall be provided.

(b) Rotation.

- (i) A power-operated turntable shall be provided that will permit continuous rotation in either direction under all the rated conditions of loading. The turntable rotation bearing shall be accessible for lubrication and retorquing of bolts.
- (ii) The turntable rotation mechanism shall be provided with an automatically applied brake of self-locking drive. It shall provide braking capacity with all power systems nonfunctioning to prevent turntable rotation under all rated conditions of loading.

(c) Extension.

- (i) A power-operated system for extending and retracting the fly section(s) under all the rated conditions of loading shall be provided. An automatic locking device shall be provided so that the desired position of extension can be maintained.
- ~~(ii)~~ (ii) ~~When a winch-type extension system or an extension system with a single extension cylinder and single set of extension cables is provided, ladder rung lock pawls shall be provided to prevent retraction movement of the sections in the event of power loss. These lock pawls shall align the rungs between sections. The control for the pawls shall be at the base of the ladder adjacent to the operator and shall permit the operator to clearly determine the on and off position without it being necessary to see the pawls.~~
- ~~(iii)~~ (ii) An automatic locking device shall be provided, in addition to pawls, so that the desired position of extension can be maintained.
- ~~(iv)~~ (iii) Provision shall be made to prevent damage at full retraction or extension, stops shall be provided to align the sections without damage to the ladder or to the cable mechanism when the ladder is retracted.
- ~~(v)~~ (iv) The step(s) for the tip operator shall be designed to keep the operator's feet from protruding through the outermost fly section.
- ~~(vi)~~ (v) The lower station controls shall be capable of overriding the aerial tip controls.

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(vi) When a winch-type extension system or an extension system with a single extension cylinder and single set of extension cables is provided, ladder rung lock pawls shall be provided to prevent retraction movement of the sections in the event of power loss. These lock pawls shall align the rungs between sections. The control for the pawls shall be at the base of the ladder adjacent to the operator and shall permit the operator to clearly determine the on and off position without it being necessary to see the pawls.

(4) Aerial ladder water delivery system.

- (a) When more than one set of controls are provided, the set at the aerial operator's position shall be capable of overriding all others.
- (b) A preset relief valve capable of protecting the waterway system by relieving pressure through the dumping of water to the environment shall be provided. Such dumping shall be through a system of piping terminating in an area away from the operator's position. The discharge end of the piping shall not have a threaded connection.
- (c) A flow meter shall be installed in the waterway with the display on either the pump operator's panel or the aerial ladder operator's control panel.
- (d) A permanently installed monitor/nozzle shall not present an obstacle for access to or from the tip of the ladder.
- (e) When a prepiped waterway is not provided, one hose strap shall be provided per ladder section.

(5) Elevating platform requirements.

- (a) The platform shall have a minimum floor area of fourteen square feet.
- (b) Steps and the floor of the platform shall be provided with skid-resistant surfaces.
- (c) Drain openings shall be provided to prevent water accumulation on the platform floor.
- (d) The platform shall be provided with a continuous guard railing, no less than forty-two inches high, on all sides. The railing shall be constructed so that there are no horizontal or vertical openings below it greater than twenty-four inches in either dimension.
- (e) At least two gates shall be provided for access to the platform. Each gate shall be provided with a self-engaging latch. The use of a vertical-opening or inward-opening, self-closing gate or door for access to and from the platform shall be considered as meeting the continuous railing requirement of paragraph (L)(5)(d) of this rule.
- (f) A kick plate or toeboard no less than four inches high shall be provided around the floor and may swing with the gate.
- (g) A heat reflective shield shall be provided on the front, sides, and bottom of the platform.
- (h) A water curtain system capable of providing a cooling spray under the entire floor of the platform and flowing a minimum of seventy-five GPM shall be provided. The system shall be controllable by a single, quick-acting valve with an actuator accessible from the platform.
- (i) The platform shall be provided with means for attaching fall protection, and persons working on the

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platform shall be provided with fall protection.

(j) Capacity rating.

- (i) The elevating platform shall be capable of carrying its rated capacity in the platform in any position of operation. Positive stops shall be provided to limit platform travel to those positions of operation recommended by the manufacturer. The capacity rating of the platform shall be a minimum of seven hundred fifty pounds with the waterway uncharged. All capacity ratings shall be in addition to any fire fighting equipment installed on the elevating platform.
- (ii) If the elevating platform is rated in multiple configurations, these configurations, including the rated load capacity of each, shall be clearly described in both the operations manual and on a sign at the operator's control station.

(6) Elevating platform operating position.

- (a) Two control stations shall be provided, one known as the platform control station, and the other as the lower control station. All operational controls shall be operable from both of these positions. The lower control station shall be located so that the platform is fully visible to the operator while the controls are being operated.
- (b) Provisions shall be made so that the lower control station operator is not in contact with the ground. Sign(s) shall be placed to warn the operator(s) of electrocution hazards.
- (c) The lower station controls shall be capable of overriding the platform station controls.
- (d) A weather-resistant, two-way, voice communication system shall be provided between the platform control station and the lower control station. The speaker/microphone at the tip shall allow for hands-free operation.

(7) Elevating platform operating mechanisms.

- (a) Power-operated elevating and extending devices shall be provided. They shall be so designed and provided with adequate power to allow multiple movements of the elevating platform booms or sections simultaneously under all rated conditions of loading. An automatic locking device(s) shall be provided so that the desired elevated position can be maintained. Provisions shall be made to prevent damage at top and bottom limits.
- (b) An automatic platform-leveling system shall be provided so that the platform, together with its rated load, is supported and maintained level in relation to the turntable or horizontal regardless of the positions of the booms or sections.
- (c) A power-operated turntable shall be provided that will permit continuous rotation in either direction under all the rated conditions of loading. The turntable rotation bearing shall be accessible for lubrication and retorquing of bolts.
- (d) The turntable rotation mechanism shall be provided with an automatically applied brake or self-locking drive. It shall provide braking capacity with all power systems nonfunctioning to prevent turntable rotation under all rated conditions of loading.
- (e) A locking device shall be provided that will retain the elevating platform booms or sections in the bed

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when the vehicle is in motion.

(8) Ladders on the elevating platform.

- (a) If the raising and extending booms or sections incorporate a ladder or ladder sections, the ladder shall meet the requirements of paragraphs (L)(1)(a) to (L)(1)(d), (L)(1)(f), (L)(1)(g), and (L)(2)(B) of this rule.
- (b) The transition step between the top rung of the ladder and the platform shall be no more than eighteen inches.

(9) Elevating platform water delivery system.

- (a) A slow-operated type shutoff valve shall be provided at the base of any monitor.
- (b) A flow meter shall be installed in the water delivery system with at least one display on the pump operator's panel or at the elevating platform operator's position..
- (c) A ~~present~~ preset relief valve capable of protecting the waterway system by relieving pressure through the dumping of water to the environment shall be provided. Such dumping shall be through a system of piping terminating in an area away from the operator's position. The discharge end of the piping shall not have a threaded connection.

(10) Control devices.

All control devices on aerial devices shall meet the requirements for water tower control devices in paragraphs (K)(5)(a) to (K)(5)(n) of this rule.

(11) Safety.

Aerial devices shall meet the safety requirements for water towers in paragraphs (K)(6)(a) to (K)(6)(i) of this rule.

(12) Hydraulic system.

Aerial device hydraulic systems shall meet the requirements for water tower hydraulic systems in paragraphs (K)(7)(a) to (K)(7)(f) of this rule.

(13) Structure.

Aerial devices shall meet the structural requirements for water towers in paragraphs (K)(9)(a) to (K)(9)(c) of this rule, except that wire ropes, chains, and attaching systems used to extend and retract the fly sections or booms shall have a safety factor of five.

(14) Stabilization.

Aerial devices shall meet the stability requirements for water towers in paragraphs (K)(4)(a) to (K)(4)(e) of this rule.

(15) Breathing air system.

- (a) Where a remote breathing air system is provided for aerial ~~ladders~~ devices, it shall supply breathing

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air for a minimum of ~~one person~~ two persons on the ~~aerial platform~~. The system shall include storage for at least ~~two~~ four hundred cubic feet (eleven thousand three hundred twenty liters) of breathing air.

- (b) ~~Where breathing air system is provided for elevating platforms, it shall supply breathing air for a minimum of two persons in the platform. The system shall include storage for at least four hundred cubic feet of breathing air~~ Discharge air from a compressor shall pass through a purifications system prior to distribution.
 - (c) The cylinder(s) shall be manufactured, installed, and used in accordance with 49 CFR 178.37, "Specification 3AA and 3AAX Seamless Steel Cylinders," or 29 CFR 1910.169, "Air Receivers."
 - (d) All components of piping system shall be designed for a pressure rating of three times the working pressure that they are expected to carry. The piping system shall be equipped with a high pressure regulator at the air supply that shall limit the air pressure in the piping up the aerial device to one hundred twenty-five psi at the outlet point.
 - (e) All piping, valves, and components shall be made of corrosion-resistant materials and shall be sized for the number of outlets provided.
 - (f) A pressure relief valve set to relieve the pressure at one and one-half times the working pressure of the piping system in the event of regulator failure shall be provided on the downstream side of the high pressure regulator.
 - (g) All valves, pressure regulators, and gauges shall be protected from accidental damage that could occur through normal use of the aerial device. The piping or hose system between the air cylinder(s) and the aerial device shall be installed so as to prevent damage caused by abrasion, bending, pinching, or exposure to excessive heat.
 - (h) The system shall meet the performance requirements for open-circuit SCBA in paragraph (P) of rule 4123:1-21-02 of the Administrative Code. Holders shall be provided for the storage of the breathing air equipment when it is not in use.
 - (i) A low air warning system shall be provided that will monitor the air volume and will provide an audible warning at both the upper and lower control stations when the air volume is at twenty per cent or below.
- (16) Instruction plate and signs as required for water towers in paragraph (K)(10) of this rule shall be provided on aerial devices.

(M) Inspection, maintenance, testing and repair.

- (1) All apparatus shall have an operational check and visual check at least weekly, and as soon as practical after any use or repair to identify and correct unsafe conditions. A preventive maintenance program shall be established and records shall be maintained. Maintenance, inspections, and repairs shall be performed in accordance with the manufacturer's instructions. If the manufacturer is no longer in business and, therefore, cannot be consulted with regard to repair of the apparatus, the repairs shall be performed by a repair facility experienced in performing such repairs.
- (2) Any apparatus found to be unsafe shall be placed out of service until repaired. After being repaired, the

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apparatus shall have an operational check and visual check prior to being placed back in service. The apparatus shall be returned to service only after the defects and deficiencies that caused the apparatus to be taken out of service have been corrected.

(3) If the aerial device is involved in a situation that produces any structural damage, or if the inspections and tests that are required reveal any problems that affect the structural integrity of the aerial device, the aerial device shall be placed out of service and tested in accordance with NFPA 1911 before it is placed back in service.

~~(3)~~(4) Fire pumps on apparatus shall be service tested in accordance with the frequency and procedures specified in NFPA 1911, "Standard for Inspection, Maintenance, Testing, and Retirement of In-Service Automotive Fire Apparatus, ~~2007~~ 2012 Edition."

~~(4)~~(5) All aerial devices shall be inspected and service tested in accordance with the frequency and procedures specified in NFPA 1911, "Standard for Inspection, Maintenance, Testing, and Retirement of In-Service Automotive Fire Apparatus, ~~2007~~ 2012 Edition."

~~(5)~~(6) Fire department vehicles shall be operated only by members who have successfully completed an established or recognized driver training program.

~~(6)~~(7) Any new component added to an existing apparatus for refurbishing, shall meet the requirements of this rule.

(a) The refurbished apparatus shall be tested at the contractor's approved facility and certified by an independent testing organization approved by the fire department. The certification shall include at least the following tests:

- (i) Pumping test.
- (ii) Pumping engine overload test.
- (iii) Pressure control device test.
- (iv) Priming device test.
- (v) Vacuum test.
- (vi) Water tank to pump flow test.
- (vii) Aerial device tests.

(8) Refurbished automotive fire apparatus shall meet the requirements of NFPA 1912, "Standard for Fire Apparatus Refurbishing."

(N) Application.

The requirements of this rule shall apply only to newly manufactured automotive fire apparatus contracted for or bought on or after the effective date of this rule, except that the requirements of paragraphs (M)(1) to ~~(M)(5)~~ (M)(6) of this rule shall also apply to all apparatus owned before the effective date.

4123:1-21-05 Ground ladders.

(A) Requirements for all ground ladders.

- (1) Ground ladders shall be free of sharp edges, burrs in excess of one-sixty-fourth inch, or other defects that may cut or tear clothing or skin or that may result in inadequate structural strength.
- (2) The beams, at the tip of each section of ground ladders, shall be rounded to allow the ladder to slide on irregular surfaces without catching or snagging during placement or operations. This shall not apply to combination ladders, folding ladders, and pompier ladders.
- (3) Rungs shall be no less than one and one-fourth inches in diameter. This shall not apply to folding and pompier ladders.
- (4) Rungs shall be uniformly spaced on no less than twelve plus or minus one-eighth inch and no more than fourteen plus or minus one-eighth inch centers.
- (5) Rungs shall be constructed of a heavy duty corrugated, serrated, knurled, dimpled, or coated with a skid-resistant material.
- (6) Butt spurs shall be provided on the butt end of each beam of single ladders and on the butt end of each beam of the base section of extension ladders.
- (7) All ground ladders shall bear a unique, individual identification number or alphanumeric code and the month and year of manufacture. This identification shall be branded or metal-stamped on the ground ladder or stamped on a metal plate permanently attached to the ground ladder.
- (8) All ground ladders shall bear an electrical hazard warning label on the outside of each beam, four and one-half feet to six feet from the butt.
- (9) All ground ladders shall bear the ladder positioning label. This label shall be placed between four and one-half feet and six feet from the butt on the outside of both beams.
- (10) The designated length of the ground ladder shall be marked within twelve inches of the butt of each beam of single ladders and on each beam of the base section of extension ladders.
- (11) A label stating that the ground ladder meets the requirements of NFPA 1931, “Standard for Manufacturer’s Design of Fire Department Ground Ladders,” shall be affixed to the ladder.

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(B) Additional requirements for metal and fiberglass ground ladders only.

- (1) All structural components of metal and fiberglass ground ladders shall be constructed of materials that maintain at least seventy-five per cent of their designated design strength at three hundred degrees Fahrenheit.
- (2) Metal and fiberglass ground ladders shall bear heat sensor labels preset for three hundred degrees Fahrenheit on the inside of each beam of each section immediately below the second rung from the tip of each section and immediately below the center rung of that section. Each heat sensor label shall bear an expiration year and wording that indicates that the expiration date is at the end of that year..

(C) Additional requirement for single ladders only.

- (1) The minimum inside width between beams for single and roof ladders shall be no less than sixteen inches.
- (2) The designated length shall be the length of one beam excluding any butt spur. The actual length of the beam shall not be less than the designated length.
- (3) The actual length of the beam shall not be less than the designated length.

(D) Additional requirements for roof ladders only.

- (1) Only single ladders shall be provided with folding roof hook assemblies for use in roof operations.
- (2) Folding roof hooks shall be solid steel and directionally spring locked. The point of the roof hook that engages the roof shall be tapered to reduce slippage.
- (3) Folding roof hook assemblies shall be attached to the beams in a manner that does not appreciably weaken the beams.
- (4) Ladders with double-tapered beams shall not be used in roof operations.

(E) Additional requirements for extension ladders only.

- (1) Extension ladders shall be constructed with a permanently affixed stop installed by the manufacturer to prevent their overextension.
- (2) Extension ladders shall not be constructed in a manner or method which necessitates the elimination of a rung on any section.

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- (3) Extension ladders shall be constructed in a manner so that rungs of each section shall align with the rungs of other sections when the ladder is extended and pawls are engaged.
- (4) The minimum inside width between beams on any section of extension ladders shall be no less than sixteen inches.
- (5) The minimum inside width between beams on any section of attic extension ladders shall be no less than seven and one-half inches.
- (6) Attic extension ladders shall not exceed sixteen feet in length.
- (7) Hardware shall meet the minimum strength requirements of the ground ladder's component parts and shall be corrosion resistant or protected against corrosion.
- (8) Extension ladders over sixteen feet in designated length shall be equipped with a halyard and pulley system.
- (9) The pulley shall be attached to the ladder in a manner so as not to weaken appreciably either the rungs or the beams.
- (10) The pulley shall be no less than one and one-fourth inches in diameter measured at the base of the sleeve.
- (11) The halyard shall be no less than three-eighths inch in diameter, shall have a minimum breaking strength of eight hundred twenty-five pounds, and shall be of sufficient length for the purpose intended. Splices are prohibited.
- (12) On three- and four-section extension ladders, all fly sections beyond the first fly section may be extended by wire rope. Such wire rope shall have a 5:1 safety factor while supporting two times the dead load weight of the fly section(s) that the cable is intended to raise. When wire rope is used, a means for adjusting the length of wire rope shall be provided. Splices are prohibited.
- (13) Where a continuous halyard is used, a secondary means to secure the halyard from the ground prior to climbing shall be provided. The secondary means of securing the halyard shall be capable of supporting the pull on the halyard in case the pawl disengages while persons are on the ladder.
- (14) Pawls shall be of a positive mechanical action type and shall engage a rung of the supporting section.
- (15) Pawls shall be fastened or secured to beams in a manner so that vibration and use will not cause bolts and nuts to loosen.

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- (16) Pawls shall be constructed so that the hook portion of the pawl that engages or rests on the rung shall have sufficient bearing surface or area to prevent the hook from cutting into the rung(s) when engaged.
- (17) The hooks on pawls shall have no sharp edges and points.
- (18) Pawls shall be designed and attached so that they will rest on the rungs as near the beams as possible.
- (19) Staypoles shall be provided on all extension ladders of forty feet or greater designated length.
- (20) All staypoles shall be permanently attached to the ground ladder with universal swivel mounts and shall not be removed for ladder nesting.
- (21) Staypole spikes shall not project beyond the butt of the base section when the extension ladder is in the bedded position.
- (22) A means shall be provided to hold the staypoles in a secure position against the base section when the staypoles are not in use.
- (23) A label shall be provided on each staypole, located between four and one-half feet and six feet from the butt of the pole. The label shall read: "Caution: Only Place Staypoles When Both Poles Can Be Placed Properly."

(F) Additional requirements for combination ladders only.

- (1) The designated length of combination ladders shall be determined in the single or extension configuration and shall not exceed sixteen feet.
- (2) The inside width between beams for combination ladders shall be no less than twelve inches.

(G) Additional requirements for folding ladders only.

- (1) All folding ladders shall be equipped with foot pads to prevent slippage. The pads shall have a nonskid or skid reducing material on the bottom side of the foot pad.
- (2) Folding ladders shall have a positive locking device to hold the ladder in the open position.
- (3) The designated length of folding ladders shall not exceed fourteen feet.
- (4) The inside width between beams for folding ladders in the open position shall be no less than seven and one-half inches.

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(H) Additional requirements for pompier ladders only.

- (1) Pompier ladders shall be equipped with a serrated steel hook permanently fastened to the center beam of the ladder.
- (2) Pompier ladders shall be equipped with a minimum of two stand-off brackets. Each stand-off bracket shall maintain a minimum distance of seven inches between the center line of the rung and the portion of the bracket that contacts the wall.
- (3) The designated length of pompier ladders shall not exceed sixteen feet.
- (4) The overall width of the rungs shall be no less than twelve inches.

(I) Inspection and maintenance of ground ladders shall be in accordance with NFPA 1932, "Standard on Use, Maintenance, and Service Testing of In-Service Fire Department Ground Ladders."

- (1) All ground ladders shall be inspected and maintained in accordance with the manufacturer's recommendations.
- (2) Ground ladders shall be visually inspected at least once every month and after each use.
- (3) Visual inspection shall include but not be limited to:
 - (a) Heat sensor label on metal and fiberglass ladders, and on wood ladders when provided, for change indicating heat exposure and expiration date;
 - (b) All rungs for snugness and tightness and for punctures, wavy conditions, worn serrations or deformations;
 - (c) All bolts and rivets for tightness;
 - (d) Welds for any cracks or apparent defects;
 - (e) Beams and rungs for cracks, splintering, breaks, gouges, checks, wavy conditions, or deformation;
 - (f) Butt spurs for excessive wear or other defects.
 - (g) Surface corrosion.
 - (h) Loss of gloss on fiberglass and wood ladder beams.

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- (i) Labels present and legible.
- (j) Ladders clean with no buildup of grease, dirt, or grime on the beams.
- (4) Any ground ladder that shows any sign of failure during visual inspection or any signs of damage beyond gouges and dents shall be removed from service and - repaired to bring it into compliance with the requirements of this rule. If repaired, it shall be service tested as specified in paragraph (J) of this rule before being returned to service.
- (5) If gouges or dents are discovered during the visual inspection, the ladder shall be subjected to the service tests specified in section (J). Gouges and dents shall not be cause to fail a ladder if it passes the service test.
- (6) Any ladder repaired shall be done in accordance with the manufacturer's instructions.
- (7) Ground ladders shall not be painted except for the top and bottom eighteen inches of each section for the purpose of identification or visibility.
- (8) When in storage, ground ladders shall not be stored in an area where they are exposed to the elements.
- (9) Additional requirements for wood ground ladders only.
 - (a) Visual inspection shall include the bolts for snugness and tightness without crushing the wood.
 - (b) When a wood ground ladder develops dark streaks in the beams, the ladder shall be removed from service and service tested as specified in this rule prior to further use.
 - (c) Wood ground ladders shall be stored away from steam pipes, radiators, and out of direct sunlight.
 - (d) Wood surface finish shall be maintained in accordance with the ladder manufacturer's recommendations.
- (10) Additional requirement for fiberglass ground ladders only.

When in storage, fiberglass ground ladders shall not be stored in direct sunlight.
- (11) Additional requirement for roof ladders only.

Visual inspection shall include an operational check of the roof hook assemblies for proper operation.

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(12) Additional requirements for extension ladders only.

- (a) Visual inspection shall include an operational check of the pawl assemblies for proper operation.
- (b) Pawl assemblies shall be kept cleaned, lubricated, and maintained in accordance with the manufacturer's instructions.
- (c) Ladder slide areas shall be kept lubricated in accordance with the manufacturer's instructions.
- (d) Halyards and wire cables on extension ladders shall be replaced when they become frayed or kinked.
- (e) Wire rope on three- and four-section ladders shall be snug, when the ladder is in the bedded position, to ensure proper synchronization of upper sections during operation.

(J) Service testing of ground ladders.

(1) Requirements for all ground ladders shall be in accordance with NFPA 1932, "Standard on Use, Maintenance, and Service Testing of In-Service Fire Department Ground Ladders."

- (a) Only employees who have been adequately trained in service testing procedures and equipment shall do service testing. The employer may contract with an approved testing organization to perform the service tests specified in this rule.
- (b) Any ladder that shows any sign of failure during service testing shall be removed from service and destroyed or repaired for fire service.
- (c) All ground ladders shall be service tested on the following schedule:
 - (i) Prior to being put into service for the first time;
 - (ii) At least annually;
 - (iii) At any time a ladder is suspected of being unsafe;
 - (iv) After the ladder has been subjected to overloading (see table 1 of this rule);

All extension ladders maximum load seven hundred fifty lbs (three hundred forty kg).

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Combination ladders maximum load seven hundred fifty lbs (three hundred forty kg).

-Table 1 Ground Ladder Duty Rating-

		Maximum Load
Type	lb	kg
Folding ladders	300	136
Pompier ladders	300	136
Single and roof ladders	750	340
All extension ladders	750	340
Combination ladders	750	340

- (v) After the ladder has been subjected to impact loading or unusual conditions of use;
 - (vi) After heat exposure (see paragraphs (J)(1)(h) to (J)(1)(j) of this rule);
 - (vii) After any deficiencies have been repaired, unless the only repair was replacing the halyard.
- (d) All ground ladders, except pompier ladders, shall be service tested as specified in paragraph (J)(2) of this rule.
- (e) Pompier ladders shall be service tested as specified in paragraph (J)(3) of this rule.
- (f) Folding ladders shall be service tested as specified in paragraph (J)(5) of this rule.
- (g) All service test results shall be permanently recorded. The minimum information recorded shall be as required in table 2 of this rule.

-Table 2 Fire Department Ground Ladder Record-

Manufacturer's Ladder Identification Number or Code:
Fire Department Identification (if different):
Ground Ladder Manufacturer:
Fire Department Company Where Ground Ladder is Assigned:
Date Purchased:
Date Placed in Service:
Type of Ground Ladder: single; roof; extension; combination; folding; pompier.
Ladder Construction: wood; metal; fiberglass; solid beam; truss beam.
Heat Sensor Label Test:
Previous Repairs. Reason for Repair and Date of Repair:
Type of Test. Test Date, and Person(s) Performing Test:

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Reason for Test:
Test Results:
Horizontal Bending Test
Amount of Permanent Deformation:
Passed:_____Failed:_____
Hardware Test
Passed:_____Failed:_____
Roof Hook Test
Passed:_____Failed:_____
Pompier Ladder Test
Passed:_____Failed:_____
Repairs Completed:
Person(s) Performing Repairs:
Date Completed:
Person Signing Record:

(h) Additional requirement for metal ground ladders only.

Whenever any metal ground ladder has been exposed or shows evidence of having been exposed to direct flame contact, or whenever the heat sensor label has changed to indicate heat exposure, the ladder shall be service tested as specified in paragraphs (J)(2) and (J)(4) of this rule.

(i) Additional requirement for wood ground ladders only.

Whenever any wood ground ladder has been exposed to or shows evidence of having been exposed to direct flame contact, the ladder shall be service tested as specified in paragraph (J)(2) of this rule.

(j) Additional requirement for fiberglass ground ladders only.

Whenever any fiberglass ground ladder has been exposed to or shows evidence of having been exposed to direct flame contact, or whenever the heat sensor label has changed to indicate heat exposure, the ladder shall be service tested as specified in paragraph (J)(2) of this rule.

(2) Strength service testing requirements for all ladders except pompier and folding ladders.

(a) Horizontal bending test.

The ladder shall be positioned for testing and tested as shown in figure 1 of this rule. The ladder shall be placed in a flat horizontal position supported under the six inches from each end of the ladder. Extension and combination ladders shall be extended to their maximum extended length, with pawls engaged, for this test. The test load shall be applied equally to a

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center span covering sixteen inches each side of the center inclusive. The test load shall be applied to a flat test surface resting on the beams in the center area. The test load shall consist of free weights in increments consistent with safety and ease of handling. All test loads shall include the weight of the test surface. If a test fixture is used with a dynamometer, the test fixture shall be designed to apply the load over the required area in a manner that allows a load shift to a weak beam and does not restrain the load directionally.

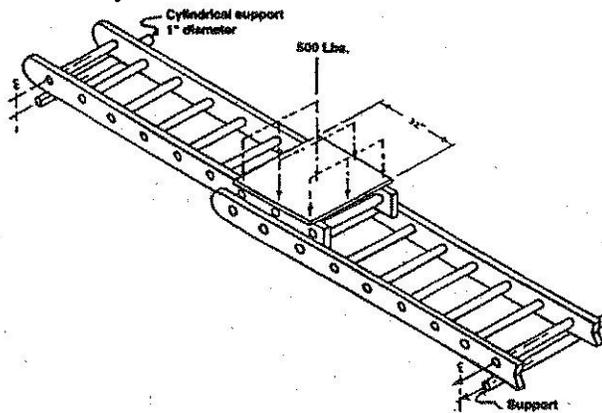


Figure 1 Extension ladder positioned for horizontal bending test.

- (b) Test procedures for metal and fiberglass ground ladders only.
- (i) The ladder shall be loaded with a pre-load of three hundred fifty pounds applied equally to the center span covering sixteen inches each side of the center inclusive. Caution shall be exercised whenever applying or removing the weights to minimize any impact loading. The load shall be allowed to remain for at least one minute to "set" the ladder prior to completing the rest of the test.
 - (ii) After the pre-load is removed, the distance between the bottom edge of each side rail and the surface upon which the ladder supports are placed shall be measured. All measurements shall be taken at a consistent location as near as practical to the center of the ladder.
 - (iii) The ladder shall be loaded with a test load of five hundred pounds applied equally to the center span covering sixteen inches each side of the center inclusive. The test load shall remain in place for five minutes.
 - (iv) The test load shall then be removed, and after five minutes have elapsed, the distance between the bottom of each side rail and the surface upon which the ladder supports are placed shall be measured.

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- (v) The difference between measurements taken in paragraphs (J)(2)(b)(ii) and (J)(2)(b)(iv) shall not exceed one-half inch for ladders twenty-five feet or less in length, one inch for ladders twenty-six feet to thirty-four feet in length, and one and one-half inches for ladders thirty-five feet or more in length. Any ladder that does not meet this criterion shall be removed from fire service use and destroyed.
- (vi) There shall be no visible, permanent change or failure of any hardware.
- (c) Test procedures for wood ground ladders only.
 - (i) The ladder shall be loaded with a test load of five hundred pounds applied equally to a center span covering sixteen inches each side of the center inclusive. The test load shall remain in place for five minutes and then removed.
 - (ii) To pass the test, the ladder and all components shall not show ultimate failure. Any ladder that does not meet this criterion shall be removed from fire service use and destroyed.
- (d) Additional requirements for roof ladders only -- roof hook test.
 - (i) The ladder shall be positioned for testing and tested as shown in figure 2 of this rule. The ladder shall be hung solely by the roof hooks, with the hooks supported only by the points of the hooks, in a vertical position from a fixture capable of supporting the entire test load and weight of the ladder. The ladder shall be secured in such a manner to retain the ladder in the test position to prevent injury to test personnel, if the hooks fail during the test.

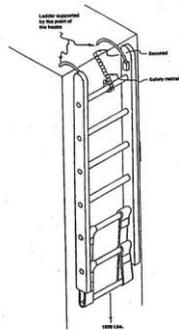


Figure 2. Roof ladder positioned for roof hook test.

- (ii) A test load of one thousand pounds shall be placed over as many rungs as needed. The test load shall consist of weight increments consistent with safety and ease of handling.
- (iii) The test load shall be applied for a minimum of one minute.

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- (iv) Ladder and roof hook assemblies shall sustain this test load with no permanent deformation.
 - (v) Variations from the specific methods depicted in figure 2 of this rule shall be acceptable provided such alternative means provide equivalent results and comply with the intent of the specified test method.
- (e) Additional requirements for extension ladders only -- hardware test.
- (i) The ladder shall be positioned for testing and tested as shown in figure 3 of this rule. The ladder shall be extended a minimum of one rung beyond the bedded position.

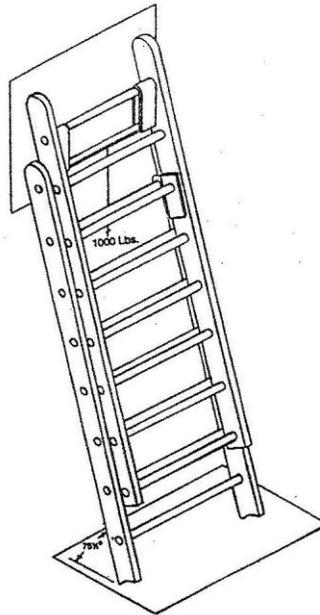


Figure 3 Extension ladder positioned for hardware test.

- (ii) A test load of one thousand pounds shall be placed on the rungs of the fly section. The test load shall consist of weight increments consistent with safety and ease of handling.
 - (iii) The test load shall be applied for a minimum of one minute.
 - (iv) Ladders shall sustain this test load with no permanent deformation or other visible weakening of the structure.
 - (v) Variations from the specific methods depicted in figure 3 of this rule shall be acceptable provided such alternative means provide equivalent results and comply with the intent of the specified test method.
- (3) Strength service testing requirements for pompier ladders only.

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- (a) The ladder shall be positioned for testing and tested as shown in figure 4 of this rule. The ladder shall be tested in the vertical hanging position supported only by its hook from a fixture capable of supporting the entire test load and weight of the ladder. The ladder shall be secured in such a manner to retain the ladder in the test position to prevent injury to test personnel, if the hook fails during the test.

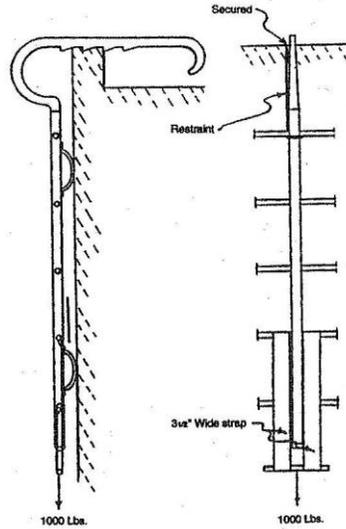


Figure 4 Pompiers ladder positioned for test.

- (b) A test load of one thousand pounds shall be applied over multiple rungs.
- (c) The ladder shall withstand this test without ultimate failure. Any pompiers ladder that does not meet this criterion shall be removed from fire service use and destroyed.
- (d) Variations from the specific methods depicted in figure 4 of this rule shall be acceptable provided such alternative means provide equivalent results and comply with the intent of the specified test method.
- (4) Strength service testing requirements for folding ladders only.

- (a) Horizontal bending test.

The ladder shall be positioned for testing and tested as shown in figure 5 of this rule. The ladder shall be placed in a flat horizontal position and supported six inches from each end of the ladder. Folding ladders shall be in their unfolded configuration for this test. The test load shall be applied equally to a center span covering eight inches on each side of the center inclusive. The test load shall be applied to a flat test surface resting on the beams in the center area. The test load shall consist of weight increments consistent with safety and ease of handling. All test loads shall include the weight of the test surface. If test fixture is used with a dynamometer, the test fixture shall be designed to apply the load over the required area in a

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manner that allows a load shift to a weak beam and does not restrain the load directionally.

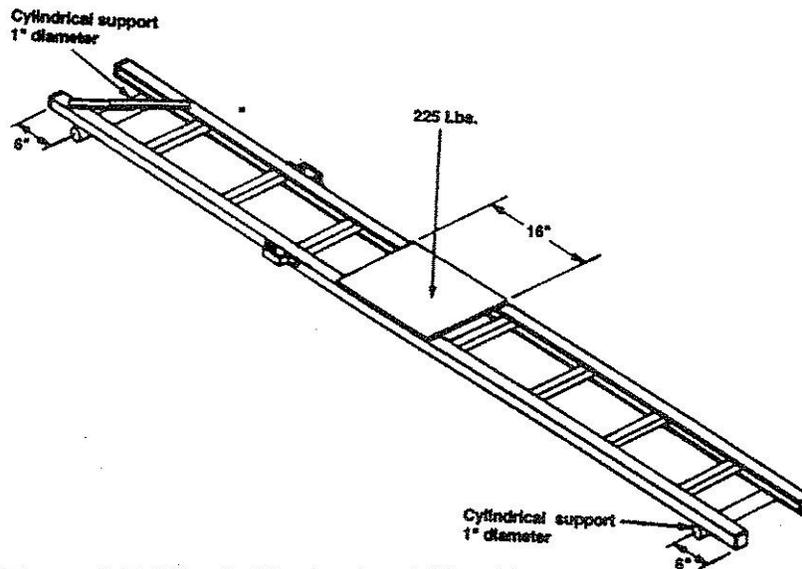


Figure 5 Folding ladder horizontal bending test

(b) Test procedures for metal and fiberglass folding ladders only.

- (i) The ladder shall be loaded with a pre-load of one hundred sixty pounds applied equally to the center span covering eight inches on each side of the center inclusive. Caution shall be exercised whenever applying or removing the weights to minimize any impact loading. The load shall be allowed to remain for at least one minute to "set" the ladder prior to completing the rest of the test.
- (ii) After the pre-load is removed, the distance between the bottom edge of each side rail and the surface upon which the ladder supports are placed shall be measured. All measurements shall be taken at a consistent location as near as practical to the center of the ladder.
- (iii) The ladder shall be loaded with a test load of two hundred twenty-five pounds applied equally to the center span covering eight inches on each side of the center inclusive. The test load shall remain in place for five minutes.
- (iv) The test load shall then be removed, and after five minutes have elapsed, the distance between the bottom of each side rail and the surface upon which the ladder supports are placed shall be measured.
- (v) The difference between measurements taken in paragraphs (J)(5)(b)(ii) and (J)(5)(b)(iv) shall be no more than one-half inch. Any ladder that

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does not meet this criterion shall be removed from fire service use and destroyed.

(vi) There shall be no visible, permanent change or failure of any hardware.

(c) Test procedures for wood folding ladders only.

(i) The ladder shall be loaded with a test load of two hundred twenty-five pounds applied equally to a center span covering eight inches on each side of the center inclusive. The test load shall remain in place for five minutes and then be removed.

(ii) To pass the test, the ladder and all components shall not show any permanent damage. Any ladder that does not meet this criterion shall be removed from fire service use and destroyed.

(K) Application.

The requirements of this rule shall apply only to ground ladders contracted for or bought on or after the effective date of this rule, except that the requirements of paragraph (J) of this rule shall also apply to all ground ladders owned before the effective date.

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4123:1-21-06 Fire hose, couplings, and nozzles.

(A) Care and use of fire hose.

(1) Attack hose, supply hose, and forestry hose.

(a) Large-diameter hose marked "Supply Hose" shall be used at operating pressures not to exceed one hundred eighty-five psi to supply pumpers from hydrants and in relay from pumper to pumper and to directly supply attack lines, master streams appliances, portable hydrants, manifolds, and standpipe and sprinkler systems. ~~If a higher operating pressure is needed, a hose having a service test pressure of at least ten per cent greater than the highest operating pressure should be used.~~

(i) If a higher operating pressure is needed, a hose having a service test pressure of at least ten per cent greater than the highest operating pressure should be used.

~~Six-inch supply hose shall not be used at operating pressures exceeding one hundred thirty-five psi.~~

(ii) Six-inch supply hose shall not be used at operating pressures exceeding one hundred thirty-five psi.

(b) A pressure and volume relief device with adequate capabilities and a maximum setting, not to exceed the service test pressure of the hose being used, shall be provided on the discharge side of the pump when large-diameter supply hose is being used to supply attack lines, manifolds, and standpipe and sprinkler systems. ~~Rapid closing or opening valves shall not be used with large diameter supply hose.~~

Rapid closing or opening valves shall not be used with large-diameter supply hose.

(c) When ~~hose marked "Supply Hose"~~ supply hose is used in relay between pumpers, the suction of each receiving pumper shall be equipped with a relief valve.

(d) Hose that has been frozen during use shall be thawed and service tested as specified in paragraph (D) of this rule before being put back in service or in storage.

(e) After use and before being placed in storage or back in service, the hose shall be drained, cleaned, and inspected as specified in paragraph (A)(3) of this rule.

(2) Booster and hard suction hose.

(a) Booster and hard suction hose shall be service tested at least annually as specified in paragraph ~~(D)(5)~~ (D)(2) of this rule.

(b) Hose which has exposed reinforcement shall be removed from service and repaired or destroyed. The defective section may be cut out, and the length recoupled and service tested as specified in paragraph ~~(D)(5)~~ (D)(2) of this rule.

(3) Inspection.

(a) Physical inspection shall determine that the hose couplings and nozzle, when required, have not been

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vandalized and are free of debris and that there is no evidence of mildew, rot, or damage by chemicals, burns, cuts, abrasion, and vermin.

- (b) If the hose fails the physical inspection, it shall be removed from service and not used until it can meet the service test requirements specified in paragraph (D) of this rule.
- (c) The couplings shall be inspected as specified in paragraph (C)(2)(a) of this rule.
- (d) When nozzles are required, they shall be inspected as specified in paragraphs (C)(1)(a) and (C)(1)(b) of this rule.
- (e) The interior of the hose at each end shall be visually inspected for any physical signs of liner delamination. If the liner shows signs of delamination, the hose shall be condemned.

(4) Storage.

- (a) Hose shall be stored only after it is properly inspected, service tested, if required, brushed or washed, dried, and rolled.
- (b) Hose out of service for repair shall be properly tagged as specified in paragraph (B)(4) of this rule and, if temporarily stored, kept apart from any hose in storage ready for service.

(c) Hose shall be kept out of direct sunlight and in a well ventilated location.

(B) Hose records (attack and supply hose).

- (1) Accurate hose records shall be established and maintained.
- (2) Each length of hose shall be assigned an identification number for use in recording its history throughout its service life. The identification number shall be stenciled on the jacket or cover with an ink or paint that is not harmful to the hose. The identification number may be stamped on the bowl or swivel of the female coupling utilizing a procedure to prevent damage to the coupling.
- (3) The following information shall be included for each length of hose:
 - (a) Assigned identification number;
 - (b) Manufacturer and part number;
 - (c) Vendor;
 - (d) Size (internal diameter of waterway);
 - (e) Length;
 - (f) Type of hose;
 - (g) Construction;
 - (h) Date received and date put in service;
 - (i) Date of each service test and service test pressure;
 - (j) Repairs and new length if shortened;

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- (k) Actual damage;
- (l) Exposure to possible damage;
- (m) Reason removed from service;
- (n) Reason if condemned.

(4) Out-of-service hose shall be properly tagged with the reason it has been removed from service noted on the tag.

(C) Nozzles and couplings.

(1) Nozzles.

- (a) All nozzles shall be inspected annually and after each use. The nozzle shall be inspected for the following:
 - (i) Obstructions in waterway;
 - (ii) Damage to tip;
 - (iii) Full operation of adjustments such as pattern selection, etc.;
 - (iv) Proper operation of shutoff valve, if so equipped;
 - (v) Missing parts;
 - (vi) Internal gasket.
- (b) If the nozzle fails the inspection for any reason, it shall be removed from service, repaired and reinspected, or replaced.

(2) Couplings.

- (a) After each use and at each service test of the hose, couplings shall be visually inspected for the following:
 - (i) Damaged threads;
 - (ii) Corrosion;
 - (iii) Slippage on the hose;
 - (iv) Out-of-round;
 - (v) Swivel not rotating freely;
 - (vi) Missing lugs;
 - (vii) Loose external collar;
 - (viii) Internal gasket for presence, tight fit, and lack of deterioration;

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(ix) Other defects that impair operation.

(b) Couplings found defective shall be removed from service, repaired and reinspected, or replaced.

(c) When couplings of dissimilar metals are left connected, they shall be disconnected and inspected at least quarterly. If corrosion exists, the couplings shall be cleaned, and a protective coating specified by the coupling manufacturer shall be applied to the threads. This coating shall be applied after each use and during each inspection.

(d) The outside diameter of the hose shall fit snugly in the internal diameter of the bowl of the coupling. The expansion ring shall be of the proper size and length for the coupling used.

(e) When couplings are attached or reattached to hose, the hose shall be service tested in accordance with paragraph (D) of this rule.

(f) After repair or recoupling, the hose shall be retested to the service test pressure. The date and nature of the repair and/or recoupling and the person performing the repair shall be recorded for each length of hose as specified in paragraph (B)(3) of this rule.

(g) The thread gasket in couplings and nozzles shall be inspected for presence, tight fit, and lack of deterioration. If defective, it shall be replaced with a new gasket.

(h) The tail gasket at the end of the hose shall be replaced when attaching a coupling.

(D) Service testing.

(1) In-service hose shall be service tested prior to being put into service for the first time and at least annually thereafter.

(2) Service test pressure.

(a) ~~Hose manufactured prior to July 1987.~~ Hose manufactured prior to July 1987 shall be phased out by the year 2020.

(i) The service test pressure for hose manufactured prior to July 1987 to meet the requirements of the 1979 edition and previous editions of NFPA 1961, "Standard for Fire Hose," shall be determined by noting the acceptance or proof test pressure stenciled on each length of hose and shown as "Tested to --- PSI" and then by finding the acceptance or proof test pressure by type of hose and corresponding service test pressure specified in table 1 of this rule.

Table 1 Service Test Pressures for Hose Manufactured Prior to July 1987

Trade Size in (mm)	Jackets	New Hose Rated Acceptance Test Pressure psi (kPa)	Service Test Pressure psi (kPa)
Lined Industrial, Standpipe, and Fire Department			
1½ (38) thru 2½ (65*)	Single	300 (2070)	150 (1030)

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Table 1 Service Test Pressures for Hose Manufactured Prior to July 1987

1½ (38) thru 4½ (114)	Single	400 (2760)	250 (1720)
1½ (38) thru 2½ (65)	Single	500 (3450)	250 (1720)
1½ (38) thru 4 (102)	Multiple	400 (2760)	
(1750)250	1½ (38) thru 4 (102)	Multiple	600 (4140)
250 (1750)	Unlined Standpipe		
	1½ (38) and 2½ (65)	Single	
150 (1030)	Lined Forestry		
	1 (25) and 1½ (38)	Single	450 (3100)
250 (1720)	Unlined Forestry		
	1 (25) and 1½ (38)	Single	450 (3100)
250 (1720)	Relay Supply		
	3½ (89) thru 4½ (114)	Single	400 (2760)
200 (1380)	5 (127) and 6 (152)	Single	300 (2070)
150 (1030)	Pumper Supply		
	(Soft Suction)		
	4 (102) thru 6 (152)	Multiple	400 (2760)
200 (1380)			

*1½ (38) thru 2½ (65) single jacket hose with a new hose rated acceptance test pressure of 300 psi (2070 kPa) shall not be maintained on fire apparatus for fire fighting purposes.

- ~~(ii) (ii) The hose rated acceptance or proof test pressure that is stenciled on hose manufactured prior to July 1987 shall not be used for the service test pressure.~~
- ~~(iii) (iii) The hose rated acceptance or proof test pressure tests shall be conducted only at the point of manufacture or at a facility properly equipped for these tests. Test in the field shall not subject the hose to its proof test pressure.~~

(b) Hose manufactured July 1987 and after.

- (i) The service test pressure for hose manufactured in July 1987 and after ~~to~~ shall meet the requirements of the ~~1987 and subsequent edition~~ of NFPA 1961, "Standard for Fire Hose, ~~shall be determined by the service test pressure stenciled on each length of hose and shown as "Service Test to PSI per NFPA 1962."~~ standard that was in effect when it was manufactured.
- (ii) ~~Proof pressure tests for hoses shall only be conducted at the point of manufacture or at a facility equipped to perform these tests. Tests in the field shall not subject the hose to its proof test pressure.~~ Attack fire hose shall be service tested to a minimum of three-hundred psi (20.7 bar or two thousand-seventy kPa) or a pressure not to exceed the service test pressure marked on the hose.
- (iii) ~~After the correct service test pressure for each length of hose to be tested has been determined, the service test shall be conducted as specified in paragraph (D)(3) of this rule.~~ Supply fire hose shall be service tested to a minimum of two hundred psi (13.8 bar or one thousand three

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hundred-eighty kPa) or a pressure not to exceed the service test pressure marked on the hose.

(iv) Forestry fire hose shall be service tested to a minimum of three hundred psi (20.7 bar or two thousand seventy kPa) or a pressure not to exceed the service test pressure marked on the hose.

(v) Each length of fire hose shall be indelibly marked "service test to [the service test pressure] psi (bar) per NFPA 1962."

(c) Hard suction hose.

Suction hose manufactured in accordance with the ~~1992~~ 2013 Edition of NFPA 1961, Standard on Fire Hose, will be marked "for vacuum use only" if it is designed for use under vacuum only. If the suction hose is designed for use under positive pressure, it will be marked "service test to (the service test pressure) and twenty-two inch Hg. vacuum per NFPA 1962."

- (i) Hard suction hose shall be dry-vacuum tested annually. This test can be run in conjunction with the annual pumper suction test. The hose shall be attached to a suction source. The free-end shall be sealed with a transparent disk and connected to an accurate vacuum measuring instrument. A twenty-two-inch mercury vacuum shall be developed. While holding the vacuum for ten minutes, the lining of the hose shall be inspected through the disk. There shall be no collapsing of the lining into the waterway.
- (ii) ~~If hard suction is used under positive pressure, it shall be service tested to the marking on the hose, or if not marked, to one hundred sixty five psi using the procedures as specified in paragraph (D)(3) of this rule.~~ Suction hose shall not be used under positive pressure unless it has been specifically designed for such use.

(d) Booster hose.

Booster hose shall be tested annually in accordance with paragraph (D)(3) of this rule to one hundred ten per cent of its maximum working pressure which may be marked on the hose. If it is not marked, it shall be tested to one hundred ten per cent of the normal highest working pressure as used in the system.

(3) Service test and hose testing machine procedure.

The following test procedure shall be followed:

- (a) Each length of hose to be service tested shall be inspected as specified in paragraph (A)(3) of this rule. Any length of hose that fails the inspection shall be removed from the service test area and repaired as necessary or destroyed.
- (b) A hose testing machine, a stationary pump, or a fire department pumper, each equipped with a hose test gate valve, shall be used for the test procedure.
 - (i) The hose testing machine shall be carefully examined for damaged components before commencing the service tests. This check shall be performed before each testing session. If any damage is discovered, the machine shall not be used until repairs are made.
 - (ii) Pressure leak integrity test shall be performed on the machine to determine if the pressurized

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outlet side and its components are leak free. The fire hose outlet connection(s) of the machine shall be capped or otherwise closed. Pressure shall be applied through the machine using the integral pump to a level that is ten percent higher than the highest service test pressure needed for the hose test. The pressure shall be held for three minutes with the pump turned off. If leaks are detected, the machine shall not be used until the leaking components are repaired.

- (c) The hose test gate valve may be a fire department gate valve with a one-fourth-inch opening drilled through the gate that permits the pressure to be raised to the test pressure after the hose has been filled, the air completely removed, and the hose gate valve closed.
- (d) All three and one-half-inch and larger hose shall be service tested while lying flat. A short length of smaller diameter hose with the same or higher proof pressure shall be used to connect the test valve to the hose being tested.
- (e) Each length of hose to be tested simultaneously shall be of the same service test pressure ~~and collectively shall be considered the hose test layout.~~ The total length of any hose line in the hose test layout to be service tested shall not exceed three hundred feet. The hose layout shall be straight without kinks or twists. Exception: hose that has been repaired or recoupled shall be tested one length at a time.
 - (i) The total length of any hose line in the hose test layout to be service tested shall not exceed three hundred feet. The hose layout shall be straight without kinks or twists. Exception: hose that has been repaired or recoupled shall be tested one length at a time.**
 - (ii) The hose layout shall be straight without kinks or twists.
 - (iii) Hose that has been repaired or recoupled shall be tested one length at a time.
- (f) The test layout shall be connected to the hose test gate valve of the pump. The hose test gate valve shall be used to prevent the reaction of discharging a large volume of water in the event of a hose bursting during the test. If a fire department pumper is used, the hose test gate valve shall not be attached to any discharge outlet at or adjacent to the pump operator's position. The hose test gate valve end of the hose line shall be secured with a belt tie-in or rope hose tool at a point ten to fifteen inches from the coupling. Shut-off nozzles or test caps shall be attached to the far end of the line.
- (g) With the hose test gate valve open and the nozzle or test cap valve open, the pressure shall be gradually raised to forty-five PSI plus or minus five PSI. After the hose test layout is full of water, all air in each hose line shall be exhausted by raising the discharge end of each hose line above the highest point in the system. The nozzle or test cap valve shall be closed slowly; then the hose test gate valve shall be closed.
- (h) The shutoff device or the hose directly in back of the shutoff device shall be secured to avoid possible whipping or other uncontrolled reaction in the event of a hose burst.
- (i) After being filled to forty-five psi plus or minus five psi, the hose shall be checked for leakage at the coupling and tightened with a spanner wrench where necessary. Each hose shall then be marked at the end or back of each coupling to determine, after the hose has been drained, if the coupling has slipped during the test.
- (j) All personnel not required to perform the remainder of the test procedure shall clear the area.

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- (k) The pressure shall be raised slowly at a rate not greater than fifteen psi per second until the service test pressure is attained and then maintained, by pressure boosts if necessary, for the duration of the stabilization period. The stabilization period shall be not less than one minute per one hundred feet of hose in the test layout. After the stabilization period, the hose layout shall hold the service test pressure for three minutes without further pressure boosts.
- (l) While the test layout is at the service test pressure, the hose shall be inspected for leaks. If the inspecting personnel walk the test layout to inspect for leaks, they shall be at least fifteen feet to either side of the nearest hose line in the test layout. Personnel shall never stand in front of the free end of the hose or closer than fifteen feet to the hose and shall not straddle a hose in the test layout during the test.
- (m) If during the test a section of hose is leaking, or if a section bursts, the service test shall be terminated, and that length of hose shall have failed the test. The test layout shall be drained, and the defective hose removed from the test layout. The service test shall be restarted beginning with paragraph (D)(3)(a) of this rule.
- (n) After three minutes at the service test pressure, the pump shall be shut down, the hose test gate valve opened, the pressure allowed to equalize with the source, the pump discharge gates closed, and each nozzle or test cap valve opened to drain the test layout.
- (o) The marks placed on the hose at the back of the couplings shall be observed for coupling slippage. If the coupling has slipped, the hose shall have failed the test.
- (p) The hose records specified in paragraph (B) of this rule shall be updated to indicate the results of the service test for each length of hose tested.
- (q) All hose failing the physical examination, bursting, leaking, or having couplings that fail because of slippage or leaking shall be tagged as required in paragraph (B)(4) of this rule, removed from service, and sent for repair. For leaking hose or for hose jackets failing the physical examination a distinguishing mark noting the location of the defects shall be placed on the hose. For defective couplings, the couplings shall be cut from the hose.

(4) Unlined hose.

Unlined fire hose shall not be ~~replaced with an approved lined fire hose when service testing is required~~ used for fire fighting.

(E) Application.

The requirements of this rule shall apply only to fire hose, couplings, and nozzles contracted for or bought on or after the effective date of this rule, except that the requirements of paragraph (D) of this rule shall also apply to all fire hose, couplings, and nozzles owned before the effective date.

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4123:1-21-07

Fire department occupational safety and health.

(A) Incident management.

- (1) An incident management system shall be established with written standard operating procedures applying to all members involved in emergency operations.
 - (a) All members involved in emergency operations shall be trained in the system.
 - (b) The incident management system shall be utilized at all emergency incidents.
 - (c) The incident management system shall be applied to drills, exercises, and other situations that involve hazards similar to those encountered at actual emergency incidents and to simulated incidents that are conducted for training and familiarization purposes.
- (2) The incident management system shall utilize the concept of risk management based on the following principles:
 - (a) Activities that present a significant risk to the safety of members shall be limited to situations where there is a potential to save endangered lives.
 - (b) Activities that are routinely employed to protect property shall be recognized as inherent risks to the safety of members, and actions shall be taken to reduce or avoid these risks.
 - (c) No risk to the safety of members shall be acceptable when there is no possibility to save lives or property.
- (3) The employer shall establish and ensure the maintenance of a fire dispatch and incident communication system.
- (4) Each crew operating within the hazardous environment shall be provided with communication equipment capable of communicating with the incident command.

(B) Accountability.

- (1) The employer shall establish written standard operating procedures for a personnel accountability system that provides for the tracking and inventory of all members operating at an emergency incident. The system shall provide a rapid accounting of all personnel at the incident scene.
- (2) The employer shall consider local conditions and characteristics in establishing the requirements of the personnel accountability system.
- (3) It shall be the responsibility of all employees operating at an emergency incident to actively participate in the personnel accountability system.
- (4) The incident commander shall be responsible for overall personnel accountability for the incident. The incident commander shall initiate an accountability and inventory worksheet at the very beginning of operations and shall maintain that system throughout the operations.

(C) Operating at emergency incidents.

- (1) The employer shall provide an adequate number of personnel to safely conduct emergency scene operations. Operations shall be limited to those that can be safely performed by the employees available at the scene. No employee or employees shall commence or perform any firefighting function or evolution that is not within the established risk management principles as specified in paragraphs (A)(2)(a), (A)(2)(b), and (A)(2)(c) of this rule.
- (2) Employees operating in hazardous environments at emergency incidents shall operate in teams of two or more.

Team members operating in hazardous environments shall be in communication with each other through visual, audible, or physical means, in order to coordinate their activities. Team members shall be in close proximity to each other to provide assistance in case of an emergency.
- (3) In interior structural fires a minimum of four employees shall be required, consisting of two employees working as a team in the hazardous atmosphere, who shall remain in voice or visual contact with each other; and two members who are located outside the hazardous atmosphere, who shall be responsible for maintaining a constant awareness of the number and identity of those operating in the hazardous atmosphere and be prepared to perform rescue of those members if required. Interior structural firefighting means the physical activity of fire suppression, rescue, or both, inside of buildings or enclosed structures which are involved in a fire situation beyond the incipient stage.

- (4) Initial attack operations shall be organized to ensure that, if upon arrival at the emergency scene, the initial attack employees find an imminent life-threatening situation where immediate action could prevent the loss of life or serious injury, such action shall be permitted with less than 4 employees. No exception shall be permitted when there is no possibility to save lives. Any such actions taken shall be thoroughly investigated by the employer.

(D) Operating at traffic incidents.

- (1) The employer shall establish written standard operating procedures regarding emergency operations for traffic incidents.
- (2) Fire apparatus shall be positioned in a blocking position, so if it is struck it will protect members and other persons at the incident scene. When acting as a shield, apparatus emergency/warning lights shall remain on.
- (3) All additional responding vehicles, when arriving on the scene, shall position beyond the traffic barrier unless their function requires placement before the barrier.
- (4) One or more of the following warning devices shall be used to warn oncoming traffic of the emergency operations and the hazards to members operating at the incident:
 - (a) Five fluorescent orange traffic cones not less than twenty eight inches in height, each equipped with a six inch retro - reflective white band no more than four inches from the top of the cone, and an additional four inch retro - reflective white band two inches below the six inch band;
 - (b) Federal highway administration (FHWA) approved forty eight inch by forty eight inch retro - reflective signs stating "Emergency Scene Ahead" (with directional arrow overlay);
 - (c) Five illuminated warning devices such as highway flares;
 - (d) Other warning devices appropriate to warn oncoming traffic of the emergency operations.
- (5) When employees are operating at a traffic incident and their assignment places them in potential conflict with motor vehicle traffic, they shall wear a

garment that meets the ANSI/ISEA 107-~~2004~~ 2010, Class 2 or 3 "Standard for High - Visibility Safety Apparel," or public safety vest that meets ANSI/ISEA 207-~~2006~~ 2011 "Standard for High - Visibility Public Safety Vests," with fluorescent and retro - reflective material.

(E) Risk management.

The employer shall develop and adopt a comprehensive written risk management plan. The plan shall consider all fire department policies and procedures, and it shall include goals and objectives to ensure that the risks associated with the emergency and non-emergency operations of the fire department are identified and effectively managed.

(F) Employee fitness.

- (1) The employer shall establish and provide a health- related fitness and wellness program that enables members to develop and maintain a level of health and fitness to safely perform their assigned functions. This program will not be punitive, as the purpose of the program is to improve the health and well-being of the individual.
- (2) It shall be the responsibility of all employees to actively participate in the fitness and wellness program.
- (3) The employer shall adopt a written ~~policy that establishes a program designed to relieve the stress generated by an incident that could adversely affect the psychological and physical well-being of fire department employees~~ protocols to address occupational exposure to atypical stressful events that employees may experience in the course of their job duties.

(G) Infection control.

The employer shall operate an infection control program that actively attempts to identify and limit or prevent the exposure of employees to infectious and contagious diseases in the performance of their assigned duties.

- (1) Universal precautions shall be observed to prevent contact with blood or other potentially infectious materials. All body fluids shall be considered potentially infectious materials.
- (2) The employer shall establish a written infectious and contagious disease "Exposure Control Plan" that includes universal precautions.

- (3) Engineering and work practice controls shall be used to eliminate or minimize employee exposure.
- (4) The employer shall make available, at no cost to the employee, the hepatitis B vaccine and vaccination series to all employees who have potential occupational exposure. If a routine booster dose(s) of hepatitis B vaccine is recommended by the U.S. public health service at a future date, such booster dose(s) shall be made available, at no cost to the employee.

(H) Hazardous materials.

The employer shall establish written plan that defines the fire department's hazardous materials handling capabilities.

- (1) The plan shall cover all hazardous material operations with all other responding agencies and their roles and capabilities.
- (2) Employers shall develop and require use of a written plan covering the safe use, limitations, care, inspection, maintenance, and replacement of the hazardous materials equipment, and all affected employees shall be trained in accordance of such plan.

(I) Technical rescue.

The employer shall provide or make available and approve personal protective equipment and associated technical equipment that is appropriate for the technical rescue operations that provides for the safety of each member operating at the scene.

- (1) Technical rescue operations are defined by the employers according to their risk management plan as defined in paragraph (E) of this rule.
- (2) Employers shall develop and require use of a written plan covering the safe use, limitations, care, inspection, maintenance, and replacement of the equipment utilized in technical rescue operations, and all affected employees shall be trained in accordance of such plan.

Effective:

Five Year Review (FYR) Dates:

Certification

Date

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4121.12, 4121.121, 4121.13

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4121.12, 4121.13, Const. Art. II Section 35

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