

The Essentials of Fire Fighting Personal Protective Equipment Student Handout

Overview

- Introduction
- Need for PPE
- PPE Selection
- PPE Construction Concepts
- PPE Components
- Use of PPE
- Care & Maintenance

Introduction

- Fire suppression activities normally occur in hostile environments that have a great potential for injury.
- Even though fire fighter deaths and fires have decreased over the last ten years, fire fighter injuries have remained relatively unchanged. What does this mean?

Need for PPE

- The environment
- Changes in fire load
- Toxicity of materials

PPE Selection

- Occupational Safety & Health Administration (OSHA)
- National Fire Protection Association (NFPA)

PPE Construction Concepts

- Provide thermal insulation through layering of materials.
- Provide flame-resistance through the use of synthetic fabrics.
- Provide impact and abrasion-resistance through the use of synthetic materials.

Three Protective Layers of PPE

- Outer Shell
- Moister barrier
- Thermal barrier

PPE Materials

- PBI[®]
- Kevlar[®]
- Gortex[®]
- CrossTech[®]
- Nomex[®]
- Scotchlite[®]
- Fiberglass
- Polycarbonate
- Velcro[®]
- Leather

PPE Components

- Helmet
- Protective hood
- Protective coat
- Protective trousers
- Firefighting Gloves
- Extrication Gloves
- Firefighting boots
- Eye Protection
- Hearing protection
- SCBA
- PASS
- PAT
- Handlight

Use of PPE

- Proper fit
- Proper donning
- Proper adjustment

Eye Protection

- Must meet ANSI specifications
- Clean and free of scratches
- Use eye protection when appropriate
- Carry your eye protection at all times
- Eye protection comes in many forms safety glasses , safety goggles & helmet faceshields
- Helmet face shields are secondary eye protection only!!

Hearing Protection

- Mandated by OSHA (29 CFR 1910.95)
- All apparatus in Montgomery County must have some sort of hearing protection

Integrated PASS Device

- It is permanently affixed to the SCBA.
- It must be checked every day
- It must be maintained in working order.

Personnel Accountability Tag

PPE Care & Maintenance

- Follow manufacturer's recommendations.
- MCFRS Protective Clothing Policy
- Storage
 - Dry area
 - No sunlight
- Quarterly Gear Inspection

PPE Cleaning Tag

MCFRS Station Uniform

- Your uniform is NOT flame resistant
- Do not expose your uniform to open flame or sparks
- Your uniform provides NO thermal protection

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The Essentials of Fire Fighting Self-Contained Breathing Apparatus Student Handout

Overview

- Common Hazardous Atmospheres
- Gas Toxicity
- SCBA Limitations
- Types of Breathing Apparatus
- SCBA Wearer Requirements
- SCBA Parts ID
- Scott 4.5 & Air-Pack Fifty
- Donning & Doffing
- Inspection & Maintenance
- Emergency Procedures
- Cleaning & Refilling

Elevated Temperature

- Rapid inhalation of heated air 120 + can cause acute hypotension
- edema in lungs, asphyxiation
- possible pneumonia / death

Smoke

- Suspended particles of carbon, tar, and dust
- provides location for condensation of gaseous products
- may be simply irritating - possibly fatal
- larger smoke particles filtered by nasal hair and mucous membranes

Toxic Gases

- direct damage to lungs
- passes into blood stream to impair O₂ carrying capacity
- synergistic effect
- severity depends on: nature of combustible, rate of heating, temperature of evolved gases, O₂ concentration

Oxygen Deficiency

- 1st. Noticeable sign is faster breathing
- 17 % muscular impairment
- 12 % dizziness, headache, fatigue
- 9 % unconsciousness
- 6 % death

Gas Toxicity

- Carbon Monoxide
- Carbon Dioxide
- Hydrogen Chloride
- Hydrogen Cyanide
- Nitrogen Dioxide
- Phosgene
- Ammonia
- Chlorine

Types of Breathing Apparatus

- Open -Circuit Self-Contained Breathing Apparatus (SCBA)
 - Compressed breathing air is supplied to the user's respiratory system from a cylinder carried on the user's back. Exhaled air is released to the atmosphere.
 - SCBA is the most common type of respiratory protection used in the fire service.
- Open Circuit Supplied Air Breathing Apparatus (SABA)
 - Compressed breathing air is supplied from a remote location using a long air hose, Exhaled air is released to the atmosphere.
 - Reserved for special rescue and hazardous materials operations – not used for fire attack.
- Closed-Circuit Breathing Apparatus (Rebreather)
 - A rebreather does not use compressed air. Instead, the user's exhaled air is chemically scrubbed of CO₂ and a small amount of O₂ is added from a cylinder contained in the unit.
 - Rebreather's commonly have long durations of use which are advantageous in extended rescue operations such as mine rescue. Rebreathers are not used for fire attack operations.

Montgomery County SCBA

- Bethesda Chevy Chase Rescue Squad - Uses the Cairns SCBA
- All other MCFRS stations use the Scott 4.5 SCBA or the Scott 50 Pak.

HARNESS

- Constructed of a lightweight aircraft aluminum alloy, the back frame follows the shape of the user's back.
- The back frame places the bulk of the SCBA's weight on the user's hips, where wrap-around wings provide comfortable hip support.
- Results in a design intended to minimize shoulder fatigue and give the user maximum freedom of movement.

CONTROL CONSOLE

HEADS-UP REGULATOR

QUICK DISCONNECT

CBRN REGULATOR

HEADS-UP DISPLAY

AV2000 Face Piece

AV 3000 FACE PIECE

RIC UAC CONNECTION

AIR-PAK respirators in compliance with NFPA 1981 are fitted with a Rapid Intervention Crew Universal Air Connection System which permits emergency replenishment of an approved SCBA breathing air supply cylinder on a user's respirator from an approved air supply source while in use.

Scott SCBA Important Data

- Maximum cylinder pressure is 4500 psi
- SCBA operating pressure is 100 psi
- 30-minute cylinders hold 45 cu ft of air
- 45-minute cylinders hold 66 cu ft of air
- 60-minute cylinders hold 87 cu ft of air
- VibraAlert activates at ¼-cylinder capacity
- Hydrostatic test needed every 3-years on composite cylinders.
- MOSH NIOSH certified
- Weight 30 min. 21 lbs..
- Weight 45 min. 27 lbs..
- Weight 60 min. 32 lbs..

SCBA Inspection

•Daily Inspection

– Cylinder is full (>4000psi), VibraAlert® functions, purge valve and donning switch operate properly, face piece is in good condition, PASS device operates properly.

•Monthly Inspection

–Check all components for deterioration, clean and disinfect the regulator.

SCBA Maintenance

•Preventive Maintenance & Repair

–SCBA Repair Shop 240-777-2221

–SCBA repair technicians are Scott certified and are the **only** personnel authorized to repair MCFRS SCBA.

–Annual preventive maintenance is performed on all MCFRS

–SCBA repairs are made on an as needed basis by completing a repair tag and forwarding the item to the repair shop.

Replacing the Cylinder

SCBA Emergency Procedures

- Face Piece Failure
- Breathing Regulator Malfunction
- Pressure Reducer Malfunction
- Air Depletion

Emergency Breathing Support System (EBSS)

SCBA Cleaning

•SCBA unit

–Mild soap and water using a scrub brush.

–Do not submerge components in water!

–Do not submerge an integrated PASS in water!

•Face piece

–Mild soap and water using a soft cloth.

–Can use an approved disinfectant if needed.

•Breathing regulator

–Multi-wash solution

–6 sprays, wait 10-minutes,

–Rinse with spray bottle of clean water

Refilling SCBA Cylinders

- Cylinders are refilled based upon the principle of air moving from high pressure to low pressure.
- Cylinders are refilled using either a storage bank of larger cylinders (cascade system) or a breathing air compressor system, or a combination of both.
- All safety guidelines must be followed in order to prevent injuries should a cylinder rupture during refilling operations.

Review

- Common Hazardous Atmospheres
- Gas Toxicity
- Types of Breathing Apparatus
- SCBA Wearer Requirements

SCBA Limitations

- Scott 4.5 SCBA
 - Inspection & Maintenance
 - Donning & Doffing
 - Emergency Procedures
 - Cleaning & Refilling
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