3M™ RBE Loose Fitting Powered Air Purifying Respirator (PAPR) System
NIOSH CBRN PAPR Approved

RBE-NM10, with NiMH Battery
RBE-L10 with Lithium Primary Battery

Warning:

Read the printed *User Instructions* provided with each 3M™ RBE Loose Fitting Powered Air Purifying Respirator (PAPR) System before use. The *User Instructions* include numerous warnings that, if not followed, could result in serious injury, sickness or death.

The employer must have a written respirator program in place in accordance with the OSHA standard for respiratory protection: 29 CFR 1910.134. Infection control personnel should also be consulted regarding any policies or procedures related to infectious agents.

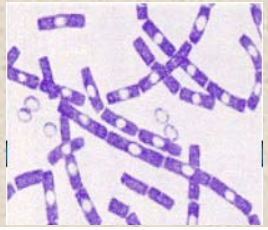
NIOSH CBRN PAPR Certifications

- NIOSH CBRN testing is additional testing performed on 42 CFR 84 approved respirators
  - Special tests under NIOSH 42 CFR Part 84.63(c)
    - (1) Durability conditioning
    - (2) Chemical agent permeation and penetration resistance against distilled Sulfur Mustard (HD) and Sarin (GB)
    - (3) Laboratory Respirator Protection Level (LRPL)
    - (4) Canister test challenge and test breakthrough concentrations
  - NIOSH Currently has CBRN approvals available for:
    - Full face Air Purifying Escape
    - Full face Air Purifying
    - SCBA
    - Close Circuit SCBA
    - PAPRs

NIOSH CBRN PAPR Approvals

- NIOSH has two CBRN approvals for PAPRs.
  - Loose Fitting (23C Cartridge Approval – can be used for escape up to IDLH)
  - Tight Fitting (14G Canister Approval – can be used for escape above IDLH)
- Systems must be approved to 42 CFR 84 requirements before they can be tested for CBRN approval

CBRN Warfare Agents



- ***C**hemical agents can be solids, liquids, gases or vapors*
  - *Can also be hazardous through skin exposure*
  - *Industrial chemicals may be used as a weapon*
- ***B**iological agents are particles*
  - *No known exposure limits and may not know you've been exposed until afterwards*
- ***R**adiological agents are radioactive particles*
  - *May be dispersed through a "dirty bomb"*
- *Respirators won't protect from a **N**uclear blast*
  - *May help filter dust from the aftermath*

OSHA Standard for Hazardous Waste Operations and Emergency Response (HAZWOPER)

- *Level A-D personal protective equipment (PPE) based upon required level of skin and respiratory protection*
- *Level C personal protective equipment (air purifying respirators) may be used only if all of the following are met:*
  - Oxygen concentration is at least 19.5%
  - Contaminant is identified and concentrations are not immediately dangerous to life or health (IDLH)
  - Contaminant concentrations are within the maximum use concentration for the respirator
  - Lesser level of skin protection required (does not require a totally encapsulating chemical protective suit)
  - There is an appropriate cartridge/filter available for the contaminants
  - If the contaminant is a gas or vapor, a cartridge or canister change schedule has been developed

Canister RBE-57

- *NIOSH Testing*
  - High Efficiency particulate filtration (99.97%)
  - "Cap 1" means test life > 15 minutes against NIOSH Test Chemicals.

  Actual service life may be longer at lower concentrations
- *Cartridge approval means it can be used to escape from environments less than IDLH*
- *5 year shelf life with cap and plug in place*
  - *Expiration date printed on foil wrapper and bottom of canister*

Time Use Limitations

- *Warfare Agents – replace entire system within 8 hours if exposed to vapors, or within 2 hours of exposure to liquid agents*
- *Particles – replace canister if it becomes contaminated with warfare agents, dirty, damaged or does not provide >6cfm air flow*
- *Gases or vapors – develop canister change schedule based on contaminant and concentration levels*
  - *Technical data bulletin #177 for RBE-57 CBRN cartridge*
    - *www.3M.com/occsafety → literature and publications*
  - *3M Service Life Software should be available soon.*
    - *www.3M.com/occsafety → cartridge change schedule*

RBE-L10

Butyl Hood, BE-10BR
BE-Turbo, 022-00-03
Non-rechargeable Battery (10 yr shelf life), 520-04-57
Breathing tube w/ clamp, RBE-BTH
Decon belt, RBE-BLT
Cartridges, RBE-57
Airflow Indicator, 520-01-21
Duffle bag, 629-02-56

RBE-NM10

Butyl Hood, BE-10BR
BE-Turbo, 022-00-03
Rechargeable NiMH Battery, BP-15
Breathing tube w/ clamp, RBE-BTH
Decon belt, RBE-BLT
Cartridges, RBE-57
Airflow Indicator, 520-01-21
Duffle bag, 629-02-56

Intended Use

- Motor blower draws contaminated air through a cartridge and blows filtered air up into head covering
- When properly used, it helps reduce respiratory exposure to gases, vapors and particles including biological and radiological aerosols
- PAPR with hood has OSHA Assigned Protection Factor of 25 or 1000.
  - For APF of 1000 manufacturer must provide evidence supporting APF.
  - 3M recommends APF of 1000. (Refer to Tech Data Bulletin 175 for APF information on hoods)
- Not for use with contaminant concentrations that are immediately dangerous to life or health (IDLH)
- Not for use in oxygen deficient environments (< 19.5%)

Rechargeable NiMH Battery BP-15

- Up to 8 hour run time (less at high or low temperatures and high filter loading)
- Storage: -4° to 115° F (-20° to 45° C), dry (< 85% relative humidity)
- Low voltage indicator light located on top of battery
  - If battery switch is turned on, red light indicates that battery must be recharged
  - Shortly after red light comes on, battery will shut down (red light will no longer function)
- Color strip indicates year of manufacture
- Up to 400 charge/discharge cycles
- A new battery must be fully charged and completely discharged three times to reach full capacity

BC-210 Charger

- Can link up to 10 chargers together
- Charges battery in 4 hours (90% charge in two hours)
- Batteries may be charged any time during discharge cycle
- Recommended storage method is to leave battery on charger
- Charge batteries between 50°F (10ºC) and 90°F (32ºC).
- If a battery feels hot, let it cool for 1/2 hour before charging.
- Do not charge batteries stacked together, on top of charger, or in an enclosed cabinet
    - Heat must be allowed to dissipate

Battery Charging

- Before use of a new Smart Battery Charger BC-210 remove plastic protective cover between power base and adapter module.
- Plug the charger power cord into the battery charger and the other end into a wall outlet
- LED (left side of charger when facing it) on the power base indicates status of base charger

Power Base Status	**LED Status**
Power is ok, ready to start charging	Steady green
Excess current, not ready to charge	Steady yellow
Too hot	Steady Red

Battery Charging (Cont.)

- Insert charging lead into socket on top of battery. LED indicator (right side of charger when facing it) on adapter module shows charging status

Charger Status	**LED Status**
Power ON	Momentary (single) flash green
Standby; waiting to charge (pulse charge – battery is warm or very low voltage status)	Steady yellow (leave battery connected, when it cools or voltage is increased battery rapid charge will begin)
Rapid charging	Rapid flashing green
Top-off charge	Slow flashing green
Charge complete; ready mode	Steady green
Battery fault	Steady Red

3M™ Battery Pack, Lithium

- Non-rechargeable.
- Up to12 hour run time (temperture and filter loading will affect run time).
- Grid printed on side of label allows user to mark number of hours used.
- 10 year shelf life. A manufacturing date code (MM/YY) is printed on the side of the label.
- 32°F to 120°F (0° C to 48° C) operating temperature.
- After final use, the battery should be completely discharged using the de-activation device located on the top of the battery. See User Instructions for further information.
- May wish to train with rechargeable NiMH batteries and store PAPRS with lithium batteries
- Passenger Aircraft restrictions.

520-04-57R01

Cartridge Replacement

The cartridges must be changed if:

- The cartridge has been physically damaged
- The PAPR does not pass the air flow test with a properly charged battery
- Required by administrative procedures including infection control guidelines
- According to a cartridge change schedule
  - Depends on contaminant, concentration, temperature, relative humidity, flow rate, etc.
  - Please see Service Life Software or technical data bulletins for 3M™ Canister RBE-57 at www.3M.com/occsafety

Before Use: Inspection

- Inspect hood for damage or separated seams.
- Check breathing tube for any punctures
- Ensure that cartridges have not expired and have not been opened
- Check body of the motor blower unit for cracks or general wear.
- Ensure that NiMH battery has been charged or that there are enough hours remaining on the lithium battery.
- Perform air flow check

Air Flow Check

- Remove breathing tube from blower
- Attach cartridges and remove plugs
- Insert airflow indicator into blower and turn PAPR on.
- Middle of ball in flow indicator must rise up to at least "6 CFM" location on flow meter for use with hood
- If PAPR does not pass the test, repeat inspection or see your supervisor. Do not use unit.
- Reattach breathing tube to blower

Donning with 3M™ Hoods R-Series

- Attach the unit to your waist and turn PAPR on by turning switch on battery.
- Push the slotted end of the breathing tube into the connector in the rear of the hood until it snaps into place.
- Pull the hood over your head and adjust it so the headband wraps around your head.
- Tuck the inner shroud under your protective clothing and allow the outer shroud to hang outside your clothing.

Trouble Shooting

Problem	Possible Causes	Corrective Action
Smell or taste contaminants, irritation during use	Misuse, improper assembly, or malfunction of equipment	Leave area immediately and contact supervisor. Do not use PAPR until corrected.
Blower does not run	Battery is discharged Faulty power switch Faulty motor	Recharge or replace battery Replace motor blower Replace motor blower
Low airflow	Battery needs charging Filter in cartridge is loaded PAPR blower malfunction Breathing tube restricted.	Use fully charged battery Replace cartridge Switch to a different blower unit Remove restriction

Cleaning/Decontamination

- If system has been exposed to Live Warfare Agents it should be disposed of after 2 hours for liquid and 8 hours for vapor.
- Follow the industrial hygiene / infection control practices established by your employer for the specific contaminants to which you have been exposed.
- For general cleaning, wipe the outside surfaces of the PAPR system with a solution of warm water and mild detergent. Do not clean with organic solvents. Do not soak the blower unit or battery in cleaning solutions.
- Wipe with a cloth dampened with clean warm water.
- If necessary wipe with a cloth dampened with a hypochlorite solution (1 oz. [30ml] household bleach in 2 gallons [7.5 L] of water).
- Other methods of cleaning, disinfection or sterilization have not been tested for compatibility with the PAPR, may damage the PAPR system, and therefore must not be used.

Storage

- Store components in a cool dry area that is free from contaminants and direct sunlight.
- Store in such a way as to protect the PAPR from physical damage.
  - For the hood, use foam insert to maintain form and prevent creasing of visor.
- Respirators assigned to an individual should be marked as such or stored in a specific location.

Battery Storage

- NiMH batteries stored at room temperature lose about 2% charge per day (more rapidly at higher temperature)
- NiMH batteries may be left connected to charger
  - Trickle charge overcomes normal charge loss
- Infrequently used batteries that are not left on a charger should be charged initially, then at least monthly
- Batteries subjected to prolonged storage (longer than 1 year) may lose capacity to hold a full charge
  - ➢Run PAPR with airflow indicator and determine if 6 cfm is maintained for desired use time
  - ➢If necessary, charging and discharging battery 2 or 3 times may restore battery capacity

Suggested Monthly Maintenance

- According to OSHA, respirators used for emergencies must be inspected monthly and before and after use.
- Visually inspect entire PAPR system (blower, breathing tube and hood or head cover) for damage.
- Check that cartridge caps and plugs are intact and that the shelf life printed on bottom of cartridge has not been exceeded.
- Perform a flow check. If flow is not adequate, make sure that battery has been properly charged. Replace cartridge, battery or charger as necessary.

Specifications

Operating Temperature	0 to 120F (-18 to 48C), 32F (0C) lower limit with lithium battery
Battery pack	Rechargeable NiMH (up to 8 hrs of use per charge) or 12 hour lithium
Airflow range	> 6 cfm (170 lpm) with hoods
Weight	Approximately 8 lbs (3.6 kg)
Natural rubber latex?	Hoods (yes)
Faceshield	Butyl Rubber: pressed vinyl

Components and Replacement Parts

Part Number	Description
BE-10BR	Butyl Rubber Hood
RBE-BTH	Breathing Tube w/ Clamp
520-01-00	Breathe Easy Assembly, includes motor blower, NiMH battery, belt and flow meter
022-00-03R01	Motor Blower
BP-15	Rechargeable Battery (NiMH)
RBE-BLT	Decon Belt
RBE-57	Cartridges
520-01-21	Airflow Indicator
BC-210	Battery Charger
RBE-CMH	Communication System, Hood
RBE-MIC	Throat Microphone
RBE-TRN	Training Cartridges
RBE-SC	Shower Covers
RBE-CMP	Breathing Tube Clamp

3M™ Technical Service

USA: 1-800-243-4630

Canada: 1-800-267-4414

Web Site:
www.mmm.com/occsafety