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

• **Chemical agents can be solids, liquids, gases or vapors**
  Can also be hazardous through skin exposure
  Industrial chemicals may be used as a weapon

• **Biological agents are particles**
  No known exposure limits and may not know you’ve been exposed until afterwards

• **Radiological agents are radioactive particles**
  May be dispersed through a “dirty bomb”

• **Respirators won’t protect from a Nuclear 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

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For Internal and External Use
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

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For Internal and External Use
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 (10°C) and 90°F (32°C).
- 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

<table>
<thead>
<tr>
<th>Power Base Status</th>
<th>LED Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power is ok, ready to start charging</td>
<td>Steady green</td>
</tr>
<tr>
<td>Excess current, not ready to charge</td>
<td>Steady yellow</td>
</tr>
<tr>
<td>Too hot</td>
<td>Steady Red</td>
</tr>
</tbody>
</table>
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

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

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3M™ Battery Pack, Lithium

- Non-rechargeable.
- Up to 12 hour run time (temperature 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.
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/occ safety

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

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Temperature</td>
<td>0 to 120F (-18 to 48C), 32F (0C) lower limit with lithium battery</td>
</tr>
<tr>
<td>Battery pack</td>
<td>Rechargeable NiMH (up to 8 hrs of use per charge) or 12 hour lithium</td>
</tr>
<tr>
<td>Airflow range</td>
<td>&gt; 6 cfm (170 lpm) with hoods</td>
</tr>
<tr>
<td>Weight</td>
<td>Approximately 8 lbs (3.6 kg)</td>
</tr>
<tr>
<td>Natural rubber latex?</td>
<td>Hoods (yes)</td>
</tr>
<tr>
<td>Faceshield</td>
<td>Butyl Rubber: pressed vinyl</td>
</tr>
</tbody>
</table>
# Components and Replacement Parts

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BE-10BR</td>
<td>Butyl Rubber Hood</td>
</tr>
<tr>
<td>RBE-BTH</td>
<td>Breathing Tube w/ Clamp</td>
</tr>
<tr>
<td>520-01-00</td>
<td>Breathe Easy Assembly, includes motor blower, NiMH battery, belt and flow meter</td>
</tr>
<tr>
<td>022-00-03R01</td>
<td>Motor Blower</td>
</tr>
<tr>
<td>BP-15</td>
<td>Rechargeable Battery (NiMH)</td>
</tr>
<tr>
<td>RBE-BLT</td>
<td>Decon Belt</td>
</tr>
<tr>
<td>RBE-57</td>
<td>Cartridges</td>
</tr>
<tr>
<td>520-01-21</td>
<td>Airflow Indicator</td>
</tr>
<tr>
<td>BC-210</td>
<td>Battery Charger</td>
</tr>
<tr>
<td>RBE-CMH</td>
<td>Communication System, Hood</td>
</tr>
<tr>
<td>RBE-MIC</td>
<td>Throat Microphone</td>
</tr>
<tr>
<td>RBE-TRN</td>
<td>Training Cartridges</td>
</tr>
<tr>
<td>RBE-SC</td>
<td>Shower Covers</td>
</tr>
<tr>
<td>RBE-CMP</td>
<td>Breathing Tube Clamp</td>
</tr>
</tbody>
</table>
3M™ Technical Service
USA: 1-800-243-4630
Canada: 1-800-267-4414
Web Site: www.mmm.com/occsafety