



Pneumatic Transport Ventilation

Use of Nuclear Biological Chemical (NBC) Filters with pNeutron Ventilators

Nuclear Biological Chemical (NBC) filters are used in conjunction with full face gas masks to provide safe breathing in hazardous environments. These filters provide protection against:

- Radioactive and highly toxic particles, aerosols and micro-organisms
- Warfare and terrorism agents such as anthrax, sarin, smallpox, mustard gas, cyanogen, arsine and phosgene
- Bacteria and viruses
- Industrial organic and inorganic gases such as chlorine, hydrogen cyanide, hydrogen sulphide
- Organic and inorganic acids such as formic acid, sulphur dioxide, hydrogen fluoride and hydrogen chloride
- Riot control agents like CN and CS tear gases

During a mass causality event where any of the above agents are released there is the likelihood that victims will be in severe respiratory distress requiring mechanical ventilatory support. While rescuers can be protected from the effects of these agents by using NBC equipped gas masks or self contained respirators, the commonly used ventilatory devices do not offer patients any protection. The standard Bag Valve Mask (BVM) resuscitator entrains outside air in order to operate. Disposable resuscitators, such as the Vortran, also entrain outside air. In a hazardous environment any victim that is being ventilated with these devices will continue to receive contaminated air until the agent is removed from the environment.

pNeutron Ventilators entrain outside air to deliver 65% oxygen. The standard filter on the rear of the ventilator is designed to trap most small particles. With a special adapter, an NBC filter can be substituted for the standard air filter. This is done by simply unscrewing the standard filter and screwing on the optional NBC filter. With the NBC filter in place all air delivered to the patient will be free of all nuclear, biological and chemical contaminates. The pNeutron Ventilator will operate normally when the NBC filter is attached. All ventilatory support applications, including Face Mask CPAP, non-invasive and invasive ventilation can be provided at 65% or 100% delivered oxygen.

To confirm the proper operation of pNeutron with NBC filters, the following tests were performed:

- The ventilator was set up to ventilate a Michigan Instruments TTL test lung at 65% oxygen setting using either the standard air filter or the optional NBC filter (a Scott # 805557-01).
- During mandatory ventilation with the tidal volume set at 1,200 ml there was no difference in delivered tidal volume or oxygen concentration between the two filters.
- During spontaneous ventilation at CPAP 10 cm H₂O there was no difference in delivered CPAP, baseline flow or oxygen concentration between the two filters.
- During simulated peak inspiratory flow of 75 L/min on CPAP 10 cm H₂O there was no significant difference in delivered flow or oxygen concentration between the two filters.

The pNeutron Ventilator is safe and effective to use in hazardous environments with the optional NBC Adapter / Filter available as part number 58070.

Note: Operating pNeutron in environments with reduced or absent oxygen concentration should always be done using the 100% oxygen setting to maximize patient safety.



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