

The Two Safety Issues Related to Conventional PPE

The lack of adequate PPE head covering has continuously endangered our emergency responders and healthcare workers during disasters (9/11, Ebola incident, and the recent Covid-19). Many of them suffered severe health issues or got infected by leaving their head and face exposed even though a N95 or surgical mask was worn.



It is commonly understood that infectious or other harmful substances falling on the head, face, and neck creates a fatal situation for emergency responders and healthcare workers in any disaster. **When a mask is required, a head covering is needed as well.** While agencies and healthcare systems are stocking N95 masks by the millions, acquiring at least an equal number of protective head coverings is also necessary.

Problem 1: PPE Hoods for primary head protection are the critical component missing in conventional PPE. Basically, there was no suitable material available for making head coverings that conformed to the contours of the wearer's head and face.

Because the materials were stiff, conventional head coverings (such as nonwoven and Tyvek hoods) had to be made baggy to cover different head sizes. Not only did that create too much gapping to provide an effective barrier, they also did not fit well even when incorporated with elastic components. Coverall hoods are a common alternative; however, they quickly tire the wearer because of restricting head movement and mobility. PAPR hoods are expensive and the decontamination after each use is an additional tedious job. Further, they are inconvenient/cumbersome for many quick jobs. Consequently, healthcare workers are left (or elect) to expose their heads and faces in infection-risk environments during their daily jobs.

Problem 2: Facemasks are not reliable for respiratory protection in work environments. The problem with masks is leakage. Because faces vary in shape and nose-bridge height, there are many gaps between a wearer's face and the edges of a flat facemask. Also, their elastic ear-loops are either too loose or too tight for proper fit. Masks often fall from the nose to cover only wearer's mouth or even hang under the chin protecting nothing. Meanwhile, the elastic straps of the rigid dome-shaped masks have to be uncomfortably tight to seal at all. Even then, the mask moves and leaks when the wearer talks or sweats.

To wear a N95 mask is complicated. Required by CDC and OSHA respectively, the wearer has to be pre-qualified by passing a medical evaluation (for chronic respiratory, cardiac, or other medical conditions), fit test (for selecting model, style, and size), and seal test (for airtight fit). Not only do people not always remember which models/makes of N95 masks fit them best, emergency stocks may not always have all models to meet the demands of every individual.

The airtight fit of a N95 mask is created by two strong elastic straps. Even then, a perfect fit cannot always guarantee against leakage since the mask can move while speaking or sweating. Even worse, the airtight-fit often causes skin pain and bruising in just a short period of time. The discomfort and difficulty in breathing often causes wearers to move (pull away) the mask.

If the risk is low, why go through the hassles required for wearing a N95 mask? On the other hand, in urgent and lethal environments, why mandate any healthcare worker and emergency responder to risk their life on a N95 mask that uses two simple elastic straps and gives an unreliable seal?

Nonetheless, N95 masks have been over-promoted for their usefulness in blocking virus. In fact, the excessive thickness of N95 masks does not provide more benefit than surgical masks in filtering particles when they are used in normal breathing (less than 10 liters per minute). Instead, it creates difficulty in breathing.

The Solution:

Latex-free Elastic Nonwovens to Make Innovative Soft-stretch Hoods

The latex-free elastic nonwoven fabrics are created by a unique thermo-mechanical treatment without incorporating elastomers. Our elastic nonwovens are the breakthrough materials that give a soft and stretchy structure while maintaining the breathability and barrier functionality of nonwovens.

When stretched, the intertexture fibers of the elastic fabrics shift position, but do not create pin holes. Meanwhile, the ultrafine gaps between fibers in their dense fiber-composite structures allow vapor and air to flow through while blocking particles and liquids to provide barrier functionality.

Our Soft-stretch Biosafety Hoods provide effective head covering against Ebola, Covid-19, and other communicable diseases by blocking micron-sized particles, viscous fluids, and blood splashes.

The FDA guiding principles for surgical masks were followed throughout the development process to design their barrier properties to include breathing resistance (ΔP) of less than 3.5, bacterial filtration efficiency (BFE) of >90%, particle filtration efficiency (PFE) of >95% @ 0.1 μ , and blood penetration resistance of level-1.

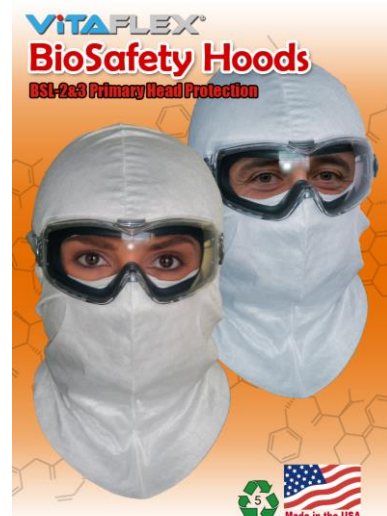
The innovative advantage is Comfort:

- **Soft Form-fit** to securely cover the head without restricting peripheral vision, head movement, and wearer's mobility.

When wearing our soft-stretch hoods, the soft form-fit gives the wearer a **sense of security** from the feel of an isolation layer next to the skin.

By covering the entire head, face, and neck, it gives a **sense of dignity** when the wearer deals with disgusting waste and foul liquids.

- **Easy Breathability** to keep the head cool for extended wear. It **eases the anxiety** in stressful work situations.



Innovative PPE Hoods Made in the USA
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Solution 1- Replacing facemasks: By wearing properly with goggles that fit the wearer's face (seals around the nose and presses firmly on the nose bridge), our Biosafety hoods can provide effective respiratory protection and replace facemasks in general work environments.

If high filtration is desired, they can be worn under or over a mask or full-face respirator to provide an additional layer of barrier and a soft cushion of comfort and to reduce gapping from respirator movement due to work or sweat. In the extreme situation, wearing our Biosafety hood under the PAPR or hazmat hood provides continuous protection after removal of the contaminated suit.



Solution 2- Replacing alternative head coverings: Our Biosafety hoods are replacing the conventional head coverings and coverall hoods since they provide more form-fit and comfort with unrestricted head movement and mobility. Owing to the low air-flow resistance of hood structures and ample space inside the hood, they allow for easy breathability and fast dissipation of exhaled air which reduces goggle fogging.

The Hooded Coveralls have been criticized for quickly tiring the wearer because they restrict head movement and mobility. **It is more practical and economical to wear our Biosafety hood with an un-hooded coverall suit.** Wearing two hoods is recommended. That way, the outer layer can be removed upon being contaminated while the inner layer remains in place keeping the wearer protected until there is no longer a danger and the respirator has been removed.

Powered Air Purification Respirator (PAPR) provides complete coverage for the head. However, of great concern is that the removal of the PAPR hood would immediately expose the wearer's head to contaminants accumulated on the suit. Even changing the doffing procedure to remove the PAPR last leaves a risk of accidental self- contamination from the contaminated PAPR.

Wearing a Biosafety hood under the PAPR or hazmat hood provides continuous protection after removal of the contaminated suit. Our Biosafety hoods should be the first PPE put on and the last removed.

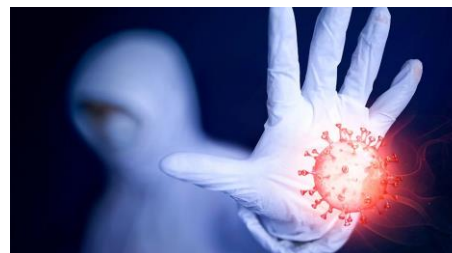


Caution: VitaFlex's soft-stretch hoods are NOT for replacing respirators in OSHA requirements. Not for blocking concentrate detergents, high viscosity solutions, organic solvent, toxic or bio-hazard gases, fumes, or vapors. Not for blocking pressurized liquid and particles.

	<p style="text-align: center;">Donning Procedure</p> <p>First, pull the hood down all the way until it touches the top of the head. Then, adjust the eye-opening. Lastly, hold the nose bridge line and pull the hood collar tip (as shown in photo) to straighten the hood's center line and create an air-pocket around the nose and mouth. This will allow for dissipation of exhaled air.</p>
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