

Cooper™ 1070 Advanced Filtering Face Mask (AFFM)

Made in Las Vegas, NV USA

SGS Labs Tested to ASTM 3502-21 Compliance

Bifold, Earloop





What is an Advanced Filtering Face Mask (AFFM)?

A Complete Informational Guide to AFFMs

Learn all of the basics behind why AFFMs are the best choice for your industry



The rise and fall of the persistent COVID-19 outbreaks across the world have proportionally driven respirator and mask usage and sales over the last few years. And as production rates begin to slowly creep to match ongoing demand, the consumer base, including that of healthcare and frontline workers, have sought after equipment that not only is trusted to protect them while they work, but also comfortable enough to wear for long hours while still easily replaced throughout the duration of their job.

This shift in the tide of the market forced the U.S. Center for Disease Control's National Institute for Occupational Safety and Health (NIOSH) to create a minimum performance standard for face mask filtration and breathability.[2] On February 15, 2021, the global industry standards group ASTM published F3502-21, Standard Specification for Barrier Face Coverings with support, and approval from the CDC.[3]

I. Function over Ideals

What is Most Important?

While NIOSH-approved respirators are still the gold standard promoted for use during the pandemic by the CDC, specific strict attributes required by NIOSH may not necessarily be preferred by the end consumer in the field. From first hand interviews with healthcare nurses, NIOSH-required elastic mask headbands make swapping out masks much more difficult, especially when considering other worn equipment like surgical bouffants and face shields. Increased air flow resistance, also required by NIOSH, creates breathing difficulty for those in high stress and

highly physical occupations. This would lead ASTM to restructure more realistic standards based strictly around filtration efficiency and breathability. The ASTM F3502-21 specifications break down filtration efficiency and breathability into Level 1 (Lower Performance) and Level 2 (Higher Performance) in each category.[3]

Testing Standards

Like surgical face masks and respirators, advanced filtering face masks are tested similarly to NIOSH approved respirators regarding filtration efficiency and breathability. However, each product must satisfy minimum compliance to whichever standard they seek to achieve.

Per ASTM F3502-21 testing filtration minimum requirements, face masks must reach a minimum sub-micron filtration efficiency of 20% to qualify as a Level 1 mask. In application, this would mean that the mask would only successfully block one in five aerosol particles sized at 0.3µm from entering the respiratory system through the filtration media, similarly sized to aerosol viral particles like airborne coronavirus. Level 2 denotes that filtration efficiency must be a minimum of 50%.[4]

Breathability is evaluated similarly to NIOSH respirators and measured in units of airflow resistance pressure, mm H₂O. A lower value represents less resistance, while a value of zero represents no obstruction resistance. This translates into real world applications as a barrier face covering that is easier to breathe through and more comfortable to wear for longer periods. Less airflow resistance pressure means less strain and work on the respiratory system and

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heart. ASTM F3502-21 denotes that a Level 1 barrier face covering meets a maximum airflow resistance of 15 mm H₂O or below, while Level 2 meets a maximum airflow resistance of 5 mm H₂O or below.[3]

Face mask re-use potential must meet general ASTM performance standard cycle requirements right out of the package identified by the manufacturer.

Leakage describes how well the barrier face masks seals and covers around the face to prevent particles from entering or exiting the sides. Though manufacturers seek to minimize this through design and manufacturing, it is a non-mandatory quantitative test of the standard.[3]

And lastly, the standard provides a series of design requirements for the barrier face coverings that range from general construction, use of nonirritating and nontoxic materials, flammability, sizing, and shelf life, all similarly to that of NIOSH testing requirements even though



barrier face masks that conform with ASTM F3502-21 are not to be considered respirators certified under NIOSH's approval program and do not meet minimum requirements of federal regulation at 42 C.F.R. Part 84.[2,3]

How Do They Compare?

There are many similarities to the general design construction, materiality and physical attributes of AFFM ASTM 3502-21 compliant barrier face coverings to current market behemoths of the N95 and KN95 respirators. It is in the smaller physical design changes and shifted priority in performance requirements that allow for AFFMs to be more comfortable to wear over long durations and easier to swap in and out without drastically compromising personal safety.[6]

The first is foregoing the NIOSH elastic requirement of over-the-head attachment bands and allowing for more conventional behind-the-ear elastic loops. In many real world cases in healthcare, hospital nurses are required to wear a multitude of face protection, additional to a respirator. This may include a surgical bouffant, face shield, hair tie, safety glasses, etc. With over-the-head elastic bands, changing respirators becomes a challenge as much of the face protection must be removed in order to do so. Changing a respirator with ear loops does not require dismantling the entire protection setup.

Next is easing on the requirement for filtration efficiency to 20% and 50% minimums for Level 1 and Level 2, respectively. In comparison, the minimum filtration efficiency for that of



Figure 1. Elastic earloops are preferred for comfort and ease of use.

N95s and KN95s is as the certification name implies, 95%. However, recent studies on real world application on viral load and severity of symptoms and possible hospitalization have argued that this requirement may not be necessary to suitably protect the wearer.[1,13]

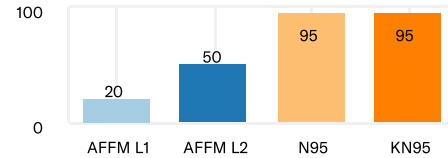


Figure 2. Percentage filtration efficiency requirement of sub-micron particles

Finally, the more drastic difference between ASTM F3502-21 compliant barrier face coverings and N95/KN95 respirators is breathability and airflow resistance.[3] Sacrificing filtration efficiency allows for the face masks to substantially drop resistance pressure of the filtering media, creating an easier breathing environment within the face mask. The standard specifies 15 mm H₂O and 5 mm H₂O of airflow resistance pressure for Level 1 and Level 2, respectively. As reference, NIOSH-approved respirators are tested for both inhalation and exhalation airflow resistance; both with a limit of 35 mm H₂O and more than double of the Level 1 standard set by ASTM F3502-21.[2]

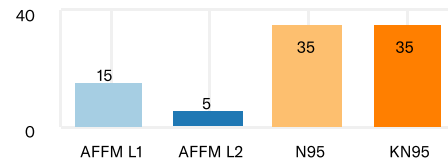


Figure 3. Breathability airflow resistance pressure requirements

Real World Performance

Taking these all of these parameters into consideration, how does an AFFM mask compare against cloth, surgical, and N95/KN95 respirators in real world application? And what best balances overall consumer satisfaction while providing the most effective barrier against bioaerosols like coronavirus and other airborne transmitted viruses?

In a recent study published to the

National Center for Biotechnology Information, concluded that there is actually an inverse correlation between viral load and hospitalization and in many cases, mild viral load led to more severe and lasting symptom onset. What mostly influenced severe symptoms and hospitalization upon diagnosis of COVID-19 infection were factors such as age, sex, race, obesity, pre-existing conditions, history of cancer, lung disease, etc.[1]

Therefore, not only does it depend on the industry personnel's level of consistent exposure leading but also that individual's overall health and attributes that determine the type of face mask or respirator required.

In extreme cases, in both high exposure indoor enclosed areas with more at-risk individuals, N95 and KN95 respirators fill that requirement confidently. In low exposure environments with low risk individuals, surgical masks work in slowing the spread of airborne diseases. However, a gap between these two needs are high exposure zones with low-risk individuals exists. These can be environments such as hospitals with nurses to dental offices or restaurants with younger staff and clientele. Having ease of breathing while remaining comfortable for longer durations is more viable in these scenarios. In these specific industries, personnel are required more physical activity thus having lower airflow resistance pressure leads to decreased respiratory and heart load.

Advanced filtering face masks based around ASTM F3502-21 fills this need.[3]

II. Cooper Solution

American Manufacturing

Amid the height of the coronavirus pandemic, lockdowns, and supply chain bottlenecks cultivated an arms race of personal protective equipment. And because COVID-19 is an airborne-transmitted respiratory virus, face masks and respirators such as N95/KN95s were at the center of this arms race. This created a breeding ground for bad actors



to turn quick profits by selling lookalike products with underperforming results and quickly fostered widespread distrust of all personal protective equipment in the market.

Based on current domestic market studies and trends, mask and respirator usage by the general public in the United States has drastically tapered off. Production across the board has begun to catch up to usage rates and the state of emergency protection equipment shortage has subsided.

This does not mean that the demand and market for masks and respirators have disappeared. What the market values has shifted as desperation for any and all protective wear has changed.

Simply put, people are now seeking a high quality mask that is comfortable.

What does this mean? Proper respiratory protection from a face mask should be a given, however, should not sacrifice ultimate comfort and breathing ease. The product should seamlessly fit into the consumers lifestyle and feel near invisible while providing peace of mind.

Experience, lifestyle and people driven product development is what inspired Cooper to create the next generation face mask to satisfy this emerging market of smarter and more demanding clientele.

Sourcing Methodology

Good ingredients make great products. During the height of the pandemic, the shortage of face masks and respirators were solely due to the highly sought after

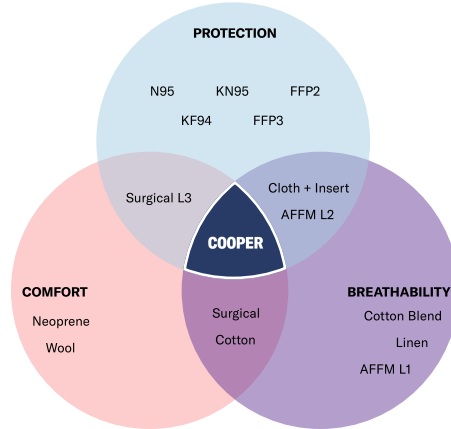


Figure 4. Product-market fit of Cooper's Advanced Filtering Face Mask

electrostatic meltblown filtering media.

Fortunately, Cooper is able bypass many of these industry bottlenecks through longstanding agreements with the largest raw material producers, such as Sinopec, along with an extensive web of sister filtration material manufacturers to procure the highest controlled quality on a reliably consistent schedule.

As a redundancy measure, Cooper also sends in sheet samples of every lot of material to the renowned Swiss filtration third party testing facility, SGS. These samples are taken both from the beginning and end of each roll as tension, weight compression, freight, air pressure can all affect the filtering performance of the raw materials.

This ensures that the very highest quality and dependable foundational materials enter the equation into the production formula of Cooper Advanced Filtration Face Masks and similar products.

Third Party Testing

Though Cooper regularly uses testing equipment internally to verify raw materials and end product, it is an important sanity check and benchmark to consistently send samples to be tested and verified by an esteemed unbiased third party testing facility. In this case, SGS was chosen because of their extensive international pedigree, nearly 200 years of experience and

advanced expertise in verifying filtration media across all industries.

Their vast range of highly sensitive and specialized equipment allows the facility to test in higher fidelity than what internal verification plans could do from complete surface filtration variance to fit testing of face shapes and sizes.

The Big Picture

It is hoped that this article helps broaden the understanding of newer face masks and respirators on the market and informs consumers of the correct products for that applications they seek.

This is not comprehensive of all currently available but consider this as a guide to help make more informed decisions.

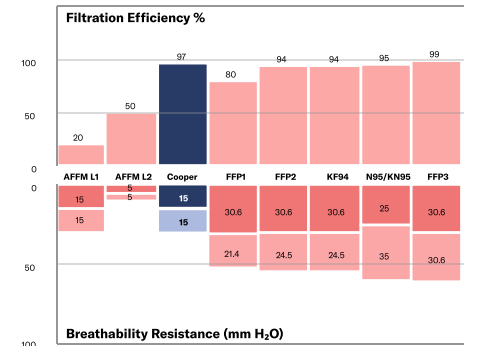


Figure 5. Filtration efficiency % versus breathability of masks and respirators

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Specification Sheet

Cooper™ 1070 Advanced Filtering Face Mask (AFFM)



Made in Las Vegas, NV USA

SGS Labs Verified to ASTM 3502-21 Compliance
Bifold, Earloop

General Usage

General Public, Hospitality, Public Transportation,
Daily Errands, Workplace Safety, Healthcare

Features

Country of Origin	United States of America
FDA Registration	#3018133054
Testing Standard	ASTM 3502-21

Specifications

Product	Cooper™ 1070 5-Ply Advanced Filtering Face Mask (AFFM) with Sponge Bar
Color	White, Black
Materials	Non-woven Polypropylene, Hot Air Cotton, Electrostatic Meltblown Polypropylene, Spandex, Nylon, Coated Galvanized Iron, Polyurethane Foam
Filtration - BFE	≥ 99.8% at 22°C
Filtration - PFE	≥ 99% at 22°C
Inhalation Resistance	≤ 15 mmH ₂ O
Exhalation Resistance	≤ 15 mmH ₂ O
Leakage	≤ 1%
Flammability	Class 1
Attachment Style	Earloops
Mask Construction	Ultrasonic Welding
Packaging	5/Bag, 50/Box



