Why?

Fogging proves to be a major problem in most devices/equipment with transparent plastics or glasses.

Take for example, a motor cycle visor, face shield, speedometer or instrument cluster, just to mention a few.
Part 1

What is an anti-fog solution?

Anti-fog or anti-fogging treatments and agents are chemicals used in industrial and domestic applications to prevent water condensation (Water condenses in form of small droplets on surfaces). These treatments were first developed by NASA.

It was a time when NASA was focusing on the Project Gemini. Since then, they are used on most transparent plastic and glass surfaces in optical applications. Principle of operation is based on reducing effects of surface tension. Instead of forming water droplets on these surfaces, it results in non-scattering film of water. Basically, anti-fogging solution alter the degree of wetting.

Anti-fog agents exist in different forms such as:

- Spray solutions.
- Creams and gels.
- Films.
- Coatings.

I am going to discuss all these in the next chapters.

Now, what makes anti-fog products unique?

It depends on careful selection of appropriate agents. Each of them has a unique performance criteria. Let’s look at some of the most common anti-fog agents:

1. Hydrophilic

It maximizes surface tension energy. There are very many types of hydrophilic substances such as polymers, hydrogels, nanoparticles and colloids, just to mention a few. This variation depends on the chemical constituent of the anti-fog agent. Take for instance: titanium oxide is highly hydrophilic when subjected to UV light.
2. Hydrophobic

They reduce surface tension of water. Before I proceed to discuss various types of anti-fog solutions, I will explain to you the technological advancements in this industry. Here is what I mean:

The technological advancements in anti-fog

As you may have noticed, there are very many companies that have ventured in anti-fog industry. Below are 7 main companies in anti-fog industry:

1. FSI
2. Uvex
3. Honeywell
4. Pinlock
5. WeeTect
6. 3M
7. Gibson

Don’t worry, I will discuss all this companies in the last chapter. But, what am I trying to say? Companies have ventured and invested a lot of resources in anti-fog technology. For instance, WeeTect introduced an advanced anti-fog solution for IP cameras and instrument cluster.

Anti fog solution for IP Camera, speedometer, digital gauge and more

You can’t compare the current and traditional anti-fog products.

Why? The anti-fog coating, film or solution resist fogging for longer period of time.

That is: Workers do not have to remove their eyewear or instrument screens to wipe.

Basically, they are easy to install, eco-friendly and feature advanced anti-fogging technology. I am not going to lie to you, these companies have partnered with a number of learning institutions. This is an attempt to get the best products that guarantee high degree of performance. Learning institutions invest a lot in anti-fog research. In 2011, University Laval introduced the first permanent anti-fog coating. In short, I can’t explain
Anti-fog Solution

I have introduced you to the anti-fog solutions and technological advancements. Next, I am going to discuss various types of anti-fog solutions that you may consider.
Check these out:

**Part 2**

Anti-fog Solution – Anti-fog Coating

The information in this chapter is useful for anyone who would wish to understand various anti-fog coating treatments. The choice of treatment will depend on the performance specification of the anti-fog product.
Let me breakdown what I intend to discuss here: By the end of this chapter, you should understand and explain the following key aspects:

**Anti-fog agents exist in different forms such as:**

- Anti-fog flow coating
- Anti-fog hydrophilic coating
- Anti-fog dip coating
- Anti-fog hydrophobic coating

**Anti-fog flow coating**

Having the right treatment formula to protect an equipment from fogging is never enough. You must adopt an efficient way to apply the anti-fog treatment. As I said earlier, this is what we shall discuss here before proceeding to the later section where will discuss the specific applications of this technology. Flow coating is a popular technology in anti-fog technology. Ideally, this describes how one applies anti-fog treatment.

**What does it imply?**

It is an automated method of applying a liquid coating on a surface. Normally, you have to direct numerous individual streams of anti-fog treatment on a surface. Depending on the design of the equipment, the streams of anti-fog coating may move in a horizontal manner or parts to be coated can move in a horizontal manner. You can use it for multi-dimensional surfaces.

**Benefits of anti-fog flow coating**

Flow coating guarantees the following main benefits:
1. Transfer efficiency.
2. Versatility; it is a perfect choice for irregular shaped or large parts that you cannot dip coating.
3. Quality surface finishes; you can achieve flat surface that is thick.
4. When properly designed, one can save a significant amount of money.
5. Adaptability; apart from anti-fog coating, you can use it for anti-static and anti-abrasion coating.
6. Simple and easy to maintain.

Later in this chapter, when I’ll be discussing anti-fog dip coating, you will realize how important this process is. Practically, dip coating process has a number of limitations. You can only overcome them when you adopt an anti-fog flow coating. This does not imply that flow coating is 100% perfect. When you adopt this process, be prepared to deal with solvent flux and wedge effects. Furthermore, you have to adopt a superior evaporation process to ensure that anti-fog coats is uniformly distributed on the surface. As a result, you need to ask yourself one simple question: At what point can you achieve an optimal anti-fog flow coating? Well, you have to examine the product to coat with anti-fog substrate. It is at this point that you can establish whether the process is recommended for the task at hand or not. Normally, you will find that automotive industry have adopted anti-fog flow coating for headlamp lenses.

It is advisable that you evaluate the anti-fog coating technique process you would wish to adopt. More importantly, focus on aspects that can undermine the integrity of the final product. I think, it will be appropriate to review anti-fog dip coating. This is because it will be easy to compare the two, now that we have discussed the anti-fog flow coating.

**Anti-fog dip coating**

I would like to introduce you to a new technology that is adversely used in the anti-fog industry. This is anti-fog dip coating technology. What does it mean? And, why is it important? Well, these are two main questions you could be asking yourself. I will make it simple for you.

This is because I want you to compare it with the anti-fog flow coating technology. Like the name suggests, anti-fog dip coating is a process where the part to be treated is dipped in an anti-fog coating solution then it is withdrawn after a predetermined period of time.

It may seem to be so simple a process, however, there are some procedures that make it even more complicated. One of the biggest questions you must be asking yourself is the ability to control the thickness of the anti-fog treatment.

At any given time, you must learn how to control the thickness of the coating. There is one secret I would wish you know: This thickness is dependent on balance force at the stagnation point.

**What am I trying to say?** I guess this may seem complicated. When you withdraw the material faster from the anti-fog solution, the final product will have a thicker coating.
Other factors to consider include:

1. Fluid density  
2. Surface tension  
3. Viscosity

Anti-fog dip coating process can be summarized as:

- Prepare the anti-fog solution and the material you would like to coat.
- Immersion process; dip/immerse the substrate in the solution. Hold it in a stationary position and allow the anti-fog coating material to apply itself on the surface of the substrate.
- Withdraw the substrate from the solution; you should withdraw substrate at a constant speed.

Why?

A faster withdrawal will tend to pull more anti-fog solution.

Allow me to take a technical perspective, for the sake of professionals who use the anti-fog dip coating technology. To understand how the anti-fog coating stabilizes on the surface of a material, then you must understand the Stern’s theory.

That is, the coating particles are stabilized due to surface charges. That is the bottom line. With this fact, it is possible to understand and analyze various fluid parameters I have listed above. Of course, you should not forget the importance of the withdrawal speed. Like the anti-fog flow coating, anti-fog dip coating has both pros and cons.

That is:

This is one of the simplest methods of coating substrates with an anti-fog solution. This makes easy to adapt to any manufacturing environment. It is a flexible and adaptable from the fact that, the thickness of anti-fog coating is controlled by rate of withdrawal and solution properties. The dip tanks can be modified to accommodate substrates of all sizes. The main disadvantage of anti-fog dip coating is that, it is not suitable for products that may float on an anti-fog solution.

The final product may have:

1. Fatty edges on the bottom section.
2. Wedge effect.
3. Refluxing by anti-fog solution may remove some of the coating.
Anti-fog hydrophilic coating

I believe you have come across this and I had mentioned it earlier. To make you understand how anti-fog hydrophilic coating works, I will explain to you what we mean by hydrophilic. It is the most active component of this anti-fog coating. From experience, I can confidently say, hydrophilic products are a perfect solution to any fogging problem. So, what is a hydrophilic coating? These are coating with water-loving properties. It implies that, their chemical properties makes them to participate in a dynamic hydrogen bonding with surrounding water molecules.

Most of them exist in ionic form and are negatively charged thus, speeding up aqueous interactions. Moreover, the above chemical interaction produces hydrogel materials. This explains the reason why hydrophilic coating may exhibit low coefficient of friction. Does this seem too technical? You should not get worried since I will make it simple for you.

Check this out:

Have you come across this word wetting? Well, this plays a pivotal role in explaining how hydrophilic products work. Why do I say this? You will understand this in a short while, just stay with me on this page. The ability of a liquid to maintain contact with any surface is called wetting. It is determined by two main forces – adhesive and cohesive forces. The mystery that surrounds hydrophilic products is a major area of study in nanoscience and nanotechnology. It is from this that anti-fog hydrophilic coating have been developed. This is not all, maybe I should explore the mathematical aspect of this technology before wrapping it up.

Here we go:

Are you familiar with different types of angles? That is 90 or 180 degrees, acute and obtuse angles? Let me define an important aspect that will help you understand what I will discuss next. This is contact angle. A contact angle is an angle between a solid-liquid interface and liquid vapor interface. Contact angle that is less than 90°, also referred to as low contact angle, favors wetting. Implying, the fluid will spread over the surface thus, hydrophilic. This is an indication that, there is high adhesive forces. Does this seem complicated? May be you can contact our technical team. The main reason why I have gone into a detailed explanation of this concept is: When you understand hydrophilic, then it will be easy to comprehend what we mean by hydrophobic. We shall discuss this in next subtopic. It will help you understand why it offers a permanent anti-fog solution.

Facts about anti-fog hydrophilic coating

Now, let me take you through another approach where I shall blend the technical aspects explained above and the practical application – anti-fog coating. You understand the fact that water droplets impede vision. Again, it is nearly impossible to avoid the formation of fog/water droplets since it is a natural phenomenon. For instance, how can you control ambient temperature or change in humidity? It is for this reason that you need a hydrophilic anti-
fog coating. Anti-fog hydrophilic coating possess “water loving” ingredients. This implies that, it will keep absorbing moisture. Therefore, more hydrophilic ingredients will imply that, the anti-fog coating will absorb more moisture. The truth of the matter is, the effectiveness of these anti-fog solutions will depend on a proper choice of the desired ingredients. The good thing about these hydrophilic products is that, they cause the water droplets in the individual water droplets to disperse, thus eliminating fogging phenomenon. Hydrophilic anti-fog coating emerged by 2011. In fact, they were the first permanent anti-fog solutions to be developed. So far, they have evolved to be the most efficient and reliable anti-fog solution. They are a perfect alternative to anti-fog sprays. Anti-fog hydrophilic coating are used in a number of products such, motorcycle visors, swimming goggles, ski goggles, motor vehicle headlamps, etc. I will discuss a list of anti-fog applications later in this handbook. Next, I will discuss anti-fog hydrophobic films. The working principle of this coating is simple the opposite of anti-fog hydrophilic as we shall in the next few paragraphs.

**Anti-fog hydrophobic coating**

Hydrophobic are water repelling substrates. As I had mentioned earlier, their properties are basically the opposite of hydrophilic substrates. The manufacturing industries try to explore the effectiveness of both the anti-fog hydrophilic and anti-fog hydrophobic coatings. It is due to their effectiveness when it comes to eliminating fog. Here, a question of wettability also plays an integral role. This is a basic fact that you can’t ignore when you plan to invest in this industry. Can you remember what I said about hydrophilic substance? Well, I will use those points to distinguish additional aspects I would like you to know about hydrophobic substances. This will act as a good foundation before we focus on using anti-fog hydrophobic coating to eliminate fog. When the contact angle is greater than 90° then, it implies that wetting of a surface is unfavorable. Such fluids are referred to as hydrophobic. Again, there are others that we refer to as super-hydrophobic coatings. The contact angle is greater than 150°. In short, hydrophilic substrates are referred to as “water loving” while hydrophobic substances are referred to as “water repelling”.

I hope this is clear for now. But, I know you could be asking yourself one question: How can you use such products to solve a single problem – eliminate fog? Well, this is where I will focus on before I begin to explore different applications of anti-fog products. You should note that the use of anti-fog hydrophobic coating is an innovative solution that aims to eliminate fog problem irrespective of the weather condition. Major anti-fog manufacturing companies in the anti-fog manufacturing companies such as WeeTect have invested in the industry. They can manufacture eye wear such face shield and visors with a permanent anti-fog coating.

**What's unique about anti-fog hydrophobic coating?**

It's a fact that I want you to understand. This is a sure way of making a wise decision. It doesn't matter whether you are a manufacturer or end user of anti-fog product. These anti-fog coating are formulated to create a sheeting action. This forces water droplets to slide off the surface, thus, eliminating fogging phenomenon that could impair vision. But, when should you opt for anti-fog hydrophobic film? Nature of environment plays an integral.
You should opt for this anti-fog coating when in situations where:

1. Very steamy environments with high exertion levels.
2. A transition between low to higher temperatures.

The question of how fast anti-fog hydrophobic coatings erode is a fundamental issue. However, this will depend on the individual coating of the anti-fog product. Go for reputable manufacturers since it is upon the manufacturer to choose the right ingredients.

**Hydrophilic & hydrophobic anti-fog coating**

At times, the manufacturer may decide to combine the two in one anti-fog coating. This guarantees a permanent and a long-lasting solution to the fogging problem.

In such situation, you will have an equipment that functions as:

1. When exposed to extreme humidity or moisture, hydrophilic properties will absorb moisture from the surface. This eliminates fog.
2. After saturation point, hydrophobic properties take over. They make moisture to sheet on the surface.

**What does this imply?**

When you have such an anti-fog solution, it will guarantee anti-fog protection in a number of manufacturing environments. As I summarize this section, I would like to state that, anti-fog coating and anti-fog films are highly recommended for any individual who would wish to eliminate fog. They are not like the anti-fog sprays that offer a temporary solution to this problem. Therefore, you have all the reasons to trust these products. You will see this in the number of applications that I will explain shortly. Let us explore some of the most common applications. To make it simple for you, I have classified them from anti-fog application 1 to 5. This is due to the similarities that exist in the products I will list and subsequently discuss. Keep reading to learn more.

**Anti-fog Solution – Anti fog Film**

I am going to focus on three main types of anti-fog films:

1. Polyester anti-fog film.
2. Polycarbonate anti-fog film.
3. Anti-fog back adhesive

The two anti-fog films offer an improved anti-fog solution than the sprays. In fact, they satisfy all needs in eyewear market and single use. Most of them use condensation control technology thus, preventing formation of vision obscuring fog. In short, you will be sure of better performance and greater durability. But, this is not all, maybe I should explore it further. It will help you understand why I recommend anti-fog films.
What is an anti-fog film?
What is the main difference between anti-fog spray and film? This is one question that I have some across more than once. May be I should make it clear. Anti-fog spray is basically a pressurized fluid that gets atomized. Due to the electrostatic charges, the fluid spreads evenly on the surface to be treated as it leaves the nozzle. On the other hand, anti-fog films are thin flexible strip of treated plastic material. They are coated with different substrates that aim to eliminate fogging phenomenon. A good example is the hydrophilic coated anti-fog films. Depending on the manufacturer, these films can be optimized for different environments. I will explain why this is important shortly. Our first product is:

Polyester anti-fog film
Polyester films are popular in most industrial setup. This is due to their superior physical and chemical properties. Generally, polyester combines good chemical, mechanical, optical and thermal properties. May be, this may sound really general, I will explain this shortly. But, why is this important? You may come across various anti-fog films. So, the purpose of this section is to help you make an informed decision on the exact material to consider for as your film. It is important that you take this seriously since it is where people go wrong. When you opt for polycarbonate and not polyester (vice versa), then it will undermine the performance of the anti-fog product. You will not be able to balance between cost and performance. Don’t worry, there are quite a number of people who are in such a situation.

Here is the deal:

Polyester films have the following main advantages:

1. Superior optical properties; that is, they are clear in appearance.
2. Good mechanical and toughness.
3. Enhanced puncture and tear resistant.
4. Dimensionally stable over a wide range of temperature.
5. Resistant to most oil, grease, moisture and solvents.

Basically, in case the application at hand meets these specifications, then you can opt for polyester anti-fog films. Apart from these, the good thing about this product is that, it can be modified to meet certain performance standards.

For example:

1. Modify the overall texture of the film.
2. Alter color, translucency, haze or opacity.
3. Subjecting it to chemical treatment to improve its ability to adhere to surfaces.
Now that I have introduced you to some properties of polyester, we need to narrow down to those with anti-fog property. You should understand the fact that, polyester is not naturally resistant to fogging. Therefore, it must be treated with various anti-fog products. It is part of chemical treatment I had mentioned earlier. This process is not different from other procedures such as anti-static or surface slip. It is the performance that differs. I have used treated polyester films before, they provide permanent anti-fog solution alongside the key 6 advantages mentioned above. However, this high performance is only possible if the anti-fog products manufacturing company incorporates a controlled manufacturing process. Well, it is true that polyester anti-fog films will prevent fogging even in adverse weather conditions. That is, under fluctuating humidity and weather conditions.

**It does not matter whether the material is subjected to:**

1. Different solvents such as ammonia, alcohol, industrial solvents or commercial glass cleaners.
2. Repeated cleaning.
3. Water immersion.
4. Exposure to steam.

The truth about polyester anti-fog film is:
Most anti-fog film manufacturing companies use cross-linked polymer that is cured on clear polyester film. From above, you can notice that these products differ from the ordinary anti-fog sprays or solutions. This explains the reason why I highly recommend them for any fogging problem.

**The most common applications of polyester anti-fog film include:**

1. Architectural glazing.
2. Display lenses and instrument clusters.
3. Industrial safety wear such as masks, sportswear and eyewear.
5. Shaving and shower mirrors, just to mention a few.

**What I am trying to say?**
Polyester anti-fog film is highly recommended for nearly all anti-fog applications. However, making a decision should be based on the key factors I have mentioned above. You will compare this property with the polycarbonate anti-fog film I will discuss in the next few paragraphs.

**Polycarbonate anti-fog film**
Polycarbonate films are a perfect choice in a number of applications.

Why?
It is due to superior physical and chemical properties. As I had indicated earlier, the anti-fog property is only an added feature to enhance the performance of these films. Again, I had pointed out that the choice of a material is a crucial process. You have to understand the basic properties this film. This is the only sure way you can make an informed decision. First, I want you to understand what I am talking about in this case.

What is a polycarbonate film?
Do you remember what I said about the film at the beginning of this chapter? Don't worry, I will tell you the truth about polycarbonate film: Anti-fog polycarbonate film is a polymer that is manufactured by extrusion.

They possess the following key physical and chemical properties:

1. High strength, thus, resistant to tear and wear.
2. Superior flexural strength, making it easy to cold bent or curve.
3. Better optical properties with light transmission being over 90%.
5. Light weight.
6. High temperature tolerance.
7. Excellent electrical insulation and thermal properties.

What am I trying to say here?
From the properties above, I can recommend polycarbonate anti-fog films for nearly all industrial applications. Polycarbonate film is reliable and guarantee high performance. In fact, it is better than the polyester. I had discussed this earlier. According to a research I conducted earlier this year, it is quite clear that anti-fog film manufacturing companies have invested in different technologies. This aims to improve the performance of anti-fog products.
In fact, this could be the reason why you need polycarbonate films for a large assortment of applications such as:

1. Commercial freezer displays.
2. Medical and safety equipment.
3. Electronic and instrument displays.
4. Automotive and architectural industries, among other industries.

You will find that companies use different technologies to optimize the performance of their polycarbonate anti-fog films.

Here is the deal:

1. Permanent anti-fog film without adhesives.
2. Disposable anti-fog films.
3. Anti-fog films with pressure sensitive adhesives.

As you can see, the example I have given above only focuses on how the film binds on the surface. That is not all, I will explore other factors shortly, keep reading... Did you know that some polycarbonate anti-fog films offer permanent performance? Well, this is possible through advanced technological advancements we have witnessed in the recent past. This is also a vital factor you need to consider. It also plays an essential role when it comes to choice of material. Next, I will explain the installation and maintenance process: I know this is what most people tend to focus on that most factors listed above. Polycarbonate anti-fog film has a lightweight. Therefore, installation process is easy and simple. The fact that polycarbonate is resistant to most chemicals makes it easier to clean than other products we use to eliminate fogging phenomenon. Obviously, eliminating fog and ensuring that you have a clear view at all times is guaranteed. You don't need to worry about it. In fact, it provides 100% visibility. It is time to introduce you to another product in this chapter before I discuss various types of polycarbonate sheets.

This is actually the main reason why I did not explore the technical aspect of the anti-fog film. The difference between the sheet and film is very slim. You will learn more about this in a short while. For now, I think you should know anti-fog film back adhesive. Have you come across the product before? If not, then I will explain, don't worry. In case you have, then I will also give you more insights about the product that you didn’t know.
It is worth mentioning that all anti-fog films must have back adhesives. How will they stick to the surface? Well, many people have made a lot of mistakes when it comes to this. It is time that I should make this fact clear, once and for all. You need to have a technical knowledge about anti-fog film back adhesive. That is, as you consider choosing either polyester or polycarbonate film, the ability to determine the right adhesive is also crucial. The bottom line is, you should analyze each back adhesive based on the following crucial aspects:

**Adhesion detachment strength**

Any film adhesive should meet either FTM 1 or FTM 2 standards. Ideally, this is the strength you need to detach pressure sensitive adhesive from a testing board. In most cases an adhesion strength can be determined based on different time frames. That is, 20 minutes, 24 hours to 1 week. The difference between FTM 1 and FTM 2 is based on the testing temperature.

That is,

1. FTM 1 – 180°C
2. FTM 2 – 90°C

Another aspect you should understand is: Release detachment strength

This is determined based on:

1. FTM 3; a test conducted for low speed.
2. FTM 4; a test conducted for high speed.

Ideally, this refers to the strength need to separate a self-adhesive anti-fog film from a protective sheet on which it has been attached.

Apart from these two, you need to evaluate the following:

1. Tack stickiness that is determined by the FTM 9. It determined a measurement of initial sickness.
Part 4

Technical Handbook

2. Cohesion detachment strength. It is determined by FTM 8. This refers to the resistance to guillotine detachment strength.

Throughout this section, I have mentioned a number of test standards – FTM. It is one of the most common ways of testing anti-fog film back adhesives. These are tests defined by the FINAT. You can review FINAT Handbook.

Other factors that are crucial include the environment and surface where you intend to use anti-fog film back adhesive. Since the beginning this handbook, we have reviewed anti-fog sprays and films. It is time that I need to review anti-fog plastics too. You can check this out in our next chapter.

Part 4

Anti-fog Solution – Anti-fog plastic sheet

I need to mention that anti-fog sheets are commonly used in both domestic and industrial applications. The available anti-fog plastic sheets are available in different designs and shapes. In this chapter, I will focus on polycarbonate plastics. In the previous chapter, I had mentioned this product. Furthermore, I had highlighted the physical and chemical properties. I will explain to you everything you need to know. I am quite sure you are reading this handbook due to an interest in anti-fog products. You have come across hydrophilic and hydrophobic. You must be curious and desire to know what they are all about. Again, that will come in the next few chapters. Let’s go straight to the main objective of this chapter. As I said earlier, anti-fog sheets are popularly used in a number of applications. So, what is the difference between a polycarbonate sheet and film? Broadly, the two are sheets of polycarbonate plastics, however, the main variation is mainly on their thickness. That is, a sheet is thicker and more flexible than a polycarbonate film.

Here, I will focus on the following key products:

1. Polycarbonate anti-fog sheet.
For the purpose of this chapter, I will focus on three crucial properties: anti-fog, anti-scratch and antibacterial polycarbonate sheet. More importantly, I will also explain why you may need such products. Our first product will be:

**Polycarbonate anti-fog sheet**

Have you seen surfaces that remain clear during moist, fluctuating temperature or humid seasons? Well, such surfaces are treated with **anti-fog substrates**. A number of companies have invested in anti-fog polycarbonate sheet. Basically, these anti-fog sheets are cross-linked aqueous hydrophilic polymer. You will learn more about this in the next chapters. In case you need a durable and effective anti-fog sheet with outstanding performance, then, polycarbonate anti-fog sheet is a viable option.

**Why do I say so?**

This is evident from the key features of polycarbonate sheet we have mentioned above. Furthermore, it can maintain its structural integrity and performance over a long period of time. It does not matter how many times you wash the anti-fog sheet. Like the polycarbonate anti-fog films, the sheets must meet the desired performance criteria. Again, they can be customized to meet the desired performance criteria. That is, they can be embossed or tinted.

Another fact that I have to mention and I didn’t mention earlier is that, they can cut or die cut to a required shape and size.

**Applications of anti-fog polycarbonate sheets**

You can use them in the following key applications:

1. **Greenhouse glazing.**
2. **Sky lighting.**
3. **Swimming pool cover**
4. **Making helmets and ceiling, among other products.**
Now, you can see the reason why we prefer polycarbonate sheets to other plastics. The next two polycarbonate sheets I will discuss have additional properties other than the anti-fogging properties. Therefore, they are superior. In most cases, they may be slightly expensive.

**Anti-fog anti-scratch PC sheet**

I didn't mention an ability to resist scratches in the physical and chemical properties above. The truth of the matter is, neither polycarbonate sheets nor films are resistant to abrasion/scratch. It is this reason that you have to treat a PC sheet with anti-abrasion additives. This is the only way you can have a reliable anti-fog, anti-scratch PC sheet. Well, in the recent past, most anti-fog PC manufacturing companies strive to improve the performance of their products. A good example is WeeTect anti-fog, anti-scratch PC sheet (WAFASPACS). Such PC sheet is considered multipurpose thus, recommended for a wide range of applications such as safety glasses, ski goggles, side windows or face shields.

Such PC sheets are recommended where visibility cannot be compromised. That is, there is neither scratches nor fog on the surface. You can rate them as polycarbonates with superior optical clarity (class 1). What comes to your mind when I talk of **abrasion**? I know you could be thinking of one scratching the surface of
Another thing that most people do not understand is that, this technology result in:

1. Enhanced UV protection. Both polycarbonate films and sheets turn yellow when subjected to UV radiation, if they are not treated.
2. Cost effective; this is due to reduced maintenance cost.
3. Improved chemical resistance.
4. Excellent optical quality irrespective of the weather.
5. Improved weatherability, thus, longer service lifespan.

Is this not everyone craves for?

May be, this may sound somehow technical to comprehend. I will make it simple for you.

The basic fact is:

This process aims at improving surface hardness of polycarbonate sheets. Surface hardening does not undermine the desirable inherent properties of anti-fog polycarbonate sheet. It simply implies that the final product will be superior. A number of companies in this industry opt for hard coat technology.

Why hard technology?

In most cases, the hard coating is applied on both sides of the polycarbonate sheet. Normally, anti-fog, anti-scratch PC sheet coated on one side, will tend to acquire scratches. This will still reduce visibility. At this point, the only secret is opt for the anti-fog polycarbonate sheets with anti-scratch properties, manufactured by reputable companies.

We have a list of all reputable companies that manufacture anti-fog products. You can also direct queries to our technical team.

Bacteria being a major issue of concern, especially in medical and food processing industry. You need to understand why your anti-fog PC sheet must possess anti-bacterial property. A reason why I will discuss anti-fog, anti-bacteria PC sheet.

Why do we need it?

Just stay on this page, I will explain that shortly.

Anti-fog, anti-bacteria PC sheet
This makes the anti-fog polycarbonate sheet a perfect choice for specific applications such as:

1. Beverage production.
2. Medical and health care centers.
3. Food processing industries.
4. Abattoirs.
5. Restaurant, residential and commercial kitchens.
7. Supermarkets and livestock buildings, just to mention a few.

I’m not going to lie to you, anti-fog, anti-bacteria PC sheets are highly recommended for applications where we cannot compromise on hygiene.
Part 5

Since you began reading this handbook, you have realized that have discussed the following:

1. Anti-fog
2. Anti-static
3. Anti-abrasion

The key benefits of anti-bacteria PC sheets include:

1. Safe and reliable
   Anti-bacteria have an active ingredient that ensures the surface remains free from any bacteria. This guarantees safety at all cost.

2. Versatility
   The PC sheet has two key elements – eliminating fog and bacteria.

3. Cost effective
4. Hygienically clean and smooth surface.
5. Resistant to stain.

Remember, anti-fog, anti-bacteria PC sheets offer these benefits alongside those I had mentioned earlier. That is, the physical and chemical properties of polycarbonates alongside the anti-fogging property. As a matter of fact, this is an innovative solution aiming to improve performance and reliability of existing products. Most people find it difficult to believe this. It is for this reason that I have to explain how the anti-bacteria treatment works.

Like anti-fog and anti-abrasion additives, anti-bacteria additive is commonly used is an active component. Depending on the manufacturer of the product, it provides a biostatic and biocidal action.

What does this imply?
This treatment stops bacterial growth and ultimately kills the bacteria. Thus, the surface will remain bacteria free making it hygienic. Mostly, they are manufactured to meet the health and hygiene standards. As a general rule, only opt for a specific type of treatment alongside the anti-fog property only when there is need to do so. These treatments come with additional cost.

Since you began reading this handbook, you have realized that have discussed the following:

1. Anti-fog
2. Anti-static
3. Anti-abrasion

The three involve various types of treatments. Since my main area of concern was the fogging property, I will focus on various types of anti-fog treatment. It intends to give you an advanced insight such as the technical knowledge about this subject.

Part 5 Anti-fog Solution – Anti fog Spray
1. Buy a quality anti-fog solution.
2. Clean the surface where you’d wish to apply the anti-fog. Follow the recommended cleaning procedure depending on your product.
3. Apply anti-fog solution by spraying the surface evenly. 
4. Allow it to dry up.

Nearly 63% of the word’s recognized anti-fog come in spray form. This should not make the product too complicated for you. I am quite sure you have come across a number of spray products. Efficiency and reliability will depend on the manufacturer. However, I find it easy to apply an anti-fog spray on all my products. This shouldn’t worry you, I will explain everything, just keep reading...

How the sprays work

The spray "guns" are designed to atomize anti-fog solution into fine sprays. Anti-fog detergent that spreads evenly on the surface thus, minimizing unnecessary wastage. When you direct the nozzle on a surface, small particles of anti-fog solution will stick on the surface. This will provide the desired anti-fog performance.

How to use anti-fog spray

1. Buy a quality anti-fog solution.
2. Clean the surface where you’d wish to apply the anti-fog.
Follow the recommended cleaning procedure depending on your product.
3. Apply anti-fog solution by spraying the surface evenly.
4. Allow it to dry up.

This is so simple!
When I talk about anti-fog spray, basically this could be for a general application. The truth about anti-fog spray is that they can be manufactured for specific uses.
What do I mean by this?
Checkout the following anti-fog products:

**Rain X anti fog**
Rain X was the original water repellent products designed for glass. At the moment, this company manufactures and sells a wide range of anti-fogging products.

What’s unique about Rain X anti-fog?
I will explain this in shortly. If you’ve never used the Rain X anti-fog, then this could be the right time for you to try it out.

Why am I saying this?
Check these out:

1. A versatile anti-fog product that can be used in both marine and automotive interior mirrors and glasses. It can guarantee an optimal performance humid weather conditions.
2. Rain X anti-fog eliminates smoke residue and fogging on the interior surfaces.
3. It stabilizes the varying temperature that can cause fogging on glass and plastics.

Here is the deal:

1. Use 100% cotton cloth or a paper towel.
2. Apply a small amount of RainX® anti-fog, then wipe across the surface.
3. Let it dry, then re-apply it again to maintain to ensure the surface remains fog free.

These are some of the main reasons why it is a top selling anti-fog product, especially in the automotive industry.

Again, this high performance is not a guarantee, you must follow the product usage instructions.
What is the selling point of Cressi anti-fog spray?

1. A versatile product that works with dive masks, face visors and swimming goggles.
2. Eliminates misting or mask fogging.
3. Contains 0% alcohol.
4. Easy to use and apply.

Do you want to make a big difference in your swimming routine?

Here is the deal:
Try Cressi anti-fog spray. It offers a perfect solution to all fogging problems. For as low as $5, fogging won't be a problem anymore. I am pretty sure you have come across anti-fog products by Cressi. In case you have not, don't worry, it is the reason I am writing this article. I am yet, to explore more anti-fog products.

Did you know that Cressi is one of the leading manufacturer of water sports equipment in the world?

This is an Italian company and has been in the industry since 1946. It doesn't matter whether you need a swimming, spear fishing, snorkeling or scuba diving equipment. It will guarantee a fog-free environment.

The truth about Cressi anti-fog spray is that, if you follow the right procedure then it will serve you optimally.
The truth about this product that I have not said before is:

1. Simple application process; spray on the surface then wipe clean.
2. It cleans and coats the surface.
3. Multipurpose; formulated for goggles and eyeglasses.
4. 3 basic ingredients: isopropyl alcohol, water and detergent

Like other anti-fog sprays, using his product is simple.

Is this not an easy task for sure?

Why do I say this?

It doesn’t offer a permanent solution to this problem. For example, you will need to reapply frequently. May be after 2 to 3 hour lessons. That’s why I want to discuss another anti-fog spray. So, our next anti-fog product is:

Tyr anti fog spray

When you mention anti-fog sprays in the U.S., then TYR Sport Inc products will definitely top the list. This is one of those companies that focuses on recreational equipment such as swimming gears.

But, why do I have this product in my list?

In case you need an anti-fog product that guarantees an all in one solution to the fogging problem then I am confident, it is the best. You can simply describe it as a cleaner and anti-fog treatment.

Well, this is true from various experiments that I have conducted. I know this may come as a surprise, especially for readers who thought that we had explored all types of anti-fog sprays. More products are yet, to be discussed. In fact, even superior ones. Just stay on this page to learn more.
How?

1. Clean your surface
2. Apply the spray evenly.
3. Wipe using a soft cloth.
4. Ensure it is dry and clear before testing it on anti-reflective lens.

Yes, it is. Don't forget, this is not the last anti-fog spray we have on our list. The last time I tested it, it did not give me perfect results for my running glasses or racing goggles.

Here is a product that will save you from this nightmare:

**Spit anti fog**

**Do you need an eco-friendly anti-fog product?**

Well, spit anti-fog could be a perfect choice for all your needs.

**Why am I saying so?**

This is the bottom line: Spit anti-fog is manufactured from natural ingredients. That is, it features non-toxic formula. You should not worry about the sport goggles or eye wear being affected by this product. Ideally, it is a biodegradable anti-fog solution. In case you care about the environment, spit anti-fog could be a better option for you. Spit anti-fog is a versatile spray in the market. It works for nearly all materials. Whether you have plastic or glass face shields or wear. Again, the spray is used for both dry and wet applications.

You can use for nearly all items such as:

1. Dive masks
Well, as you may notice, I have not mentioned swim goggles. Spit anti-fog is not recommended for this equipment. This is why I will discuss 3 more anti-fog sprays in the next few paragraphs.

Keep reading...

Another fact that I have to mention here is that this anti-fog spray guarantees a long lasting solution to fogging problems. Again, it also shares a number of features with other products I have mentioned earlier.

So, what is the underlying fact here?

You should be able to compare all the anti-fog sprays. It is a perfect way to get a long lasting solution. Don’t forget that at the end of this handbook, we’ll discuss the major anti-fog manufacturing companies in this industry. This is really fundamental.

**Arena anti-fog**

**Have you tried Arena anti-fog spray?**

Well, if you have not, then don’t do it before understanding some basic facts about it.

**Here we go:**

This is exactly what I had promised in the earlier – an anti-fog spray for swimming goggles. Arena anti-fog sprays is a perfect choice for this particular task. It guarantees fog-free environment, hence, better visibility. Here is the truth about Arena anti-fog spray and why I have recommended it for you: The spray was specifically designed for swimming goggles. In fact, Arena is a household name in the athletics industry.

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**It features a unique chemical composition:**

- 70% of anti-fog spray is water.
- 2% polyethylene Glycol.
- 28% polyoxyethylene sorbitan.

As you can see, this is a good balance of all the essential components of an anti-fog spray for swimming goggles. It is also simple to use and apply. Having said all these, I think we should move to our next anti-fog spray. Don’t worry, we shall discuss anti-fog films in the next chapter. You still have a lot to learn.

Let us explain some facts about:

**Scuba anti-fog**

I am pretty sure foggy scuba masks are really frustrating. This makes it prudent to get an advanced anti-fog
Why should you consider scuba anti-fog?

1. High performance
   This provides a long-lasting fog protection in all weather conditions. This is irrespective of temperature or humidity variation.

2. Sustainable and eco-friendly
   They neither harm rubber support frames nor silicone. Moreover, it is non-toxic and biodegradable.

3. Alcohol free formula makes it suitable for all plastic and glass lenses.
   Scuba anti-fog share a number of properties with other anti-fog products we have mentioned above. For now, let me introduce you to the last anti-fog spray before I begin discussing various anti-fog films.

Aqua sphere anti fog solution

Do you have a pretreated eye wear or instrument screen?

This is one of those products you have been looking for.

Why?
   This anti-fog product is specifically optimized for Aqua Sphere lenses. So, if you have one, this could be a perfect choice for you. It is handy in situations where one wishes to achieve a crystal clear vision. This is crucial when it comes to the swim masks and goggle. In case you have a pretreated eyewear lenses, Aqua Sphere anti-fog solution could be a better choice for you. It has been tested to meet the required quality criteria. Normally, it will enhance the effectiveness of such lenses. You should note that the use of this product is subject to certain safety warnings. Don’t forget to refer to Aqua sphere instructions. As I conclude this chapter, I would wish to state that, an anti-fog spray is just a preventive measure and do not offer a permanent solution. None of the products mentioned above is 100% perfect.
Why do I say this?
Can you imagine a situation where you have to apply an anti-fog spray after every 12 hours or 1 day? It is quite unimaginable. Maybe a tiresome and hectic process.

The bottom line is:
Anti-fog sprays do not offer a perfect solution to the fogging problem. This is why I feel I should introduce you to new anti-fog products.

These include:
1. Anti-fog plastic sheet.
3. Anti-fog film.

These three options are superior to anti-fog sprays. It is the reason why companies are investing in this technology.

For the purpose of this chapter, I will focus on:

1. Motorcycle helmet visors
2. Hockey visors
3. Football visors
4. Pilot visors
5. Visor inserts
6. Full face respiratory visors
7. Paintball visors
8. Snorkel visor inserts

You will realize that this section will focus on face protection safety equipment. As I will be discussing every product, you notice that there is need to have an anti-fog film or coating. This is for every product listed above. They are the only products that guarantee clear vision no matter the weather condition. I will begin by giving a short overview of helmet visors. That it is and why you need them. A helmet visor is a transparent or a translucent surface designed to protect eyes and face. They are manufactured from different materials such as reinforced glass, plastic or polycarbonate. Furthermore, different designs for different industries. The materials I have mentioned above are not intrinsically resistant to fog. This is the main reason why you need anti-fog films and coating.
May be I should make this some few points clear:

1. Materials election plays a significant role. That is, choosing anti-fog motorcycle helmet visor will depend on the type visor material.
2. Performance; anti-fog products have different performance criteria.
3. For optimal performance, the visor should comply with the CE standards
4. Opt for customized designs only when necessary.

They include:

1. Low distortion, thus, enhanced optical clarity.
2. Advanced for resistance.
3. Improved impact and abrasion resistance.
4. Versatility, adaptability and flexibility; this makes it possible customize it to any motorcycle helmet visor irrespective of the brand.
5. Cost advantage.

Are you a motorcycle enthusiast? Then you need to consider an anti-fog motorcycle helmet visor. As a motorcyclist, it is an annoying phenomenon to own a helmet visor that fogs during humid weather or when temperature fluctuates. This could be a dangerous and it is a major cause of most accidents.

So, how can you eliminate this problem?
Well, you need to opt for anti-fog coating or film. This is the only sure way to live a fog free life. A number of companies have invested in this industry and the good thing, a permanent solutions are available. Take for instance, the WeeTect Anti-fog Visor Inserts. They guarantee high performance to motorcycle helmet visors. I will discuss more about anti-fog inserts at the end of this chapter. In addition to these, compatibility is a critical issue motorcycle helmet visor manufacturer have to deal with.

I have mentioned a number of advantages that anti-fog motorcycle helmet visors offer.

Not all anti-fog visor available in the market will guarantee superior and reliable performance. This is the main reason why you must buy the products from reputable companies. I will continue to develop and add even crucial elements as we discuss other types of visors used in different applications. Of course, the choice of specific visor may be determined by many factors. I shall explore them in this section. This will be based on a specific application. The available anti-fog films and coatings are compatible with most motorcycle helmet visors. All that matters is the recommended installation procedure. In case, you do not understand or there is need for further clarification, you can contact our technical team.
Hockey visors are part of a safety requirement that every player possesses. It is because visors reduce facial and eye injuries. A number of hockey helmet visors are manufactured from impact resistant clear plastics. In most cases, polycarbonate is a perfect material for this task. Choosing a specific material is a rigorous process where the manufacturer must conduct several tests. This ensures that you are protected at all cost. Potential risks for any hockey player include hockey stick or ball. Therefore, visors are subjected to rigorous tests.

These tests include:

- Abrasion
- Refractive power
- Impact resistance
- Hardness
- Viscosity
- UV aging
- Anti-fog, just to mention a few.

Furthermore, hockey visor manufacturing companies have adopted effective and reliable manufacturing processes. For example, most manufacturing companies use injection molding. You can also opt for the customized designs. This may include special treatment such as hard coating or additional tint.

In the recent past, I have realized that most manufacturers try to adopt techniques that can guarantee:

1. Consistency in quality of the final product.
2. Superior optical clarity.
3. Flexibility in design and use.
4. Precision in dimensional requirements.
5. Cost effective.

Despite all these developments, fog is a major problem that manufacturing companies have to deal with. As a
hockey player, your visor must guarantee an optimal optical performance. A visor that fogs up will only undermine your performance in the game, leave alone exposing to unnecessary injuries.

I had mentioned earlier that these visors if not treated, will always fog up. It implies that, you need an anti-fog hockey visor. You need an effective remedy that will remain effective for a long period of time. This doesn’t require anti-fog spray that only remains effective for 4 to 12 hours.

It is at this point that you require an advanced anti-fog products such as coating and films. As an expert, you should ignore all dubious ways of eliminating fog on hockey helmet visors. You will find people talking about other products such as washing soap or shampoo. These arguments that are not supported by any scientific research. I consider them unconventional means of eliminating fog. An anti-fog hockey visor is the only proven way to ensure that this sportswear remains effective in all weather conditions. Anti-fog coatings and films are optimized for all weather conditions. As long you have bought one from a reputable company, the visor will remain clear in all weather conditions. The anti-fog products we use in hockey visors is similar to that used in the motorcycle helmet visors. In fact, some are universal.

What do I imply here?

You can opt for one type of anti-fog coating or film to treat the two. As long as you purchase it from a reputable company, you will experience 0%. You will find that motorcycle and hockey helmet visors are manufactured from one type of plastic – polycarbonate.

Do you work in chemical processing industries?

If yes, then I guess your management must be insisting on the use of anti-fog full face respiratory visor. This will the next safety gear I will discuss briefly before proceeding to anti-fog football visor.

**Anti-fog full face respiratory visor**

A full face respiratory visor is a vital safety gear in chemical processing industries. Like other industries, fog is still a problem in such manufacturing processes. In fact, in such situations it becomes difficult to control fog. This is from the fact that, humidity and temperatures tend to fluctuate irregularly. In such situations, you have no option, but go for an anti-fog full face respiratory visor with both hydrophilic and hydrophobic elements.

**Do you remember what we said about hydrophilic and hydrophobic films?**

Good, a careful selection of such anti-fog coating or film is vital. As a rule of thumb, you should consider performance and reliability of the anti-fog coating. Like in the previous sections, I will insist on purchasing the product from a reputable company. My WeeTect full face respirator visor (WFFRV) has never disappointed me. In fact, it compatible will all anti-fog film and coating I have used. It is a crucial aspect that
most people ignore, yet very important. When I talk of an anti-fog full face respiratory visor, it is basically a product that will guarantee 100% optical clarity. It doesn’t matter the weather condition. This safety equipment is available in different configurations and designs. For example, you can go for a front-mounted with a single filter full face respirator may be with semi-spherical visor design. Apart from the two products we have discussed above, anti-fog football visor is a common safety gear. Are you a football player? Do you need an anti-fog safety gear? This could be a perfect solution for you.

Anti-fog football visor

I have met a number of people who think that it is only hockey players who need face visors. This is not true. Footballers, especially those who play American football require facial protection. However, this alone is not enough, they need a face visor with the best optical properties. That is, they don’t fog. Again, the truth of the matter is, not all football visors are effective. This is irrespective of whether the manufacturer adopted injection molding or any other manufacturing process. It is a popular method adopted to manufacture these products. The visor must meet the ASTM and CE requirements. Of course, they are also available in different configurations such as dark and tinted football visors. The choice of material with high impact strength, dimensionally stable or abrasion resistance may not be enough. Without a good anti-fog solution, players cannot use the visor. This is why I insist on an efficient and reliable anti-fog football visors. Like hockey, the player tends to breathe in and out at a faster rate, especially whenever they are running. This implies that, the surface of football visor will be subjected to both moisture and varying temperature conditions. It is for this reason that some anti-fog products manufacturing companies opt for hydrophilic and hydrophobic anti-fog coating. So far, I have discussed three main products. I want to state that they share a wide range of properties. You can use anti-fog coating or film for motorcycle/hockey. A simple truth about anti-fog football visor is: one that guarantees optimal performance will not disappoint you when you use in either motorcycle or hockey visors. In the recent past, authorities are keen to ensure all sports adhere to a set of rules. These rules ensure that players are safe. May be I should explore another safety gear – pinball mask. Does it require an anti-fog product? Well, I will explain this in the next few paragraphs, keep reading.

Anti-fog paintball mask

Are you a paintball player or enthusiast?

I know you must be looking for a comfortable, abrasion resistant and impact resistant paintball mask. In addition to these, it must conform to the ASTM and CE standards. I know most people forget the effectiveness of paintball masks.

Why do I say this?

At any given instance, you need to consider the effectiveness of an anti-fog paintball mask. In paintball game, you can only eliminate your opponent by tagging them with water soluble dye if you can see them clearly. Moreover, paintball technology has been adopted by other organizations such as para-military and security organizations. Most people focus is so much acquiring the best paintball gear and ignore the importance of anti-fog paintball mask. Considering that you will use the mask all the time, making it fog free is paramount. When you have an effective anti-fog product, you will be able to see clearly and ultimately enjoy the game. Again, the ability to choose an effective and reliable mask with the right anti-fog ingredients still play an integral
role. It is advisable that you opt for a permanent anti-fog coating as opposed to the anti-fog sprays. This is because, they will only keep the mask fog free for a short period of time. Apart from anti-fog paintball mask, another product that is closely related to this is:

**Anti-fog pilot visor**

Equipment in the aerospace industry has evolved over the years, and this is a fact we cannot refute. Take for instance, the use anti-fog pilot visors. Pilots depend so much on helmets to go about their daily routine. Unlike the motorcycle or hockey visors, these helmets and visors are manufactured to feature high performance criteria. So far, there are quite a number of pilot visors available in the market such as a military level helicopter helmet visor. They are also referred to as the fighter pilot mask. Any pilot expects this equipment to have high impact and abrasion resistance besides, an ability to guarantee 100% optical clarity.

**What do I mean by this?**

For the purposes of this discussion, I will mainly focus on the anti-fog aspect of the pilot visor. It forms the key pillars of optimal performance. First, let me take you back to our first chapter where we discussed anti-fog sprays.

**Do you think they are a perfect choice for anti-fog pilot visors?**

No, they cannot be used. As I said earlier, it is actually the main reason why I did introduce you to advanced anti-fog products such as coatings and films. They are a permanent anti-fog solution. I will explain this further, keep reading...

As a matter of fact, you do not expect a fighter jet pilot to remove his/her helmet while flying to treat it with anti-fog spray. This will be ridiculous as a fighter jet moves at a speed more than 800km/hour. It will not be realistic and it will never happen. Do not think about it.

**So, which option do we have?**

Anti-fog coating and films. These products provide a perfect solution to this problem. You will be sure of superior optical clarity. Normally, this is referred to as class-1. At a speed indicated above, any substance that blur vision will only lead to a fatal accident.

**As a matter of fact, no pilot will be ready to take such risks, can you?**

It does not matter a type of visor series you opt for. Be it WeeTect pilot visor (WVP), visor prism, visor edge or visor platinum. You can image of the most sophisticated names in the industry. Any pilot will only be interested whether you have used the right anti-fog pilot visor or not. Unlike other industries such as motorcycle or sports, all anti-fog pilot visors are tested under adverse weather and environmental conditions. This ensures all pilot helmet visors do not lose their performance integrity. Let me remind you that pilots are subjected to drastic change in weather conditions. Therefore, they need an effective anti-fog product.

**Why am I saying all these?**

Anti-fog pilot visors should offer innovative solutions to any fogging problem. It is for this reason that you will find numerous safety measures or standards that every manufacturer is expected to meet. For example, pilot visors should comply with the ECE 22.05. Out of all the other anti-fog applications I have discussed, and those that I am yet to discuss, anti-fog pilot visor requires a high level of manufacturing technology and testing. Only a few companies in the world are licensed to manufacture such equipment. You can review a list of companies at the end of this Handbook. Before I conclude this chapter, let me review anti-fog snorkel mask and dive mask before concluding with anti-fog visor inserts.
Anti-fog snorkel mask and dive mask

When do you consider a diving or snorkeling mask safe for use?

I know this forms an essential part of a preparation process before you use this equipment. May be I can guess what you must be thinking about: Buy them from a reputable brand, high quality and durable diving or snorkeling masks. Of course, you are right, but do you know a diving equipment that fogs up can be very boring and at times may result in accidents? Well, this is why I insist on choosing the best anti-fog snorkel mask and dive mask. Using an appropriate anti-fog snorkel mask and dive mask, is important for your enjoyment. It becomes tiresome and boring when you strain to have a clear view when snorkeling. This is one of the cheapest and most cost effective way to eliminate fogging. When you choose the right type of anti-fog coating, you will be guaranteed of a crystal clear vision. Remember, this problem is due to moisture that forms in your mask. Depending on your environment, you can opt for hydrophobic or hydrophilic, anti-fog coating. Having discussed different types of anti-fog visors and masks, I need to discuss another important anti-fog equipment. You might have come across anti-fog insert.

Do you know what it is?

If you own motorcycle helmet or any other safety gear, then you must have come across it. Don’t worry, I will explain it.

Here we go:

Anti-fog visor insert

Anti-fog visor inserts have become a household name in the industry.

Why?
This accessory has the following key benefits:

1. Compatible with most helmet visors.
2. Improved optical clarity by eliminating fog, light dispersion and refraction.
3. Cost effective due to zero cost of maintenance after installation.
4. Ability to customize visor inserts for different applications.

Benefits of anti-fog visor inserts

From above, you can realize that anti-fog visor insert is an effective way to eliminate fog.

How does it achieve this?

I will make this easier for you by explaining the working principle of anti-fog inserts.

Check this out:
First, the manufacturer must choose an effective anti-fog film. This is basically the ability to consider the best chemical and physical properties. Moisture causes fog thus, you must find a way to eradicate it. Visor inserts are designed to absorb moisture. This explains the reason why they are manufactured from soft and porous plastic. Visor inserts may vary in thickness depending on the design. Normally, thicker inserts tend to absorb more moisture and vice versa. This information will help you determine the size of anti-fog visor insert based on an approximate amount of moisture within your environment. The porous plastic will absorb condensed water droplets that form fog. Apart from material, most inserts have silicone gaskets. It is this silicone gasket that forms an airtight seal.

What does this imply?

You will have an insulated environment around the visor insert. This will improve the ability of the anti-fog visor insert to eliminate fog. I can confidently say that your helmet visor will remain clear for a long period of time. However, this is one technique. Of course, it will depend on properties of anti-fog film I had mentioned earlier. There are some anti-fog visor inserts that break the normal surface tension of water molecules. Take for instance, a hydrophilic, anti-fog film. In such situations, there will be a uniform water film, resulting in an optically clear surface. So, it is upon the end user to opt for one that can meet the required performance criteria. Having looked briefly on the technical aspect of anti-fog visor insert, I want to take you through another crucial aspect. Considering that there numerous anti-fog visor inserts available in the market, I would wish to take you through a simple buying guide.
An Ñ quali¬on visor inserts buying guide

I want to make this clear to everyone reading this guide: You need to evaluate every aspect that may motivate you to opt for anti-fog visor insert. Don’t go for it because you feel it is a trend that you need to adopt. This will not work. People have ended up purchasing substandard anti-fog products only to end up regretting after a few days.

What I am trying to say?

I need to share with you as a simple guide that you can’t get anywhere for free.

Here is the deal:

1. Choose a brand

There are quite a number of companies in the anti-fog visor insert industry. It will be wise to opt for a specific brand. Of course, it must be a reputable one. Normally, I consider this as a first step to eliminate the fog problem. You may start your search for a reliable anti-fog product may be by region. For instance, whenever I think of buying these anti-fog products in China, then WeeTect anti-fog visor inserts is a perfect choice.

2. The technology adopted by the manufacturer

As a consumer, I know you desire to get the best technology that can guarantee success at all times. A new technology will guarantee superior performance, reliability and convenience. Due to dynamic consumer demands, manufacturers blend both hydrophilic and hydrophobic technology. Moreover, the ability of the insert to stabilize temperature between the internal and external environment is crucial. This eliminates fogging phenomenon completely. Apart from these, they are also available in different tints. It is an important aspect you need to consider when you have to use anti-fog insert in different environments. A number of companies have adopted photo chromatic technology. It is convenient and reliable.

3. Be specific on your demands

You need to opt for a specific tint, design and performance. Other crucial factors include material selection and thickness. Well, there is a lot of information we can share about anti-fog visor inserts. Lucky enough, I have: A Comprehens¬ve Handbook of Anti-fog Visor Inserts This is a Free Handbook that has valuable information about anti-fog visor inserts. I have explored all the available anti-fog products you can use for your visors. In case you have any questions on these visors, you can contact an anti-fog visor insert expert. Next, I have sampled a number of anti-fog applications. I find this method more convenient as it allows you to compare products with similar characteristics. Do not go away, I still have a lot to share with you.
Remember, your lenses will fog when subjected to an environment where there is a significant change of:

1. Temperature
2. Moisture or humidity

End users may not be able to notice this change, especially if you have an effective anti-fog goggles and glasses. For a defective or equipment without the recommended anti-fog coating, a section of the glass will be
Key issues you need to consider include the following:

1. Clear vision
2. Durable performance
3. Compliance

Apart from anti-fog safety goggles, we need to consider yet, other essential equipment and this is anti-fog ski goggles.

Anti-fog ski goggles

Do you love skiing? How well do you prepare for any eventualities such as accidents?

It doesn’t matter whether you practice outdoors or indoors; the fact of the matter is that you need anti-fog ski goggles. Since the year 2000, ski goggles have been in high demand as most people have adopted skiing as a sporting activity. Throughout this Handbook, I have mentioned that there are two things that are responsible for fogging phenomenon: temperature and humidity.

Also, I know you acknowledge the fact that skiing is a winter sport recognized by:

1. International Olympic Committee (IOC)
2. International Ski Federation (FIS)

First, I want to make one point clear. Do not confuse anti-fog ski goggles and fog resistance goggles. I am not going to lie to you about fog resistant ski goggles. The truth of the matter is fog resistant ski goggles will fail. In most cases, you will have to wipe them repeatedly. In fact, it will seem like you are using anti-fog sprays. This may not be possible during skiing competitions. The good thing about an anti-fog ski goggles is that,
they have an active technology that guarantees a fog free environment. It doesn’t matter the level of relative humidity within your environment. These goggles will never allow fog to form in the first place.

What does this imply?
You will be safe at all times. Forget about the complicated skiing equipment with smeared lenses, fans or moving parts. This is a solution to the fogging problem. Modern anti-fog ski goggles feature an advanced technology that is reliable.

Why do I say so?
Like visor inserts, they have a thin anti-fog film installed in two parts of the lenses.

Do you remember how anti-fog visor inserts work?
Well, it is the same principle of operation here. Remember, it is the same technology adopted for motorcycle helmets. Again, skiing goggles manufacturing companies have been exploring the possibility of using heat-conductive film.

Does this sound strange?
Don’t worry, I will explain it. Skiing goggles with conductive films have a battery. It is this battery that sends the conductive current, thereby heating the lens. By doing so, it keeps ski goggle lenses from fogging. It is an effective and reliable technology. It is the same technology that has been adopted for other sports equipment such as anti-fog racing goggles. Let me discuss this too so that you may understand what I am talking about:

Anti-fog racing goggles

The craze for anti-fog racing goggles has increased in the recent past.

Why?
Foggy goggles will definitely disrupt vision and this can be frustrating. It is for this reason that I insist on opting for high quality and reliable anti-fog solutions. At this point, I believe you know the main causes of fogging goggles and it will be wise to focus specifically on applications of anti-fog racing goggles. I know anti-fog racing goggles manufacturing companies use fancy words only to hoodwink consumers. My intention here is to make this clear to sports person who need this equipment in their daily routine. First, you need an
optical class 1 racing goggles. Ideally, these are the goggles manufactured from durable materials such as polycarbonate sheets. Furthermore, they must CE standards.

It doesn’t matter whether you choose any of these anti-fog racing goggles:

1. Motocross goggles
2. Riding goggles.
3. Motorcycle goggles.
4. Car racing goggles
5. Sports goggles, just to mention a few.

Remember, there are the custom anti-fog racing goggles. A good example is WeeTect racing goggles (WRG). You can modify them to suit your unique requirements. Performance and reliability is a critical aspect in this process.

That is, apart from eliminating fog, manufacturers are keen to ensure all racing goggles meet a desired manufacturing criteria such as:

- Abrasion resistance
- Impact resistance
- Affordable

These are crucial aspects that you need to consider at any cost. These anti-fog coating is formulated such that, they make it nearly impossible for condensation to stick on lenses. It is for this reason that most of these lenses have become a perfect choice for most competitive swimmers. In the past, swimmers could depend on various types of anti-fog sprays. Unfortunately, they have failed to yield the desired results. It is this simple, even the anti-fog sprays designed for swimming goggles, some of which I had mentioned, do not guarantee a permanent solution. It is for this reason that anti-fog racing goggles that provide a permanent solution such as anti-fog coating and films.

As a matter of fact, anti-fog racing goggles provide a reliable solution to fogging problems. However, there is one fact that I have not mentioned.

Do you know that anti-fog coatings or films must be maintained?

Well, it is one fact that most people ignore, yet it is really important. The coatings and films must be protected at all cost. This is to avoid anti-scratch or rubbing. Without proper precautions and cleaning procedures, this anti-fog treatment will fail. For example, it is recommended that you clean racing goggles after use. Adopting proper cleaning procedures will ensure that the anti-fog racing goggles remain in good condition for a long period of time. Since these may be manufactured by different companies, it is important that you read theoggle cleaning and maintenance procedures. Apart from this, your goggles must be fitted properly. Having said that, I need to summarize this chapter by discussing safety anti-fog safety glasses.
Part 8

Here, I will focus on the following 5 products:

1. Anti-fog safety face shield.
2. Fog free shower mirrors.
3. Anti-fog ballistic face shield.
4. Anti-fog windshield.
5. Anti-fog, anti-scratch PC sheet.

Before I explore various types of anti-fog sheets.

Anti-fog safety glasses

Anti-fog safety glasses are essential safety equipment. It doesn't matter whether you are into sports or manufacturing industry, you will definitely require a safety gear. This can be in the form of safety goggles or shields. As I have mentioned before, manufacturers do all that it takes to ensure that they meet a desired performance criteria. This is in terms of abrasion, impact or anti-fog resistance properties. For the purposes of this Handbook, I will focus on an anti-fog aspect of this essential equipment. Temperature and humidity being the main elements that affect fogging, you must find a way to control them at all cost. It will be frustrating to have a safety glass full of fog. It will reduce visibility. For a reliable performance, anti-fog safety glasses should be 100% fog-proof. It is important that you adopt a reliable, tested and proven anti-fog coating. So far, we have discussed quite a number of anti-fog applications. Still, this is not enough. As I promised earlier, our next chapter will be on various types of applications of ant-fog sheets.

Do you remember what I said about anti-fog sheets?

Well, that is what I will discuss next. Check this out:

Part 8 Anti Fog Application 3 – Anti-fog Sheet

I have discussed quite a number of anti-fog products in the previous chapters. I hope you still remember what I said about anti-fog sheets. As an introductory section, I will make a quick summary of what you should expect when you opt for these products.

But first, what should you expect in this chapter?

Here, I will focus on the following 5 products:

1. Anti-fog safety face shield.
2. Fog free shower mirrors.
3. Anti-fog ballistic face shield.
4. Anti-fog windshield.
5. Anti-fog, anti-scratch PC sheet.

I will adopt a simple format. That is, explain what the product is all about, unique features and benefits alongside other factors that I feel are important. Basically, this should act as a guideline that will help you make decisions. Let me take you through a quick overview of anti-fog sheet applications. Ideally, these sheets have gained popularity in a number of industrial and domestic applications. For instance, you can use anti-fog sheets to make bathroom mirrors or in glazing applications. Since most products listed above are manufactured from anti-fog sheets, it will be better to expound on this subject as I discuss each later in this
Design and complexity of anti-fog safety face shield gears on the market has improved over the years. As a matter of fact, every company in the industry is striving to get the best equipment they can afford. Despite the numerous manufacturing constrains they have to deal, they can produce: anti-fog, impact resistant, UV resistant and anti-scratch safety gears, just to highlight a few features. So far, I believe you have learnt a lot about various types of anti-fog products. These include desired physical and chemical properties alongside standards they must meet such as ANSI Z87.1-2003, ASTM and EN166. Furthermore, end users seem to be more concerned about performance, customization and price. In reality, anti-fog safety face shield manufacturers find it a difficult task to meet all these demands. I know you may have very specific requirements and demands concerning certain specifications you expect a particular face shield to meet.

Safety is a priority and it is for this reason that you need to insist on a face shield that can protect you from flying debris. Be it from grinding, cutting, woodworking or any other mechanical work. Today, fog has proved to be a major problem in a number of industrial processes. Besides, it is blamed for accidents and unproductivity that has been witnessed so far. It is for this reason that I find it important to explore various safety measures that must be adopted to alleviate this problem.

I want to make this clear today:
You'll only be sure of your safety if have clear vision. It is for this reason that most consumers insist on anti-fog safety face shield with optical clarity class 1. Again, in a manufacturing process, you cannot be sure of when fogging can be inevitable. This is why you must be prepared at all times. You must be sure of the type of anti-fog coating to use besides the anti-fog coating procedure. That is, whether you need a hydrophilic, hydrophobic or both. It will depend on your working environment. Of course, it is not a trial and error as many tend to perceive the whole process. Normally, selecting a specific coating for an anti-fog safety face shield involves a series of experiments and tests. They must comply with the standards I have mentioned so far.

Features to consider in an anti-fog safety face shield
I believe this is a crucial aspect. Most people miss this important point. It doesn't matter whether you go for a reputable brand or not.

The bottom line is:
You should be able to choose a safety face shield that is 100% perfect and the truth of the matter is, you should be able to evaluate this safety gear yourself. Through this, you will be able to reduce occupational injuries.
1. Safety standards

Well, I know you have ignored this and there are high chances that a repeat of the same is possible. Do not ignore any of these safety standards. It is not an option. Choose a face shield with a substandard anti-fog coating at your own risk. ANSI and EN standards clearly define all the best anti-fog safety shields based on all the key properties I have mentioned before. Here is a sample of a face shield data sheet. I hope I am very clear about this. Again, this simple rule will imply to all safety face shields that we shall discuss in this chapter. Non-compliance will result in two main problems: lost in productivity and high medical treatment. This will definitely have a negative impact on your company. Simply avoid it.

2. Comfort

Let me tell you a simple truth. Maybe, you have not realized this. Comfort and fit are also defined under anti-fog safety face shield compliance guideline. 100% fog free and face protection will boost user confidence. You will work in any environment notwithstanding the fluctuating humidity and temperature. Again, you should be able to adjust the face shield. It is for this reason that some face shields feature a flexible band. It is another factor that you are likely to ignore, yet it plays a crucial role when it comes to comfort.

3. Design

The choice is a particular anti-fog face shield design will depend on your key safety objectives. That is, you can opt for one that covers the entire face or that with a hard hat.

4. Ease of use and maintenance

I had mentioned earlier. Only proper maintenance procedures will ensure that coating remains effective for a long period of time. It does not matter whether the material is scratch proof. When you use abrasive material expect your anti-fog coating to deteriorate within a short period of time. As many manufacturers try to make anti-fog safety face shields easy to use and maintain. You must play your role as the end user. That is, use recommended cleaning procedures. Other factors that I may reiterate at this point before I conclude choice of material and manufacturer/brand. There are very many types of anti-fog safety face shields. Normally, the classification may be based on individual applications.

an you remember how I did classify various types of goggles? The classification has not changed.

Let me introduce you to another product before discuss fog free shower mirrors.

Anti-fog ballistic face shield

Are you a law enforcement officer?

You should not miss anti-fog ballistic face shield. This is one area that has also evolved over the years. I have seen most law enforcement officers opting for a number of composite materials aiming to get a reliable safety gear. However, these composite materials do not allow them to see through. In reality, this makes the officer to multitask by moving shield each time in an attempt to see through. Let me be specific and categorical. I do not recommend such materials. A polycarbonate or PMMA is a perfect material for this task. These materials are strong and durable. In fact, they are strong and impact resistant. Like safety equipment, these face shields are tested to ensure they comply with EN, ASTM and NIJ standards. Moreover, to ensure
Companies employ different manufacturing technologies such as:

1. Ability to be retrofitted to full coverage COMBAT or PASGT
2. Visor fastening systems.
3. Different locking mechanisms, i.e. 3 locking positions

You can use the same anti-fog coating for both safety and ballistic face shields. Another product with the same properties as ballistic face shield is:

**Anti-fog windshield**

Any time a manufacturer introduces a new product in the market, the basic factors you should consider include: an optimal performance and cost. These are crucial aspects determining whether you should acquire the product or not. Like any other anti-fog products, the need for anti-fog windshield has increased in the recent past. Obviously, this is from the fact that, people would wish to eliminate fog using any mechanism possible. This biggest question that worry most people could be:

**Which anti-fog product should you opt for?**

Well, you have a wide range of products such as:

1. Anti-fog sprays
2. Anti-fog coating
3. Anti-fog films

I have discussed all these before, hence, needless to repeat this again. However, the truth of the matter is anti-fog sprays are not recommended for such applications. You need a product that will offer a long-term solution to the fogging problem. You have two options: coating and films. Apart from these, there are quite a number of anti-fog windshield treatments available in the market. Most of these products are mainly used to prevent fogging from the inside section of the windshields. Of course, this technology is not different from those used in mirrors and windows. When you compare them to other mechanisms such as using air conditioners, they are affordable. However, these products are more expensive and labor intensive than either an anti-fog coating or films.

**What am I trying to say?**
As much as you would wish to eliminate fog, going for an affordable and reliable technique is important. It won’t make sense to go for an anti-fog spray that will require you reapply the product after every 12 hours or less. At this point, I need to make one point clear and straightforward. An anti-fog windshield is not different from other options I have discussed above. Both anti-fog films and coatings here have the same chemical composition as those used in anti-ballistic safety face shield. Don’t get scared of the naming process. It is simply an indication of where exactly you intend to use anti-fog product. However, depending on your specific application, you may optimize the product to suit your own needs. That is, when a windshield is likely to be exposed to chemicals or abrasive materials, then you need to incorporate anti-abrasive and chemical resistant elements. Under normal circumstances, an anti-fog windshield will eliminate both exterior and interior fogging. Depending on your environment and type of anti-fog coating, it will absorb moisture thereby eliminating water condensation. This will ensure that your screen remains clear even in cold, rainy and humid weather conditions.

By the way, do you remember how an anti-fog visor insert works? Isn’t the principle of operation the same?

Remember, as I said before, there is nothing new here. I am only trying to be specific based on the types of application at hand. When you live in an environment where there is a possibility of summer rains or excess humidity, then you have no option, but to install anti-fog windshield. This is also a perfect choice when you are driving in an environment with heavy moisture. Under such situations, it is only an anti-fog windshield that will eliminate fog instantly. Defrost controls and air conditioner may not deliver the required results. Allow me to deviate a little and discuss yet, a unique application of anti-fog products.

This is:

Anti-fog shower mirror

Humidity being one of the main causes of fog, bathrooms are not exempted from this annoying phenomenon. It is for this reason that you must invest in equipment that can guarantee a fog free environment.

What am I talking about?

An anti-fog shower mirror. So far, it is one of the best innovative solutions, which can guarantee a clear view in any steamy shower. Despite the humid condition within your environment, these mirrors won’t cloud when you are in the process of shaving. Anti-fog shower mirror are manufactured from different materials such as glass and plastics. Polycarbonate is a popular material used in this application. Of course, these plastics and glasses must be treated to enhance their anti-fog properties. For example, you may have anti-fog coated polycarbonate mirror. Alternatively, you may opt for anti-fog acrylic mirror.

The fog free mirrors are used in a number of applications such as:
1. Shower shaving mirrors
2. Travel mirrors.
3. Unbreakable camping mirrors.
4. Magnifying mirrors, just to mention a few.

Basically, this is an advanced technology that has revolutionized how people go about their business in bathrooms.

The key features of these mirrors include:

1. Light and durable, especially when you opt for polycarbonate or acrylic anti-fog shower mirrors.
2. More durable more so, fog free polycarbonate shower mirrors.
3. They are cost effective.

Just like other anti-fog products I have discussed earlier, you need to adopt a reliable maintenance and care procedure. Normally, you may opt for an anti-fog coating or film. I highly recommend 100% cotton cloth for any cleaning procedure. Wipe across the mirror and you must use only the recommended detergents. It is only through this that the anti-fog shower mirror will maintain a fog-free environment. Before I wrap up this chapter, I will review yet, another important product. This is an anti-fog, anti-scratch PC sheet. May be I will do a quick summary of this type of PC sheet since I have discussed a number important aspects about the product.

Anti-fog, anti-scratch PC sheet

Anti-fog, anti-scratch PC sheet is a household name in a number of manufacturing processes. Apparently, I
There are two main factors you must consider when you need these products:

2. Adopt suitable ingredients for anti-fog coating or film

Let me summarize the benefits of anti-fog, anti-scratch PC sheets:

1. Superior optical properties
2. Better UV resistant properties
3. Cost effective
4. Impact resistance.
5. Durable and improved performance.

Now that you can remember what anti-fog, anti-scratch PC sheet is all about.

Can we proceed to the next chapter?

Here is the deal:
I want a situation whereby, the time you finish reading this Handbook, you know, all applications of anti-fog products. This is why I took much time explaining what anti-fog products are. Next, I will discuss various applications of anti-fog films. That is, the main applications in both commercial and residential applications.
Earlier, I had introduced anti-fog films. This section, I will focus on different applications of this essential product. I will be comprehensive to ensure you understand all vital aspects that can enable you to make the right decision while purchasing or installing any anti-fog film.

Ideally, the available anti-fog films are manufactured from:

1. Polycarbonate materials or
2. Polyester

These are polymers with varying physical and chemical properties. Thus, you need to evaluate the application at hand to choose one that can provide optimal performance but affordable. In modern applications, manufacturers not only focus on the anti-fog aspect, but also anti-scratch properties of the final product. As a matter of fact, they guarantee a perfect solution to any fogging problem. Some of the most common applications include shower mirrors, windshield and refrigerator window, just to name a few. I will discuss other applications shortly.

Did you know that anti-fog films are a perfect choice for window films?

Well, now you know. Check this more out to learn more about:

Anti-fog window film

As you may have realized, fog is a major problem in a number of applications. It is for this reason that anti-fog window film manufacturers invest thousands of dollars to ensure that they get the best from any manufacturing process. Any surface or room with transparent or translucent windows, if not treated with anti-fog coating will fog up.

It is this simple, when you park a car in your yard, what happens the following morning?

You will see small water droplets that have covered the entire screen.
What about if you are driving through a humid environment?
It will be the same scenario.

What am I trying to say?
You need to get adopt mechanism that will eliminate any fogging problem. It is this simple, you have no option but to install anti-fog window films.

These anti-fog window films are popular in a number of applications such as:

1. Refrigerator and freezer display. Don't worry, this is an essential an important area of study, I will explain it shortly. Keep reading.
2. Bathroom mirrors.
3. Indoor pools.
4. Spa enclosures
5. Hotel and office buildings
6. Car windows, just to mention a few.

In case you are in any of these situations, then it will be advisable to consider an anti-fog window film. Of course, the working principle of anti-fog films still remains the same.

Can you remember what I discussed about anti-fog visor inserts?
I hope you do.
To stop condensation of water droplets on your window, you need to install an effective and reliable anti-fog product. I know you have seen these anti-fog products before.

For example, how frequently do you go shopping?
The clear refrigerator doors you see have anti-fog film.

Well, what am I trying to say?
This product is invisible when installed.
In most cases, these coatings are manufactured from hydrophilic coating.

Why?
They will attract water droplets and spread them into a thin layer. In fact, this layer is indistinguishable. I also hope that you haven't forgotten the science behind hydrophilic coating.

What causes these water droplets to form?
Allow me to deviate a little, this may sound somehow scientific thou, it is simple. When warm, humid air reaches a cold surface, water vapor will settle on the glass surface. This will form water droplets due to condensation. It is this water droplet that we intend to eliminate at all cost. Properties of a good ant-fog window film. I guess this could be one of those questions that is really bothering you.

Here is the deal:
In most forums, you will meet people talking about a perfect anti-fog window solution. Well, I will make this clear for you.

I will say this right. However, I want you to understand the fact that a variation in temperature causes
You can describe these anti-fog films using three basic characteristics:

1. Reduces fogging
2. Guarantees optical clarity.
3. Increases visibility.

Fogging hence, we need to use material that can stabilize the situation at all cost. Normally, people purchase anti-fog window films based on the reputation of the company. This is a better way, considering that as the end user, it will be nearly impossible to conduct some verification tests.

What should you do?
Before you purchase any anti-fog window film, find out whether the manufacturer did conduct the following tests to verify performance of the product.

The three common tests include:

1. Freezer fog tests; the anti-fog films is subjected to a 10°F for about 20 Minutes.
2. Refrigerator tests; the film is subjected to 40°F for about 20 Minutes
3. Hot water tests; anti-fog film is subjected to 75°F

The films should pass all these tests. In such situation, you will be guaranteed of an optimal performance.

Do you have any questions about this?
If any, contact our anti-fog film experts. With this background information, we can discuss an important application of anti-fog window film:

Anti-fog film for commercial freezer window

You could be wondering why I decided to narrow down on anti-fog film for commercial freezer window. This is due to the crucial role they play in retail stores across the world. Forget the theories and rumors about anti-fog films from unqualified individuals. I will tell the truth about anti-fog film for commercial freezer windows. Here, I will mainly focus on the reasons why you should install this essential film. At this point, I believe you understand how anti-fog window films work. Thus, needless to repeat that here. In most cases,
only retailers or shop owners who find this a crucial aspect. Consumers can also learn a lot too from things they interact with.

What happens when you open a freezer?
Did you note anything unusual? If you are keen, then you must have noted that the freezer doors tend to fog up. This is due to the humid air around the freezer door. In case you haven’t seen this, then you need to be keen next time. Whenever this door fogs up, it becomes nearly impossible to see through the glass. Of course, this is the main reason why we need to eliminate fog.

In such a situation, what should you do?
An electrically controlled sweat heater may turn on automatically to clear foggy panel. When other consumers come, they will be able to see through the freezer window.

However, what impact does it have to the business owner?
This is actually the main reason why you should consider anti-fog film for commercial freezer window. You don’t need to depend on these heaters anymore. In the traditional freezers, commercial freezers had sweat or door heaters to eliminate fog. As much as it could reduce condensation, this was expensive and at times unreliable whenever there is a power outage.

How can you solve this problem?
The only reliable and convenient solution is an anti-fog film for commercial freezer window. It will balance between improved consumer experience and cost effectiveness.

Advantages of anti-fog freezer films
These are some of the main reasons why I recommend anti-fog window films for anyone who runs a retail store. I want you to see this for yourself. It will help you to make an informed decision on whether you should install these films or not.

1. Improved customer experience
These films will maintain constant clear view. It doesn’t matter whether there are blackout or not. In most cases, when you opt for a polycarbonate anti-fog film, it will guarantee optimal performance for a very long period of time. With anti-fog films, there is no transition time, all fog will be eliminated immediately.

2. Prevents door fogging
There is no instance where your freezer door will fog up.

3. A better in-door branding opportunity
It is yet, another important reason why I recommend anti-fog film for commercial freezer window. You will display your products conveniently and your targeted consumers will see all the details about the product. This is a better way to advertise/market perishable goods kept in a freezer.

4. Cost effective
When you install these anti-fog window films, there are chances that you will maximize on your profit margin.

Why do I say so?
You don’t need heaters to eliminate fog. This implies a zero-energy consumption to eliminate fog. Research has proved that you may end up saving about $12 every month and this translates to over $144 per year. This will depend on the size of your freezers.

5. The life of your freezer compressor will increase by about 29%.
This is because the anti-fog film for commercial freezer window will lighten the load on your compressor.

6. Eco-friendly
When you install anti-fog window films, carbon dioxide emissions will reduce significantly. In short, anti-fog film for commercial freezer window is a passive and reliable solution to any fogging problem. In short, there is no reason why one should avoid these films. Having said that, let me explore 4 more applications of anti-fog films in different industries. Of course, the technology is not different from the one we use as anti-fog
Some of the most common examples include:

**Anti-fog medical face shield**

**Are you a doctor or medical practitioner?**

I am quite sure that you’re exposed to various risks in your line of duty.

**But, how can you ensure that you are safe at all times?**

You need an anti-fog medical face shield. As a matter of fact, anti-fog medical face shields share the same characteristics as those we have discussed above. They are designed to protect users from splashing or splattering of any infectious or hazardous substances. When you are in the medical industry, it doesn't matter whether you work in a laboratory or treatment wards. At some point, you will be susceptible to hazardous solutions or detergents. It is for this reason that you need to purchase a face shield that meet the following key specifications:

1. **Lightweight**
   This will make you feel comfortable at all times. Therefore, you will focus on specific tasks that you do.

2. **Anti-fog coating**
   It will eliminate any instances of fogging thus, it will provide continuous and clear visibility. This is crucial when handling critical medical procedures.

3. **Scratch-resistant coating**
   The anti-fog medical face shield will remain clear without scratches thus, no distorted vision.

4. **Anti-bacterial**
   This will ensure that there is no bacterial growth on the face shield. This will help you to maintain the recommended hygiene in health facilities.

5. **Compliance with international and local standards**
   It must meet the ANSI and EN requirements.

6. **Impact resistance**
   As you can see, this safety gear is not different from various aspects we have mentioned above. In addition to these, other factors such comfort and brand also play a crucial role. Furthermore, whenever you want to purchase these products, it is important that you opt for those recommended for medical, dental or emergency health care workers.

**Closely related to this face shield is:**

**Anti-fog sanitary mask**

In case you are working in a medical or food processing industry, then you have no option, but to acquire an anti-fog sanitary mask. Anti-fog sanitary masks share a number of features with various safety gears I have mentioned previously. There is only one glaring fact that is unique to this equipment; it must have superior anti-bacteria performance. This is actually evident from the name of the product itself. Having said that, maybe I can proceed with my last list of anti-fog applications. I will focus on different types of instruments. This is a crucial aspect, especially in industrial and manufacturing processes.
Part 10  Anti-fog solutions for screen protector

Fog is a major problem in a number of instruments and gadgets. This reduces performance and renders the instruments unusable.

Why?
You can hardly see the readings or collect the intended data.

For example, a foggy speedometer, how can it be useful to you in the first place?
Anti-fog solutions for screen protector has been around for a while now. In fact, manufacturing companies have invested a lot of money in superior anti-fog films and coatings. Most people have failed to acknowledge their importance and use. Not because they assume or ignore, but, simply due to lack of information.

In this chapter, I will expound various types of anti-fog solutions that formulated for:

1. IP camera
2. Speedometer
3. Instrument cluster
4. Test instruments, just to mention a few.

At the end of this chapter, you should be able to choose the recommended product that can eliminate fog permanently. Let me begin by explaining what I mean by this. I will make this simple and easy for you to understand. These are anti-fog films and coatings with different chemical compositions that aim to stabilize the environment around the instrument screen. A variation in temperature, may cause humid air to condense resulting in fogging. These coatings/films force water droplets to spread into a thin layer, thereby eliminating fogging phenomenon. Of course, this is for the hydrophilic, anti-fog products.

Advantages of anti-fog solutions for screen protector

You need this anti-fog product because:
I hope you can comprehend these facts. Now, let me go ahead and focus on individual products. Maybe this will make more sense.

**Anti-fog solution for IP cameras**

My main goal is to help understand every concept in this chapter. Let me begin by asking a simple question. Maybe to help you brainstorm.

**What is an IP camera? Why do we need them? Is an anti-fog solution for IP cameras important?**

Are you able to respond to the three questions? If not, then I will explain everything.

Keep reading to learn more.

The abbreviation “IP” refers to Internet Protocol. Normally, it is used to refer to a process where data is transmitted via a network. Therefore, an IP camera refers to a camera, which plugs directly into a network router. All the captured images are transmitted directly via the network to a remote server. Such cameras require a high speed internet connection and a computer where you can view data collected by the camera. However, you should take note that the camera itself does not depend on a computer to function. Again, IP cameras do not require specific applications to transmit images. This implies that, you don’t need a dedicated observation system to collect data. You can view all your data from a remote location. They are also easy to install and configure. IP cameras are mainly used for surveillance. They are commonly installed in banks, car parks, roads or in processing plants where you may require real-time data about what is happening. Well, this was more of a technical aspect of IP camera. Let’s come back to our main business – anti-fog solution for IP camera. As a matter of fact, your main goal for installing a camera is to have a clear view of what is going on.

**But how will you do this if the lens of the camera fogs up?**

This will be impossible and there will be no point of installing the camera. Until now, no company has ever produced an anti-fog solution for IP cameras. This is rather a worrying situation as most people opt for universal solutions that do not yield the desired results. It doesn’t matter how well you try to seal IP cameras, without a proper solution, they will still fog. Last year alone, a number of insecurity cases could not be solved due to fogged IP cameras. It is for this reason that WeeTect anti-fog solution for IP cameras has proved to be effective and reliable. These include anti-fog film and anti-fog coating. You need to purchase an anti-fog solution that has been tested to meet the required standards. Depending on your location, the anti-fog coating or films can be manufactured from hydrophilic or hydrophobic ingredients. It is nearly impossible to control various environmental conditions such as humidity and temperature. As I had indicated before, a variation in these physical parameters will automatically make IP camera lens to fog up. Anti-fog solution for IP cameras is a revolutionary technology formulated for all types of IP camera lenses. Investing a few dollars to install these films and coating will in the long-run payoff.
That is, you can install them on IP cameras that are used in:

1. Warm and humid
2. Temperate and cool weather

In short, blending all the above information, you shall have learnt all vital aspects about anti-fog solution for IP cameras.

The bottom line is:
Every IP camera must have an effective anti-fog film or coating. This will prevent unnecessary fogging. Fog will only hinder the performance of these cameras. When you use substandard anti-fog coating/film for IP cameras, then, you will receive blurred images. They will have no use. What am I trying to say, get a tested and certified anti-fog product to eliminate fogging phenomenon on your IP cameras. In case you have any questions or clarification, do not hesitate to ask or contribute in the comment section below.

I will discuss another equipment and this is:

Anti-fog solution for speedometer

What is a speedometer? Is there need for an anti-fog solution for speedometer?
Well, in this section, I will explain vital aspects about anti-fog products we can use for this important gadget. A speedometer, also referred to as speed meter is a gauge that measures and displays an instantaneous speed of automotive engines such as motorcycles, airplanes or vehicles. I am quite certain that you have seen this instrument before.

What do you think will happen if you can't read the exact speed of your car?
Definitely, you may end up over speeding. This will be due to the fact that, your eyes will not see past water droplets on the speedometer. Honestly, it is the most horrible and boring experience for any driver.

The truth of the matter is:
Your speedometer must have an anti-fog film or coating. It is the only anti-fog solution for speedometer that guarantees a permanent solution. All speedometers are designed with a transparent glass or plastics. At any instance, you will be able to monitor the speed through the lens. The main challenge is that these materials are not inherently resistant to fog. Therefore, the manufacturer must adopt mechanism they can use to eliminate fog. Assuming your speedometer lens is manufactured from polycarbonate or acrylic sheet. You have no choice but, to opt for a reliable anti-fog film. It is the desire of every individual to have a crystal clear speedometer. This is possible with an appropriate anti-fog treatment. Like I said earlier, manufacturers will formulate an anti-fog solution for speedometers depending on the nature of the application. You don't need to worry about compatibility issues.
Advantages of anti-fog solution for instrument clusters

1. 100% quality guaranteed; your cluster instruments will remain fog free. That is, all instruments will maintain their optical quality irrespective of the weather condition.

This new anti-fog coating is safe and will not damage your speedometer lens. In the recent past, most speedometer manufacturers fit them with appropriate anti-fog coating/film during the production process. I know, maybe you are looking at your speedometer and wondering where exactly anti-fog coating/film could be. Basically, you can describe it as a planar transparent lens substrate. It has both outer and inner surfaces. The anti-fog film or coating is found in the inner surface of the lens. A successful installation of anti-fog solution for speedometer will imply a low angle of contact for both moisture and water. Even though some people may opt for buying anti-fog films and subsequently installing them on the speedometer lens, this is not always the case. That is, for speedometer manufacturing companies, anti-fog films can be bonded to this lens surface during the molding process. It is an effective process and so far, it has been adopted by most companies.

The anti-fog coating is mostly a hydrophilic material. For better performance, the surfaces can be coated with a hard material. This makes the speedometer screen an anti-fog and anti-scratch. In short, you must ensure that your speedometer lens has the right anti-fog solution. Still on the anti-fog solutions for a screen protector, I will review yet another application. This is the use of this product on instrument clusters.

**You can check this out:**

**Anti-fog solution for instrument cluster**

Now that I have discussed anti-fog solutions for speedometers, you must be having an idea of what you expect in this section. Let me start by making everything simple for you. I just want to ensure we read from the same script. I will start by asking you a simple question:

**What do you understand by instrument cluster?**

An instrument cluster is a collection of gauges, lights and dials that are found just above the steering wheel. They play an important role since it’s from instrument cluster that you get to know what’s going on in the vehicle. It could be engine status, fuel level or malfunctioned parts. In most cases, these instrument cluster may last the lifetime of an automobile. This is due to quality manufacturing process. However, this does not imply that instrument clusters may be 100% free from fogging. Fogging is a major problem that most manufacturers have to deal with. It is the instrument cluster manufacturers who suffer the most. It is upon them to figure out the best anti-fog solution for instrument clusters. It should be one that do not fog in adverse weather conditions. Take for instance, during winter. Going for a permanent anti-fog solution is paramount. The installation process has proved to be a challenging task. It is from the fact that, anti-fog coating or film, should be installed from the inside section of the instrument cluster.
2. Compatible with all optical surfaces.
3. No light refraction, diffusion or haze effects.
5. Permanent anti-fog solution.

As you can see, most of these key benefits I had mentioned them earlier. Another product is anti-fog solution for test instruments. Again, you will realize that there are a number of properties that overlap among various anti-fog solutions I have discussed above. The truth of the matter is, in all these applications, anti-fog coating and films have proved to be superior and reliable.

Anti-fog solution for test instruments

Test instruments also share a number of features with instrument clusters or speedometer. However, I want to emphasize that with the test instruments, accuracy of an information/reading obtained from instruments is important. The output from instruments form a crucial foundation from which, one can make a decision.

Can you imagine a situation where you take a wrong reading may be due to parallax error?

This can be disastrous to the normal operations of the company. Here, the procedure still remains the same like for the instruments I had mentioned earlier. Again, the anti-fog solution for test instruments also exist in coating and film form. Just like I mentioned earlier, the choice of a particular anti-fog formula will depend on specific applications of the test instruments. In test instruments, optical clarity remains a fundamental factor to consider. Errors due to poor or inaccurate reading will definitely result in poor decision making. Before I wrap up this section, I will review different types of anti-fog solutions for other instruments. This section is crucial in decision making because, it will enable you to make the right decisions based on fundamental aspects that affect performance and reliability of the anti-fog solutions.

Anti-fog solution for other instruments
All instruments must be protected from the fog problem. It is this simple, you will not be able to get accurate results if by any chance the screen of an instrument is full of water droplets. Quite a number of factors will affect the accuracy of your results. It does matter whether you have analogue or digital instruments. Since this is the last section of this chapter, I will not only do a recap, but also, add other crucial aspects to support why we need anti-fog solution for other instruments.

I am not saying that we are going to introduce new anti-fog coating or films. It will be based on coatings and films that offer a permanent anti-fog solution. The use of instruments overlap from one industry to the other. Again, it will not be practical to list all instruments here. That list will be too long. However, I think it will be a noble idea to classify the use of anti-fog solution for other instruments based on specific industries.

**Examples of instruments in various industries**

**Automotive and transit**

Speedometer, gauges and instrument are some of the most common instruments in this industry. If possible, anti-fog solution must have anti-scratch elements.

**Medical**

There are quite a number of instruments in the medical industry such as thermometers, incubators, x-ray displays and weighing machines, just to mention a few. Despite the fact that the machines may be stored/used in a fully controlled environment. Fogging is still a major problem. It is for this reason that they must have anti-fog films/coating on their display.

**Aviation and aerospace industry**

Anti-fog films and coating that is used in this industry should be resistant to weathering. Anti-fog solution for instrument screen protectors are mainly used to protect cockpit instruments. In this industry, there are several gauges whose readings must be taken accurately, hence, need to make them fog free.

**Electrical and electronics**

All digital display lens must be coated with an anti-fog solution for screen protectors. This is crucial for those in manufacturing and processing industries. A good example is an LCD display system.

In short, we require an anti-fog protector on any instruments that:

1. Displays either analogue or digital data.
2. Used in humid environments.
3. Performance is highly affected by fog water droplets.

Basically, this includes all instruments that you may use in all industrial applications. I may not be able to mention individual instruments. Maybe it will be better if I classify them based on their functions.

There are anti-fog solution screen protector used to measure the following key parameters:

1. Temperature – thermometers, thermistors and RTD displays.
2. Pressure and flow- flow meters, pressure gauges, positive displacement meter display, etc.
What am I trying to say?
Any instrument with a transparent display must have an anti-fog protector. This can be in the form of a film or coating. So far, I have discussed all possible applications of anti-fog films or coating. Moreover, you should be able to explain the working principle of various anti-fog products. However, the biggest that still remain unanswered is:

Which companies manufacture anti-fog coatings and films?
I will answer this in our last paragraph.

The Leading Companies in Anti-fog Industry

Whenever you are planning to buy anti-fog coating or film, it is advisable that you opt for reputable companies in the industry. This is basically what I mean by going for the right brand. Such companies use modern technology that guarantees optimal performance and reliability. I am quite sure there are numerous companies in the industry, however, I will focus on 7 main companies.

These anti-fog films and anti-fog coating manufacturing companies include:

1. WeeTect
2. FSI
3. Uvex
4. Heoneywell
5. Pinlock
6. 3M
7. Gibson

This guide should help you go for anti-fog products manufactured from reputable companies in the industry, I will highlight a background information about the company and the list of products it manufactures.

WeeTect
This is a high-tech company that has been in the anti-fog industry since 1993. It is a Chinese company known for its vision: protect people, pursue safety. Presently, it is one of the main manufacturer and supplier of anti-fog films and coatings in China. Over the years, WeeTect has proved to deliver world-class products with consistent quality that are both eco-friendly and affordable. Since its inception, there has been significant growth. That is, the company has expanded its markets to America and Europe.

WeeTect products

WeeTect manufactures and supplies a number of products such as:

1. Helmet visors
2. Face shields
3. Auto darkening welding helmets
The company has invested in modern testing equipment such as:

1. ADF Measurement Device for Shade
2. Cary 4000 Spectrophotometer
3. Measurement Device for Homogeneity
4. Angle Dependence
5. Measurement Device for Switching Time
6. On-line Automatic Testing Device
7. Measurement Device for Light Scattered

The latest product from the company is anti-fog solution for screen protector. It has proved to be cost effective and reliable.

It is a unique technology designed for:

- Speedometers
- Instruments clusters
- IP cameras
- Test instruments

This anti-fog solution features the best optical properties. For more information about various WeeTect product, you can visit the company’s official website: www.weetect.com. Or contact the WeeTect technical team.

FSI

FSI Coating Technologies Inc. was established in 1986. It is popular for its high performance and reliable anti-fog coating solutions. Like other companies in this industry, FSI manufactures both custom and standard anti-fog products. The FSI products are used in a wide range of industries such as medical, safety, sports and military industries. Apparently, FSI is embarked on premium anti-fog technology. In fact, the company has incorporated additional elements such as abrasion and chemical resistance.

FSI products
This company manufactures a wide range of products which include:

1. Anti-fog products.
2. Formable products
3. Anti-fog film and sheet products
4. Anti-fog PET film products

For more information about this company, you can visit their official website of FSI coating technologies.

Uvex

Uvex is popularly known for its simple and straightforward mission – protecting people. This company is broadly divided into two main regions.

These include:

1. Western hemisphere that include North and South America
2. Eastern hemisphere that include other parts of the world. That is, Europe, Africa, Asia and Australia.

Uvex products

Uvex manufactures a wide range of safety products such as:

1. Sports and leisure products such as: cycling and ski goggles and helmets.
2. Safety products for industries such as hand protection, hearing and protective eyewear.

The company offers a wide range of coating such as anti-fog and anti-scratch coating. It is known for its extreme, extreme plus, ultra-Dura and supra-Dura, just to mention a few. Apart from these, the company has also invested in a number of anti-fog products. They are a perfect choice during winter and other adverse weather conditions. For more information about Uvex and its product, you can visit the company's official website.

Honeywell

This is an American multinational company that has invested in wide range of consumer products.

It has ventured in the following key areas:

1. Strategic Business Unit-Aerospace
2. Automation Controls and Solutions (ACS)
For the purpose of this Handbook, I will only have a quick summary of its safety solutions and products. The company has also invested in a number of anti-fog and anti-scratch coating. They actually meet the desired engineering standards. They are defined as safe, durable and superior optical properties.

**Gibson**
Gibson & Barnes is an American company that manufactures high quality flying helmets. This include jet pilot helmets and fixed wing helmets. They have anti-fog and anti-scratch coating.

**Pinlock**
Pinlock is a household name in the motorcycle visor insert industry. In fact, you will be surprised when people call all motorcycle visor inserts as pinlock inserts. It is one of those companies that has specialized in manufacturing fog resistant equipment. The Pinlock visor inserts are some of the most selling products manufactured by this company. Apart from this, the company manufactures other motorcycle face shield accessories. Do you need more information about Pinlock? Here is a link to the official website.

**3M**
Formerly known as Minnesota Mining & Manufacturing Company, 3M has grown to a multinational conglomerate. The company has diversified in a wide range of industries. For the purpose of this Handbook, I will only summarize the safety equipment manufactured by this company.

**3M products**
This company manufactures and supplies the following:

1. Face shield helmets.
2. Anti-fog coatings and films.
3. Safety goggles, just to mention a few.

**Conclusion**
I hope you did enjoy reading this Handbook. But, before I wind up, it will be better if I could help you brainstorm. Do you remember what you have learnt?

**Here we go:**
1. What is an anti-fog film or coating and how do they work?
2. Explain how hydrophilic and hydrophobic films work.
3. List 10 applications of anti-fog films and products.
4. Why do you need anti-fog solution for screen protectors and where can you use them?

This is basically a quick summary of what I have discussed in this handbook. Feel free to contact our technical team for assistance or contribute via our comment sections.