

# Anodizing and the Environment

## ALUMINUM LIFE CYCLE ENHANCEMENT WITH ANODIZING

Anodizing enhances aluminum and its environmental virtues. Anodizing uses the base metal - the aluminum alloy - to create a thin, extremely strong and corrosion-resistant finish. The anodized surface is very hard and thus preserves and extends the life of the aluminum product.



In contrast to anodizing, coatings - paint for example - can dramatically reduce the ability to recycle the aluminum and can increase costs. Paints, plastics, and plating rely on problematic materials in their production that can compromise green objectives. Anodizing, on the other hand, is "recycle-neutral" with minimal use of such materials as volatile organic compounds (VOCs) and heavy metals.

### Environmental Aspects of the Anodizing Process

Anodizing generates no hazardous waste; it does not use VOCs or EPA-listed toxic organics. The involvement of heavy metals is dramatically lower than exterior-use paint pigments or plating.

Recyclability is unaltered by anodizing and no intermediate processing is needed for anodized metal to re-enter the recycle chain, unlike thicker organic or plated metallic coatings.

Anodized aluminum is the environmentally sound choice for various applications.

### What Are the Benefits of Al Anodized?

#### 1. Aesthetics

Anodized aluminum coatings can have distinct visual effects; the light layers reflect light while the dark and deeper anodized layers absorb light. The anodized colors and finishes still maintain the metallic appearance of the aluminum. Unlike standard aluminum, IT can be dyed to achieve a wide range of coloration and gloss alternatives.

#### 2. Stability

The anodized aluminum has better protection against ultraviolet rays as compared to the standard aluminum. It does not peel, chip, or corrode and is easily recycled, and the life span is

extremely long. The finish of anodized Al can effortlessly be restored to its original look, by rinsing or cleaning it with water.

### **3. Safety**

The anodizing process is not at all harmful for human health because it is a modification of a naturally occurring oxidation process. It does not decompose, has excellent stability, and is non-toxic to use. Although anodize is a chemical process, it produces no hazardous by-products.

### **4. Corrosion resistance**

Neither standard aluminum nor anodized aluminum can corrode, but anodized aluminum offers comparatively better resistance. The typical aluminum can rust in harsh conditions like constant moisture, air, and the presence of other elements. But anodized aluminum is rarely going to corrode with a thicker aluminum oxide layer on its surface.

### **How Durable Is the Anodized Aluminum Coating?**

Aluminum anodize forms an oxide coating on aluminum's surface which is very hard. The anodized aluminum is exclusively abrasive-resistant and known for their durability.

Aluminum oxide is from the Corundum family of gemstones, and it is second to diamond in terms of stiffness. The oxide layer passes the pencil hardness tests, which means the anodized aluminum coating is highly durable.

### **References and citations:**

<https://www.anodizing.org/page/anodizing-environmental-advantages>

# What Is Silicone rubber?

People often mistaken silicone as a kind of plastic due to its malleability, water resistance, and flexibility. The plastics industry also considers silicone as plastic. We would say: No, Silicone isn't plastic, even though it does share some characteristics with common plastic that we're all used to. Plastic comes with many issues, such as leaching toxic chemicals into your food and drink, which silicone fixes. However, that's why silicone becomes so popular. Technically, silicone could be considered part of the rubber family.

Silicone rubber is also known as elastomer (rubber-like material) composed of Silicon (a naturally occurring element), Oxygen, Carbon, Hydrogen. Silicone rubbers are widely used in industry, and there are multiple formulations. Silicone rubbers are often one- or two-part polymers.



## What are the advantages of silicone rubber?

### 1. High-Temperature Resistance

The most well-known property of silicone is high-temperature resistance, which can still work normally within the range of  $-55$  to  $300$  °C ( $-70$  to  $570$  °F). Heat resistance can reach  $260$ °C, so silicone rubber is very suitable for cooking and mechanical equipment under severe environmental temperatures.

### 2. Non-Toxic

Although silicone rubber is a polymer, it is composed of a fairly natural mineral (silica). This also creates the safety characteristics of non-toxic and heavy metal-free silicone rubber itself, so it is suitable for skin-friendly medical products and food-contact kitchenware containers.

### 3. Waterproof

If there is something in common between silicone rubber and plastic, it is probably waterproof. However, the waterproof performance of silicone rubber is better than that of plastic. The reason is that the ductility and elasticity of silicone are very high after molding, unlike plastic parts that are shaped after molding. Therefore, it can often be seen that silicone rubber is used as a raw material for gaskets such as waterproof sealings and O-rings.

### 4. Durable, Long Lifespan

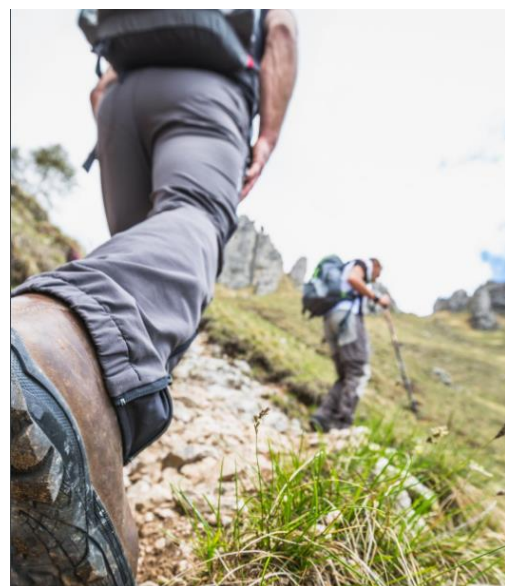
Silicone rubber-made products have high tensile strength and are not easily deformed, the failure rate and replacement rate of the products are relatively low. Not only that, the wasted silicone rubber can be decomposed naturally in nature, and it can be said to be a very environmentally friendly material.

### Is silicone rubber the same as plastic?

Although there are some common features between silicone rubber and plastic, in essence, they are completely different materials. Plastics have brought many problems to the environment and ecosystem. For example, plastics contain chemical poisons, which may enter people's diets in various ways. Silicone rubber does not produce dioxin when it burns, and it does not release toxic substances during heating or use. It is a material that is highly environmentally friendly, which just solves the environmental and ecological crisis caused by plastics. That is the reason why silicone rubber has become so popular.

### Is silicone rubber the same as plastic?

Organosilicon, which is the raw material of silicone rubber compounds, is recognized as having chemical stability. Silicone rubber will not react with food or beverages in contact with it. Therefore, many experts and authorities believe that silicone rubber is non-toxic and safe for use in food utensils. At present, there are no reported health hazards related to the use of silicone-made cookware on the market or in research reports, and they do not produce any harmful fumes. Therefore, silicone rubber is absolutely safe and non-toxic. Hearing this, everyone may have a question: Since silicone rubber is non-toxic, it should be taken as food-grade, right? Silicone rubber's resistance to ultimate temperature and chemicals means that it will not react with food or any medium encountered in production. However, only materials that meet FDA standards are considered "food grade" levels.



### Conclusion

Silicone rubber is non-toxic and is not a hazardous waste, making it the better choice. A basic tip for safe silicone rubber use: If you are going to use silicone rubber, be sure it is high quality with an official datasheet guarantee and does not contain any fillers.

### References and Citations:

[https://www.glorysungroup.com/zh-tw/blog/What\\_You\\_Should\\_Know\\_About\\_Silicone\\_Rubber](https://www.glorysungroup.com/zh-tw/blog/What_You_Should_Know_About_Silicone_Rubber)

# WHAT IS PETG?

Polyethylene terephthalate glycol, known as PETG or PET-G, is a thermoplastic polyester that delivers significant chemical resistance, durability, and formability for manufacturing. PETG is an adaptation of PET (Polyethylene terephthalate) where the 'G' stands for glycol, which is added at a molecular level to offer different chemical properties. PET uses the same monomers as the glycol modified PETG, but PETG has greater strength and durability, as well as being more impact resistant and better suited to higher temperatures.



## Is PETG Environmentally Friendly?

PETG can take decades to break down completely when sent to landfill, but it is easily recycled using chemicals to break the polymer chains back down to their original components. These components can then be used as raw materials for the manufacture of new polymers.

## What are the advantages of PETG?

### 1. Strong and Cost-Effective

PETG has high strength and impact resistance, which means it is suitable for a variety of products requiring high strength.

### 2. Food-Safe and Recyclable

PETG is safe for use for food containers and bottles for drinks. It is also fully recyclable, which reduces waste and the potential negative environmental impact.

### 3. Easily Formable

PETG is both vacuum and thermo formable and can withstand high pressures without cracking. It can be injection moulded into a variety of shapes or extruded into sheets.

### 4. Easily Colored

PETG is naturally transparent, which allows for unique effects, but it can also easily be colored and blended to create different appearances.

## 5. Non-Toxic and Odourless Emissions

PETG is non-toxic and tasteless during the production and molding process, and is very suitable for use in various industries.

## Applications

### 1. Food and Drink Containers

Because it has good chemical resistance and is easy to thermoform, PETG is widely used for items such as cooking oil containers, drinking bottles and FDA-compliant food storage containers. It is also used for cosmetics packaging and the light weight and high strength delivers advantages for distribution costs and effectiveness.

### 2. Medical and Pharmaceutical Applications

The rigid structure of PETG means that it can survive harsh sterilisation processes, which makes it an ideal substance for medical implants as well as packaging for pharmaceutical and medical devices.

### 3. Retail Stands and Displays

polyethylene terephthalate glycol is widely used for point-of-sale retail stands and displays. Since it can be colored, it is also ideal for signage.

### 4. Machine Guards

PETG is also used to manufacture machine guards. The clear plastic is easy to form while also offering protection for users. PETG guards are often used in food processing as they are easier to form than polycarbonate and more durable than acrylic.

## Conclusion

polyethylene terephthalate glycol is a well-used and versatile plastic with many properties that are better than those of comparable materials. With an increasing uptake in 3D printing applications, PETG is also widely used in the food and medical industries.



## References and citations:

<https://www.twi-global.com/technical-knowledge/faqs/what-is-petg>