Substrate Options

Properties of Aluminum

One of the reasons aluminum cookware is so popular is that it is an excellent conductor of heat. Because of this quality, heat spreads quickly and evenly across the bottom, up the sides and across the cover to completely surround the food being cooked. Aluminum frying pans are particularly popular with consumers in that they help sauté and fry foods quickly. Aluminum is a lightweight metal, about one-third the weight of steel, so in the kitchen, it means that a sturdy aluminum pan is also easy to handle. Aluminum is used for both top of stove cookware and bakeware. Aluminum also does not rust.

Aluminum is also the third most abundant element in the earth's crust. In nature, aluminum is always found in combination with other materials. An ore called bauxite is our most common source of the metal. Bauxite contains a greater percentage of aluminum than do other ores, and the metal can be extracted more economically.

Manufacturing Processes

Aluminum cookware is manufactured principally by the following methods:

Stamping, Drawing or Cold Forming: In these methods, flat sheets or circles rolled to the desired thickness are placed on a press. The press then forms the sheet metal into the desired shape. Afterward, both inside and outside finishes are applied, and appropriate handles and knobs are attached. The thickness can vary from 1.8 to 5.0mm.

Casting: Molten aluminum is poured into molds specially designed for each different cookware utensil. It can be gravity cast or pressure cast aluminum. Gravity die casting is suitable for small productions and produces a purer substrate with no outgassing issues. Pressure die casting is the most common process. The liquid metal is injected at high speed and high pressure into a metal mould. Both the machine and its dies are very expensive, but it's a much faster process. In this process, special precautions must be taken to avoid too many gas inclusions which causes outgassing during subsequent heat-treatment or welding of the casting product.
Gravity Cast

These molds allow the thickness of the cookware to be strategically varied in different areas of the pan for maximum cooking efficiency. For instance, the pan bottoms can be made extra thick for superior heat absorption and the pan walls can be slightly tapered to help create circular heat movement up and down the pan. When the aluminum cools, the mold is opened and the cookware is removed. Cast aluminum utensils are often heavier and thicker than stamped utensils. The bodies of all aluminum utensils are made in one piece so that there are no seams or hard-to-clean crevices.

Generally the gauge or thickness of the aluminum utensils is one feature that determines its quality. The heavier the gauge (thickness), the more durable and more costly the utensil. For this reason, the intended use of the utensil should be considered when purchasing. Gauge is usually described by a number, the smaller the number the thicker the aluminum. For example, eight (8) gauge aluminum is thick (.125 inch); twenty (20) gauge aluminum is thin (.032 inch).

Pressure Cast

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Aluminum utensils are manufactured with a wide variety of finishes. Stamped and drawn utensils may have exterior finishes of polished natural aluminum, chrome plate, anodized (with or without color), porcelain enamel coatings, nonstick coatings or colored organic coatings (acrylics, polyamides, etc.). Usually bottoms have a satin finish or are porcelain enamel coated; both finishes help absorb heat. Cast aluminum utensils may have exterior finishes of colored porcelain enamel coating, polished, hammered or velva-glazed natural surfaces, colored organic coating, or hard-coat anodized surfaces.

The inside finish on aluminum utensils may be a natural finish, "sunray" or "spun" finish, high polish finish, hard-coat anodized finish or nonstick coating. Hard anodized aluminum has become a popular substrate for higher end aluminum cookware lines.

When anodizing aluminum, the metal is oxidized chemically and/or electronically, producing a smooth, more durable finish. Annealing is another oxidizing process, achieved by a heating and cooling cycle that strengthens the steel and makes it more resistant to corrosion.

Anodizing is a coating where an oxide film is obtained in an electrochemical process as a result of oxidation of an anodically connected aluminium part in an acidic electrolyte solution. Thickness of anodizing coating may reach 4 mils (100 µm), which is much higher than natural oxide film on aluminium surface. Anodized aluminium has had the naturally occurring layer of aluminium oxide thickened by an electrolytic process to create a surface that is hard and non-reactive.

Hard Anodized treatment quality has direct influence over the Exterior Finish gloss and appearance:
Use and Care

New aluminum utensils require washing in warm sudsy water to remove any residual manufacturing oils.

After use aluminum utensils, like most cookware, should be allowed to cool before washing or soaking. This is a simple safeguard against warping, as well as preventing accidental burns in handling. Drying immediately after washing will help preserve their appearance. Utensils should be washed each time they are used.

Undissolved salt allowed to remain on an aluminum surface may cause pitting. Consumers should add salt to liquid after it reaches the boiling point and stir to dissolve it completely. Acid or salty foods should not remain in aluminum or aluminum-finished utensils for long periods of time, because this may cause pitting.

Because it combines easily with other natural elements, aluminum may stain when it contacts minerals in water and foods. Automatic dishwashing may increase the amount of staining when the high heat of the drying cycle is added to minerals naturally present in water and the chemicals used to purify water. For that reason, hand washing may be preferred to preserve the attractive finish of aluminum utensils.

Utensils with coated exteriors and interiors may be washed in automatic dishwashers. However, care should be taken when loading them into the dishwasher to avoid marring or scratching the coating.

Stains and discoloration that may appear on aluminum utensils can be removed by boiling a solution of two to three tablespoons of cream of tartar, lemon juice or vinegar to each quart of water in the utensil for five to ten minutes. Then lightly scour with a soap-filled scouring pad. Cooking acidic foods such as tomatoes or...
rhubarb will remove the stains naturally without affecting the cooked food product. To remove stains from the aluminum exterior, use a nonabrasive cleanser.

Cooking tools made of wood, plastic, or smooth edged metal are recommended for use in aluminum utensils, particularly those with non-stick interiors. Sharp-edged tools such as knives, masher and beaters may scratch aluminum. Check the manufacturer's recommendation.

**Aluminum, Alzheimer’s and Cookware**

As far back as the 1960s there was a pervasive rumor that there may be a link between exposure to aluminum and Alzheimer’s Disease. However, in the more than fifty years since then, after many studies on the subject, there has been no positive evidence that aluminum can contribute to Alzheimer’s.

As the Alzheimer’s website ([alz.org](http://alz.org)) says under "Alzheimer Myths", "...studies have failed to confirm any role for aluminum in causing Alzheimer's".

**Aluminum is Everywhere**

There is no escaping aluminum. It is the third most abundant element in the earth’s crust (after oxygen and silicon). It is in the air we breathe, the water we drink. Plants we eat take it up from the soil. Aluminum enters our bodies via food (such as tea, beer, baked goods), health products (toothpaste, aluminum-based antacids, buffered aspirins, some canned beverages, antiperspirants), and many more commonly used products.

The Alzheimer’s Organization points out in an article entitled “Aluminum and Alzheimer’s Disease”, “Only a minute proportion of the aluminum we ingest from these various sources is absorbed by the body, and even this small fraction is usually excreted in the urine....”

**Cookware and Coatings: More Protection (even if not necessary)**

While more than half of all cookware used today is made from aluminum, most of that is covered with a nonstick coating, which, aside from the many other benefits of nonstick coating (such as cooking with little or no grease or oil, quick and easy cleanup), acts as a barrier between the food cooked and the aluminum surface. So any exposure to aluminum via this kind of cookware is virtually impossible.

As the highly popular website “Web MD” says in a recent article called “Alzheimer’s Disease Guide: Controversial Alzheimer’s Disease Risk Factors”, “Moreover, aluminum in cooking utensils does not get into food, and the aluminum that does occur naturally in some foods, such as potatoes, is not absorbed well by the body”.

www.ProductKnowledge.com
The View of the US Food & Drug Administration

There is still much to be learned about Alzheimer’s and its causes, but aluminum, especially aluminum cookware, does not appear to be one of them.

In 1986, the US Food and Drug Administration (the FDA) reviewed existing data and formally announced that it “has no information at this time that the normal dietary intake of aluminum, whether from naturally occurring levels in food, the use of aluminum cookware, or from aluminum food additives or drugs, is harmful”. To date, the FDA has not seen any reason to alter that opinion.

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This information has been created by the Retail Marketing Team at Whitford. The Product Knowledge Network (PKN) offers you everything you need to know about nonstick-coated housewares products — all for FREE.

For more information, contact us at retail@whitfordww.com, visit us online at productknowledge.com or scan this QR code.

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