



## What's the Rub

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It's often said that the most successful companies get inside their customers' skin. For jewelry manufacturers who want to export to Europe, this is more than just a cliché; it's a major business concern.

At issue is the effect that exposure to nickel can have on human skin. It's believed that approximately 10 percent of all women are susceptible to nickel dermatitis, an inflammation of the skin caused by an allergy to nickel. The condition is most often encountered when these women don jewelry -- especially earrings -- containing nickel. Interestingly, the incidence of nickel dermatitis in the male population is increasing.

While virtually everyone in the American jewelry industry is aware of this concern, governments in Europe are taking a much harder look at the issue. Exporters who ignore the controversy run the risk of breaking laws in several countries.

What's the Law? To date, three European countries have developed laws pertaining to the sale of jewelry containing nickel. To complicate matters, these laws differ from each other in terms of regulations and penalties. The European Community (EC), as a whole, has not adopted a uniform set of standards concerning this matter, but may within a few years.

In Sweden, for example, material used for ear piercing or ear jewelry may contain no more than 0.05 percent nickel in an alloy. Shipments are sampled as they enter the country. If a single sample fails the test, the entire shipment may be rejected.

Denmark has banned the sale of any metallic jewelry that releases more than 0.5 pg/cm<sup>2</sup>/week (micrograms per square centimeter per week) of nickel. This can include car ornaments, necklaces, bracelets, chains, rings, wristwatches, eyeglass frames and any other item that could normally come in contact with skin. The test is conducted by wholesalers and retailers, not manufacturers.

In Germany, the government has banned the use of nickel in earring posts and other products designed to stay in the skin while it heals after piercing. Also, items that come into contact with skin and release more than 0.5 pg/cm<sup>2</sup>/week of nickel must carry a warning label.

Sanctions for failing to observe these regulations can be severe. In Denmark, for example, offenders are subject to penalties and/or imprisonment for up to one year.

### How to Know What Is "Nickel-Free"

This issue also is clouded by the fact that there are a variety of ways to determine if a piece of jewelry is "nickel-free."

One common test is the dimethylglyoxime (DMG) spot test. Here, a solution of DMG and ammonia is rubbed with a cotton swab on the item for 30 seconds. If a reddish or pinkish color is observed on the tip of the swab, the item has emitted nickel. This is a fast but low-sensitivity test—the detection limit varies considerably. This test does not provide a value that can be attributed to the amount of nickel detected. Instead, any tinge of pink revealed by the test is indicative of a nickel release.

The primary test in Denmark is the synthetic perspiration test method. Here, the item is stored for a period of time—usually a week—in a solution of synthetic perspiration (consisting of 0.5 percent sodium chloride, 0.1 percent lactic acid and 0.1 percent urea in deionized water with ammonia added to pH 6.5).

A furnace atomic absorption spectrophotometer is then used to determine the amount of nickel released in the solution in terms of micrograms per square centimeter per week.

The synthetic perspiration test method has its limitations. It reveals only how much nickel is released from the surface of the piece. It does not measure nickel released when a plating or coating wears off to expose nickel underneath.

In Sweden, the atomic absorption test is used. This is done by taking scrape samples of about one milligram from different parts of the item. The scrape samples are placed in a microboiling tube, dissolved in acid and diluted to one milliliter. The solution is then analyzed with a flame atomic absorption spectrophotometer to determine how much nickel is released.

By passing these tests, the item in question will be approved as "nickel-free," according to the parameters set by a particular government. Remember that this does not necessarily mean the item does not contain nickel; only that it has passed the requirements for that country.

### Do You Need To Be Nickel-Free?

There are several reasons why jewelry manufacturers may want to change their operations to produce a "nickel-free" product. First, they may export to certain European countries. In this case, they have little choice but to meet the nickel-free requirements (if not now, perhaps in the near future).

Second, the company may see a marketing advantage in manufacturing and promoting nickel-free products. For years, American companies have sold "hypoallergenic" jewelry as a means of entry into a particular market niche in the U.S. that perceives a need for these products.

Third, manufacturers who've found a market for some nickel-free products may want to change over all their lines. That way, they run one line instead of two or three, and their inventory requirements become much simpler.

Do you need to be nickel-free? You can answer that question by asking yourself if you fall into one of the three categories above. But before you jump onto the bandwagon and do a complete changeover of your manufacturing lines, you should go through a product examination process to see if it really makes sense for you.

Your first step should be to test your products to see how they fare according to current standards for nickel-free certification. Many of these tests easily can be done in your own facility; others can be done in your electroplater's labs. If your products pass comfortably, you have no problem. However, if your products fail the tests or are on the borderline, you have to make a choice: Do you change over to a nickel-free process, or do you change your plating specs (by increasing the gold plating, for example, or putting on a coating) so that the nickel content is more thoroughly protected?

Making the Change Changing to a nickel-free process affects your entire manufacturing operation. You'll need to examine all the steps in the process, including the base material. Nickel plating has a high leveling capability; acid copper, which is the nickel-free alternative, is less forgiving, so the surface quality and preparation have to be superb.

If you're working with steel, you may be accustomed to giving it a vibratory finish before plating with nickel. However, if you switch to acid copper plating, you may need to do a vibratory finish followed by hand-polishing to achieve the same quality of appearance.

You'll also need to re-examine your designs. Some products, such as those with intricate dimensional designs, plate better with nickel; acid-copper plate doesn't do the job as well.

Finally, your plating process may have to be changed. For example, at Tanury we use the following four-step process for nickel-free plating:

Copper plating. Depending on the base metal, either a copper flash or a heavy cyanide copper is used. Brass or steel items receive a flash, while white metal or zinc products receive a heavy copper.

Acid copper. Applied as the main substitute for nickel, acid copper provides the brightness and leveling necessary to achieve a high-quality, bright finish. Various thicknesses of acid copper are recommended, depending on the desired finish of the product. Typical thicknesses are 500 to 800 micro-inches.

Palladium. Next, a layer of palladium is applied to prevent migration of copper to the surface finish. This layer is often referred to as a barrier finish. It also acts as protection against corrosion. Typical thicknesses are 2 to 7 micro-inches.

Final finish. Gold, silver and rhodium are typical final layers. Tin, bronze or platinum also can be applied as a final finish.

The Plater's Perspective If you decide to change to a nickel-free process, your electroplater will give you an idea of the effects this change will have on the final appearance of your product. There are definite limitations to nickel-free plating. Most importantly, nickel-free plating is more time-consuming and expensive, in part because more than one precious metal is normally used. In addition, nickel-free plating provides a more limited spectrum of finishes.

Plating operations may have to change, too. In barrel plating, nickel is the norm. However, this process doesn't work as well when nickel is not used. To duplicate the brightness achieved with a 20-minute nickel plating, you may need to run a copper process for twice as long, and you still may not be able to achieve the same brightness level.

The best way to know if You can successfully switch to a nickel-free plating process is to run a cross-section of your product line in the new process. This will tell you what quality You'll get, and will point out what changes are necessary in Your pre-finishing operations.

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