



**NSF International<sup>1</sup>**  
**NSF/ANSI Standard 61<sup>2</sup> and Stainless Steel**

**Introduction**

Stainless steel pipe, fittings and other products are suitable for use with drinking water and provide excellent corrosion resistance if the material is welded and processed correctly. However if inappropriate or inadequate welding or passivation processes are used the products can be subject to corrosion and leach harmful contaminants into drinking water such as Chromium VI.

It is a misunderstanding of NSF/ANSI Standard 61<sup>2</sup> (NSF 61) that if a grade of stainless steel appears in Annex C of NSF/ANSI Standard 61 (NSF 61) that any product manufactured solely from that alloy can be represented as certified to NSF/ANSI 61, or that anyone without the NSF61 certification can “self perform” leach tests, and call the product NSF Certified. Manufacturers, Installers and Consumers of stainless steel products wishing to offer or use these products as certified to NSF/ANSI 61 and bear the NSF International NSF61 Mark must obtain them from companies that appear in the NSF International Listings of NSF 61 Certified products at <http://www.nsf.org/Certified/PwsComponents/>.

Several grades of stainless steel are listed in NSF/ANSI Standard 61, Annex C. These grades have standard material formulations or specifications (e.g., ASTM, SAE), and have been tested to the requirements of NSF 61 at specific surface area to volume ratios and at certain temperatures (23°C and 30°C, but not at 60°C or 82°C). The stainless steel grades that currently are listed in Annex C are 304, 304L, 316, 316L, 2205, 2203, 2101, 2304 and 2202. NSF will consider additional material grades but will require additional testing to insure compliance before adding to Annex C. Manufacturers utilizing these materials in their products under the conditions stated in Annex C may require less product testing to achieve certification. However if the components are welded or subject to passivation or other processing the final product will require testing for certification. Also if the products are used with domestic or commercial hot water they will also require testing at that temperature. It is important to note that using a product made from a material appearing in Annex C of NSF 61 does not mean that the product is NSF certified however, unless that product appears in the Official NSF Certification Listing on the NSF website.

NSF International ***NSF/ANSI 61 Certified*** stainless steel products allow potable water system producers and operators to install tested quality products that comply with regulatory requirements and protect public health.

The NSF International NSF/ANSI Standard 61 is the only American National Standard addressing the human health effects of drinking water system components. As an approved standard of the American National Standards Institute, NSF 61 is the legally recognized national standard in the United States for the human health effects of drinking water contact materials, components and devices. This standard



forms the basis of the regulatory framework, and public health protection for controlling the health effects of drinking water contact materials across the USA and Canada. It has also been used a specification by water utilities around the world including South Korea, Saudi Arabia and UAE. 46 US States and many Canadian Provinces currently require municipal drinking water system components to comply with the requirements of the NSF 61 standard.<sup>3</sup>

NSF International NSF/ANSI Standard 61 is a performance based standard that evaluates the amount of contaminants that leach from the products into drinking water, rather than setting prescriptive limits on content. This differs from U S Food and Drug Administration requirements and some international standards that are based on prescriptive content requirements.

NSF International NSF Standard 61 requires analysis for any chemicals that leach from a material into drinking water and it requires a toxicological evaluation of chemical concentrations to ensure that they are below levels that may cause potential adverse human health effects. The toxicological evaluation criteria are based on life time exposure to the concentration of contaminants in drinking water.

#### **NSF International Certification of Products to NSF/ANSI Standard 61**

NSF International offers product certification (Listing Services) for all products covered by the NSF/ANSI Standard 61.

For stainless steel products NSF International offers certification for both the Pipe and Fitting manufacturers, as well as fabrication shops that weld NSF61 certified pipe and fittings into pipe spool assemblies. NSF International NSF Listings for Certified stainless steel **Pipe and Fitting Manufacturers** as well as fabrication shops that assemble Pipe Spools are updated daily and available at:

<http://www.nsf.org>

The NSF International Certification process requires a disclosure by the pipe and fitting manufacturer of all water contact materials in the product, and a disclosure of the production and passivation processes. NSF International toxicologists perform a formulation review of each water contact material to determine any possible ingredients, contaminants or reaction by-products that may potentially leach from the material into drinking water. This formulation review then determines the battery of chemical analyses that will be performed on a particular material.

The testing of the finished product is performed by exposing the product to pH 5, and pH 10 waters and analyzing for regulated metals such as antimony, arsenic, barium, cadmium, chromium (including chromium VI), copper, lead, mercury, selenium, thallium, and nickel. The product is also exposed to pH 8 water which is tested for organic chemical contaminants that could leach out into the water. Contaminants from stainless steel products may derive from the welding, machining, or passivation process.



The certification process covers two separate applications, ambient/cold water use, which are tested at 23°C, and domestic or commercial hot water requirements, which are tested at 60°C or 82°C. It is important to note that if the pipe will be used with hot water, then the NSF International Certification Listing needs to indicate that it is suitable for use with domestic or commercial hot water.

NSF International then conducts an inspection of the production facility to verify the product formulation and production process and to ensure adequate quality control procedures are in place to prevent the use of unauthorized materials or procedures.

For pipe fabricators as well as pipe and fitting manufacturers, NSF International provides annual unannounced audits to verify the sources and certification of the materials they are using. Samples are also collected for annual exposure testing to verify that no harmful levels of contaminants are leaching out of the product into drinking water.

For questions concerning the NSF International Certification of products to NSF/ANSI Standard 61 please contact [standard61@nsf.org](mailto:standard61@nsf.org)

#### **References**

1. NSF International, (formerly the National Sanitation Foundation), 789 N Dixboro Road, Ann Arbor, MI, 48105, USA
2. NSF/ANSI Standard 61-2012 Drinking Water System Components – Health Effects, NSF International
3. Survey of ASDWA Members, Use of NSF Standards and ETV Reports, March 2010. NSF International. Available at [http://www.nsf.org/business/water\\_distribution/pdf/ASDWA\\_Survey.pdf](http://www.nsf.org/business/water_distribution/pdf/ASDWA_Survey.pdf)