

March 2015  
Volume 4,  
Issue 3

A publication of American Structures, Inc. ~

**“Dedicated to being the trusted supplier of Bolted Stainless Steel Storage Tanks.”**

## From Start to FINISH . . . American Structures Goes HRAP



Stainless steels are family of materials with unique properties. Protected

by a chromium oxide film at the surface, which is formed by a reaction of the chromium in the steel and the oxygen in the atmosphere, stainless steels require no added surface protection against corrosion. In the event of the surface becoming damaged, this film immediately self-repairs in the presence of oxygen.

At the mill, stainless steel is given a variety of finishes, from a dull, matte finish, to a brilliant, highly polished finish that mimics the reflective qualities of a mirror.

In the past, American Structures, Inc. has generally fabricated our bolted, stainless steel tanks with a Number 2B finish. A Number 2 finish is uniform, dull silver gray finish that is applied to thinner coils whose thickness has been reduced by cold rolling. After rolling, the coil is heat treated to produce a uniform microstructure (annealing) and to meet mechanical property requirements. Pickling or descaling is necessary after heat treatment to remove the chromium depleted dark surface layer and restore corrosion resistance. Pickling can be the final step in production of this finish, but, when finish uniformity and/or flatness are important, there is a subsequent final light cold rolling pass (skin pass) through dull rolls.

A Number 2B finish has all the properties of a Number 2 finish, but has been treated to the additional step of a final light rolling pass, which gives the surface a smooth, reflective gray sheen, which may or may not be uniform. It is the standard finish on 201, 301, 304, 304L, and 316L grades of stainless steel.

Recently, in response to our customers' request for a more uniform, matte tank finish, we have started fabricating our bolted, stainless steel tanks from an 304 HRAP (also known as No. 1 finish) or **Hot Rolled Annealed and Pickled** stainless steel. Breaking down the acronym of **HRAP**, you will find the following steps:

**Hot Rolling** is a mill process which involves rolling the steel at a high temperature (typically at a temperature over 1700° F), which is above the steel's recrystallization temperature. When steel is above the recrystallization temperature, it can be shaped and formed easily, and the steel can be made in much larger sizes.

**Annealing** is a heat treatment that alters the physical properties of stainless steel by heating the material (generally until glowing) for a while and then slowly letting it cool to room temperature in still air.

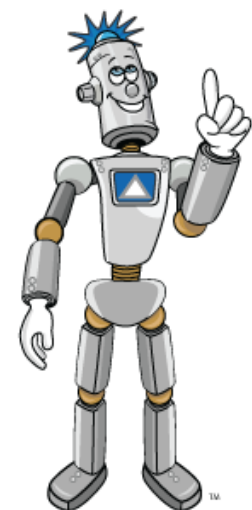
**Pickling** is a surface treatment used to remove impurities, such as stains, inorganic contaminants, or scale from stainless steel. A solution called pickle liquor, which contains strong

acids, is used to remove the surface impurities. Many hot working processes that occur at high temperatures leave a discolored oxide layer or scale on the surface. In order to remove the scale, the work piece is dipped into a vat of pickle liquor.

In summation, HRAP stainless steel is first rolled under heat to a specific size and thickness and then annealed to change the properties of the final material. Any oxidation that forms on the surface (mill scale) is removed by pickling, and a passivation layer is created on the surface.

American Structures, Inc. utilizes 304 HRAP stainless steel due to its corrosion resistance and good mechanical properties. 304 HRAP grades are widely accepted in such industries as dairy, beverage, and other food products where the highest degree of sanitation and cleanliness is of prime importance. Parts for handling acetic, nitric, and citric acids, organic and inorganic chemicals, dyestuffs, crude and refined oils, etc., are also fabricated from this 304 stainless steel.

Pictured on the next page is a recent tank project completed for the City of LeMars, Iowa utilizing 304 HRAP stainless steel. As you can see, the resultant tank finish is a more pleasing, uniform, dull gray matte finish, which blends well into any environment, while maintaining a standard of



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consistency between the stainless steel panels, generally producing a uniform, more aesthetically pleasing, quality tank.



#### Sources:

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## From Sewage to Brewage — Making Beer From

### Waste Water . . .

The latest in specialty brewing: beer made out of recycled sewage? Clean Water Services, a wastewater operator in Washington County, OR, is holding a competition this summer that will enlist 10 home brewers to use recycled water to make beer, according to Portland's local news, KGW—Channel 8.

The competition may help shine a light on the importance of recycled water. "Is there another use we can use for it to meet our long-term water needs? Oregon (and the whole country) needs to be thinking about that," states Mark Jockers of Clean Water Services.

When it comes to making beer, recycled water may actually have an edge on tap water because of how the brewing process works. A special purification system is able to make sewer water even cleaner than your typical drinking water, according to a special report from CNN.

The water that comes from this type of high purity water system is the cleanest water on the planet, per the report. That's meaningful because evidently cleaner water creates better beer.

The OR Department of Environmental Quality allows recycled water to be used for drinking purposes, but only if it goes through a specific process that includes approval from state and national agencies. Oregon State officials have reported

that the brewers participating in this competition are following this process.

Clean Water Services has held the same competition in the past. Thirteen brewers crafted 16 styles of beer using water from the Tualatin River, including 30 percent effluent from Clean Water Services' upstream wastewater treatment facility.

The source water was further treated by Clean Water Services, beyond drinking water standards, and then offered to Portland-area home brewers to concoct the best beer possible," Water Online reported.

Regardless of the light-hearted tone of this article, the reutilization of waste water is no laughing matter. The world is only just realizing that our water sources are not infinite. Reusing sewage in the brewing of beer is only the beginning of a variety of uses for waste water.

**Sources:** <http://www.wateronline.com/doc/sewage-brewage-making-beer-from-wastewater>

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