

NANO
BREWERY 304SS



NANO BREWERY PASSIVATION & 304SS CARE GUIDE





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USER GUIDE: How to look after your NANO 304SS Equipment

All of our NANO 304SS gear is made from high grade 304 stainless steel as used by commercial brewers and more generally in the food industry. Commercial brewers understand that quality equipment is an investment that will provide years of service when properly maintained. Home and craft brewers can benefit in the same way by following simple cleaning and care processes described in this guide.

Stainless steel is made from iron, carbon, chromium and other elements. The 300 series includes 304 and 316 grades which are highly resistant to corrosion and tolerant to a wide range of temperatures without losing structural integrity.

The chromium content of stainless steel alloys creates a thin passivation layer which protects iron within the material by preventing oxygen from having direct access to the underlying iron. When the protective layer is broken as happens during manufacture and fabrication, small surface imperfections and free iron are inevitable. Scrubbing your 304 grade stainless steel or using an abrasive cleaning agent can also break through the passivation layer or leave free iron residues. These provide opportunities for attack by corrosive agents causing surface rust and/or pitting to occur.

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DO'S & DON'TS: Please follow these important steps

DO clean, rinse, and dry your equipment immediately after use. Dirt and residues from brewing processes can concentrate as they dry causing damage to the passivation layer and the underlying alloy.

DO NOT use steel wool or steel scourers to clean stainless steel. Avoid abrasive cleaners.

DO use synthetic scourers such as scotch brite as these will not leave harmful residues and are less likely to damage the protection layer.

DO NOT use chlorine based cleaners or sanitisers. Chlorine is the enemy we have to live with but only in our brew water adjustments as Sodium Chloride or Calcium Chloride.

DO use oxygen bleach or citric and oxalic acid based cleaners such as Sodium Percarbonate, PBW, Oxyper, Trisodium Phosphate. If you have electronic etched markings avoid Oxalic Acid based cleaners as these will fade or erase the etched markings.

DO use phosphoric acid based sanitisers such as Starsan or Stellarsan. These are no rinse products that protect against bacteria or wild yeast infection without tainting your beer, damaging your equipment or harming the environment.

DO passivate your equipment prior to first use. Also passivate after any modifications involving drilling, grinding etc. Finally, passivate as necessary when you suspect the cleaning of stains or other activities may have compromised the protective layer. Use one of the methods described below.

HOW TO: Passivate Stainless Steel & Remove Surface Rust

Method 1 - Passivating with Citric Acid

The international standards for passivating stainless steel (Designation: A967/A967M – 17, and A380/A380M – 17) from ASTM outline a number of methods for passivating various grades of stainless steel. The primary methods involve the use of either Nitric Acid or Citric Acid. Nitric Acid is highly corrosive and must be handled with great care. It is also harmful to the environment as products of its reactions with metals and other chemicals include noxious gases such as NO and NO₂. Citric Acid is a weak organic acid which can be handled with simple precautions even at high concentrations and has no significant impact on the environment. Passivation of parts with citric acid can be achieved as follows:

STEP 1: The parts must be thoroughly cleaned to remove dirt, grease, and other contaminants all of which can interfere with the passivation reactions creating holes in the passivation layer. Cleaning agents suitable for this step include Sodium Percarbonate, PBW, Tri Sodium Phosphate, Bar Keepers Friend. Whatever you use, take the time to understand the ingredients in your cleaning product and avoid the use of any that contain chlorine bleach. Avoid using an Oxalic Acid based cleaner such as Bar Keepers Friend on Nano pots with etched volume marks as these may be faded or removed by such products. After thorough cleaning of all parts (including dismantling and cleaning of your removable valves and pipework), rinse well in clean water and dry the parts prior to the passivation step.

STEP 2: Mix a solution of 4-10% citric acid by weight with clean water. Eg. 1 litre of water requires 40-100g of citric acid. At lower concentrations use the higher end of the recommended time.

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HOW TO: Passivate Stainless Steel & Remove Surface Rust

STEP 3: Soak parts in citric acid solution at room temperature (20C) for 20-30 minutes. In the case of 304 SS Nano pots or fermenters it is clearly not economical to fill these with a citric acid solution so we recommend using an appropriate CIP spray ball and pump to maintain contact between the acid solution and the interior surfaces of the vessel. In regard to the external surfaces of these vessels, thorough cleaning, rinsing and drying should provide sufficient protection given these are not subjected to extensive periods of contact with brewing liquids.

STEP 4: Immediately after removal from the passivating solution, the parts shall be rinsed thoroughly in clean water, and dried.





HOW TO: Passivate Stainless Steel & Remove Surface Rust

Method 2 - Passivating with Starsan/Stellarsan

The international standards recognise other chemicals and methods for passivation, provided these meet standard test conditions. Home brewers have access to no rinse sanitizers containing phosphoric acid and these provide an accessible and economical alternative to citric acid for those without access to CIP spray cleaning systems. You can passivate your 304SS Nano and Nano X brew pots and fermenters using Stellarsan/Starsan phosphoric acid based sanitisers as follows:

STEP 1: Clean your parts using the same cleaning products and procedure as in Method 1.

STEP 2: Mix a solution of Starsan/Stellarsan that is 5 times more concentrated than standard for sanitizing. I.e. 1.5 ml per litre becomes 7.5 ml per litre.

STEP 3: Soak parts in the Starsan/Stellarsan solution at room temperature (20C) for 20-30 minutes. The CIP sprayball solution can also be used here, but for those without access to this equipment, the solution required to fill a 30 litre vessel requires 225 ml of Stellarsan which can be purchased for a reasonable price from our online store or other home brew shops. If you have more than one vessel it would be acceptable to reuse the passivating solution for a second and third vessel and indeed for the smaller parts that make up your system.

STEP 4: Immediately after removal from the passivating solution, the parts shall be rinsed thoroughly in clean water, and dried.

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REFERENCES & CONTACT DETAILS

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<https://www.mmsonline.com/articles/how-to-passivate-stainless-steel-parts>

<https://www.astm.org/> specifically A967 and A380



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