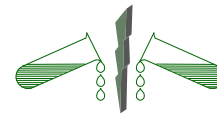
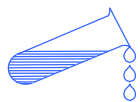


STAINLESS STEEL TREATMENT COMPLETE SOLUTION **NITRIC FREE**





FOREWORD

Within this foreword we would like to point out the benefit of our Technical Solution for the Treatment of Stainless Steel that **is fully Nitric Acid Free**.

The aims of the Realizing Solution are the following:

- realizing a Treatment Facility able to increase the effectiveness of the overall Treatment Cycle and Management
- increasing significantly the life of the chemical baths
- reducing the Management Activity of the Chemical Baths
- reducing the dangerous of the facility where the chemical treatment are made
- reducing the dangerous for workers and people around the surrounding Area
- reducing the impact for the environment
- reducing the dangerous of managing the Waste Water System introducing an automatic System
- reducing the dangerous of managing the Scrubber introducing an automatic System for controlling
- assuring a constantly high quality of products along over time

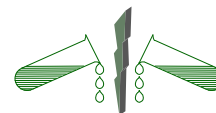
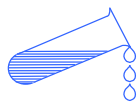
This documents faces all these aspects: from the rationales behind to the technical-economical concrete overall Realizing Solution.

RICERCA CHIMICA GROUP is producing chemical products for the treatment of stainless steel conforming to the International Standard **ASTM 380** and followings as for **ASTM A 967**, the Practice for Cleaning, Descaling, and Depassivation of Stainless Steel Parts, Equipment, and Systems¹.

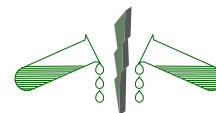
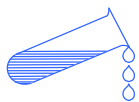
RICERCA CHIMICA GROUP is compliance with the CE n. 1907/2006 the European **REACH Regulation on Registration, evaluation, approval of Chemicals**.

THE EFFECT ON NITRIC ACID

¹ Full details of the pickling and passivation processes are available in ASTM A380-94a, Standard Practice for Cleaning, Descaling and Passivation of Stainless Steel Parts, Equipment and Systems. 2. Tuthill, A. H., and Avery, R. E. 1993. Corrosion behavior of stainless steel and high-alloy weldments in aggressive oxidizing environments. *Welding Journal* 72(2): 41-s to 49-s. 3. Guide to Stainless Steel Passivation, Halide Technology Pty. Ltd. 4. Proprietary test data. Sydney, Australia; Callington Haven Pty. Ltd. 5. Gumpel, Vollmer, et. al. 1995. *Stainless Steel Europe*.



Here after we report the effect on the Environment of Chemical Products that contains Nitric Acid as well documented by European Commission and U.S. Healthy Commission



United States Environmental Protection Agency / Office of Air Quality Planning and Standard
Research Triangle Park, NC 27711²

Health and Environmental Impacts of NO_x generated by the NITRIC ACID

Ground-level Ozone (Smog) - is formed when NO_x and volatile organic compounds (VOCs) react in the presence of heat and sunlight. Children, the elderly, people with lung diseases such as asthma, and people who work or exercise outside are susceptible to adverse effects such as damage to lung tissue and reduction in lung function. Ozone can be transported by wind currents and cause health impacts far from the original sources. Millions of Americans live in areas that do not meet the health standards for ozone. Other impacts from ozone include damaged vegetation and reduced crop yields.



Acid Rain - NO_x and sulfur dioxide react with other substances in the air to form acids which fall to earth as rain, fog, snow, or dry particles. Some may be carried by the wind for hundreds of miles. Acid rain damages forests; causes deterioration of cars, buildings, and historical monuments; and causes lakes and streams to become acidic and unsuitable for many fish.



Particles - NO_x react with ammonia, moisture, and other compounds to form nitric acid vapor and related particles. Human health concerns include effects on breathing and the respiratory system, damage to lung tissue, and premature death. Small particles penetrate deeply into sensitive parts of the lungs and can cause or worsen respiratory disease, such as emphysema and bronchitis, and aggravate existing heart disease.

² There are thousands of cases in Europe showing the dangerous on NO_x
e.g. European Journal of Emergency Medicine

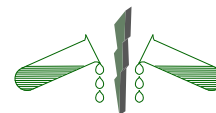
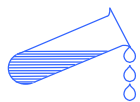
http://journals.lww.com/euro-emergencymed/Abstract/2008/12000/Acute_lung_injury_after_inhalation_of_nitric_acid.11.aspx

e.g. European Journal of Pharmacology

http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6T1J-3YVDN8S-4&_user=10&_rdoc=1&_fmt=&_orig=search&_sort=d&_docanchor=&_view=c&_acct=C000050221&_version=1&_urlVersion=0&_userid=10&md5=1cf27d03d4c65cd79beb78e47b7e25e6

e.g. U.S. National Institutes of Health (NIH) PubMed Center

<http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1745935>

**Global Warming –**

One member of the NO_x family, nitrous oxide, is a greenhouse gas. It accumulates in the atmosphere with other greenhouse gases causing a gradual rise in the earth's temperature. This will lead to increased risks to human health, a rise in the sea level, and other adverse changes to plant

and animal habitat.

Visibility Impairment

Nitrate particles and nitrogen dioxide can block the transmission of light, reducing visibility in urban areas and on a regional scale in our national parks

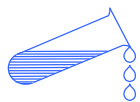
**Toxic Chemicals –**

In the air, NO_x reacts readily with common organic chemicals, and even ozone, to form a wide variety of toxic products, some of which may cause biological mutations. Examples of these chemicals include the nitrate radical, nitroarenes, and nitrosamines.

**Water Quality Deterioration**

- Increased nitrogen loading in water bodies, particularly coastal estuaries, upsets the chemical balance of nutrients used by aquatic plants and animals. Additional nitrogen accelerates "eutrophication," which leads to oxygen depletion and reduces fish and shellfish populations. NO_x emissions in the air are one of the largest sources of nitrogen pollution to the Chesapeake Bay.





Further Benefits of our nitric acid-free products

- GETTING NEVER ENDING CHEMICAL BATHS

The traditional chemical baths with Nitric Acid need to be replaced after a while since the chemical become exhaust (ineffective)

This causes:

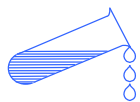
- cost for elimination of the exhaust chemical products
- cost for buying continuously new chemical products
- blockage of the production since the time spending when replacing the chemical product
- risk in manipulating continuously chemical products

Moreover, The traditional products have an high generation of dust (on the bottom).

It required a frequent cleaning of the bath that requires to make empty the bath for cleaning the dust laying on the bottom, causing blockage of the production.

Using our products free of nitric acid will remove this problem. Our bath pickling R.C. SOLAR L was also designed to have a NEVER ending life (by appropriate additives pumped through a pump) in order to reduce the problem of disposal of exhaust chemical product.

- SAVING MONEY IN THE PHASE of Waste Water Management: The presence of nitrate (derived from nitric acid) has considerable difficulties and cost in terms of depuration of waste water resulting from washing of the products as they can not be eliminated through a standard physical-chemical treatment. In order to purify water containing nitrates is necessary a more expensive technology in terms of initial



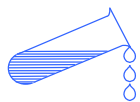
investment and management of the waste-water plant. Even if you opt for a disposal by specialized companies the cost of disposal has increased significantly.



- REDUCING PROBLEMS WITH THE WORKER AND THE ENVIRONMENT

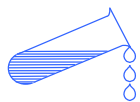
The presence of nitrate in products for the treatment of stainless steel has significant drawbacks concerning the purification and emissions into the atmosphere.

The presence of nitrates in chemicals (especially in pickling and passivation baths), also involves the formation of oxides of nitrogen (NO_x) to be emitted into the atmosphere by means of vacuum systems. These oxides of nitrogen are hazardous to both operators (hazard to humans) and the environment (formation of acid rain).



The use of our products free of nitric acid, thus allowing one hand to work in a healthier environment and safer and to eliminate the problem of NO_x emissions into the atmosphere, the other to have a significant savings on the management of plant and related systems for purification.





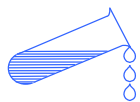
SOME INDICATION ABOUT RICERCA CHIMICA CHEMICAL TREATMENTS FOR STAINLESS STEEL

A steel is defined stainless when for its chemical composition , can resist in aggressive environment without oxidation. There are two types of oxidation for steel that is necessary to distinguish in order to understand very well the natural behaviour of this material. The first kind of oxidation is the corrosion (unwished effect). It has a harmful effect and if it is stopped rapidly can irreversibly damage the product.

The second kind of oxidation (wished oxidation) is passivation for stainless steel.

As shown in the two picture below, a passivated surface can resist better than a non passivated surface to an exposition in aggressive atmosphere of sodium chloride fog. This test is described in the specification ASTM B117.

SALT SPRAY TEST ASTM B117 200 hours	
	
Passivated sample	Non passivated sample



RICERCA CHIMICA GROUP intervene with a chemical induced passivation system that make a strong and uniform passivation and also can realize a good decontamination of the surface. This last characteristic is fundamental when the surface of stainless steel is contaminated by iron particles that can easy induce corrosion. Our chemical passivant are able to produce, on stainless steel, a compact and non porous oxide layer.

The passivation on stainless steel is taked in consideration in the following specification:

ASTM A 380 Standard Practice for Cleaning, Descaling, and Passivation of Stainless Steel Parts, Equipment, and Systems.

ASTM A967 Standard Specification for Chemical Passivation Treatments for Stainless Steel Parts

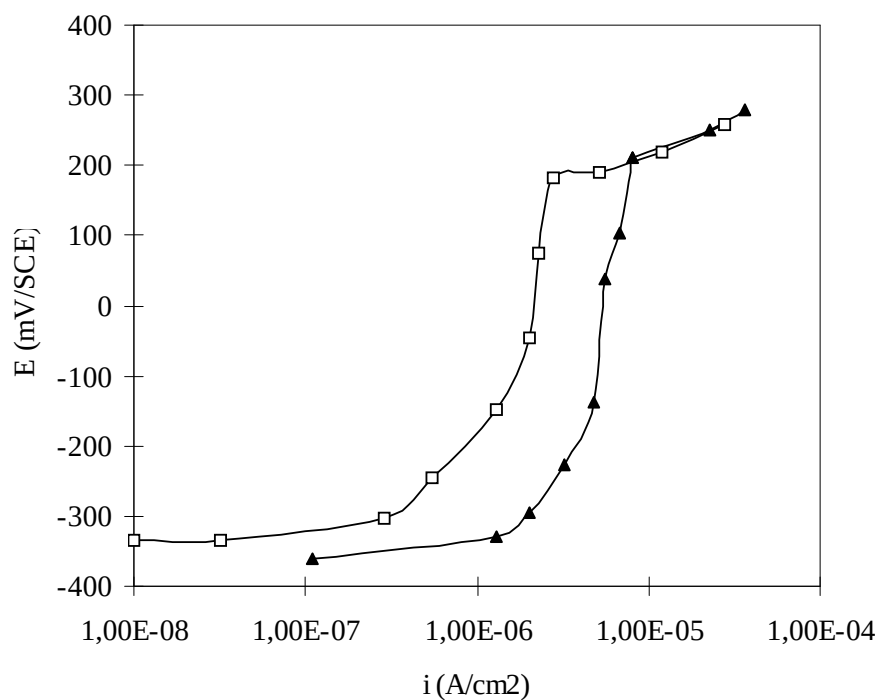
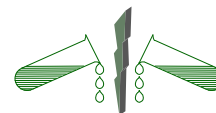
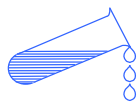
Passivation is an essential step in the stainless steel treatment because guarantee the effective corrosion resistance of the metal.

R.C. SOLAR PRO L (new generation nitric acid free passivant) went through the following tests (cited on ASTM A967) on EN. 1.4301 Stainless Steel

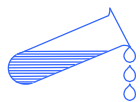
- Potassium Ferricyanide–Nitric Acid Test
- Salt Spray Test (ASTM B117)

All tests give a superlative result (strong and uniform passivation of material); In particular the Salt Spray Test (ASTM B117) was carried out for 200 hours without any sign of corrosion

R.C. SOLAR PRO L	$R_p = 46900 \Omega \text{cm}^2$	$E_{\text{corr}} = -361 \text{ mV}$
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Anodic polarization curve on EN 1.4301 stainless steel passivated with R.C. SOLAR PRO L after 1 hour of immersion in NaCl 3,5%



R.C. WASTE WATER SYSTEM

The RICERCA CHIMICA WASTE WATER SYSTEM here shown is able to treat the waste water produced by rinsing stainless steel parts after each treatment with our chemical products Nitric Acid Free (degreasing, pickling, passivation, electropolishing)

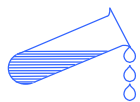
Here after the Wastewater Phases:

- initial sedimentation, accumulation, homogenisation
- separation of oil
- coagulation
- flocculation
- sedimentation
- Adsorbing filters
- Mud Drying

Construction material: certificated polypropylene, stainless steel AISI 304/316

An Example of a RICERCA CHIMICA WASTE WATER SYSTEM (**The picture it's just an example: each RICERCA CHIMICA WASTE WATER SYSTEM is tailored on the specific case**)

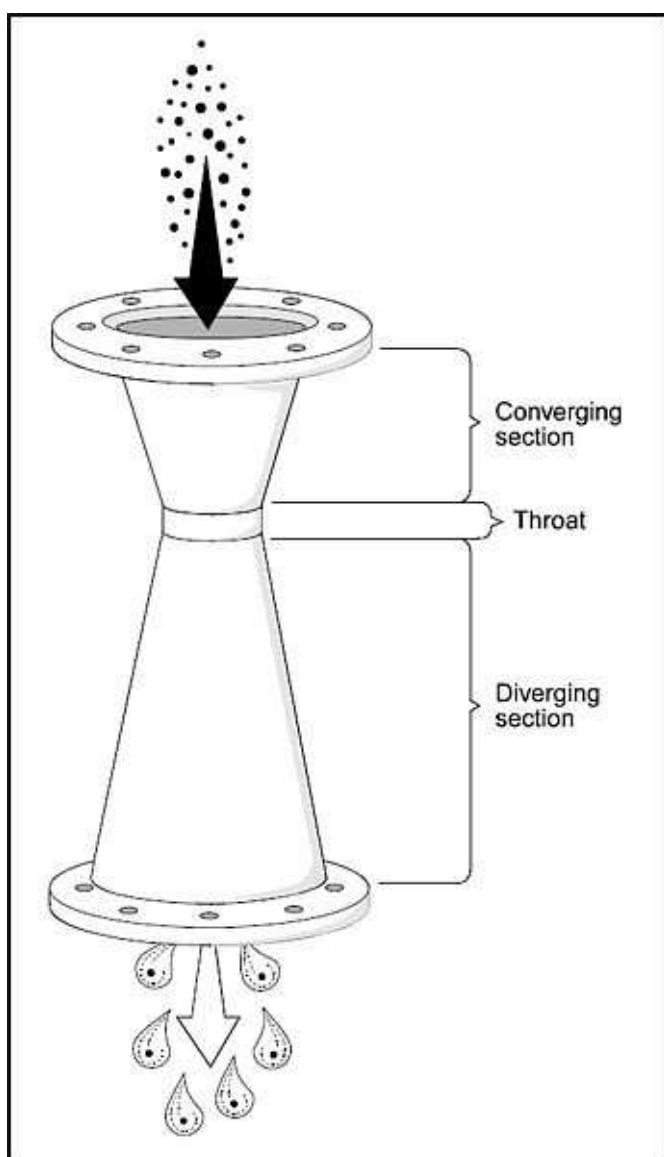


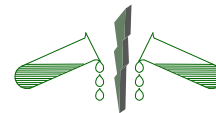
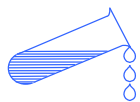


RC VENTURI SCRUBBER

A **RICERCA CHIMICA GROUP Venturi Scrubber** is designed to effectively use the energy from the inlet gas stream to atomize the liquid being used to scrub the gas stream. This type of technology is a part of the group of air pollution controls collectively referred to as wet scrubbers (Venturi Tubes derived their name from **Giovanni Battista VENTURI the famous Italian physicist**). The Venturi configuration can be effectively use to remove particles from gas streams.

Figure 1 illustrates the Venturi configuration.





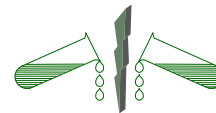
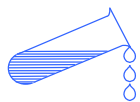
An RC Venturi Scrubber consists of three sections: a converging section, a throat section, and a diverging section. The inlet gas stream enters the converging section and, as the area decreases, gas velocity increases.

The inlet gas, forced to move at extremely high velocities in the small throat section, shears the liquid from its walls, producing an enormous number of very tiny droplets.

Particle and gas removal occur in the throat section as the inlet gas stream mixes with the fog of tiny liquid droplets. The inlet stream then exits through the diverging section, where it is forced to slow down.

An Example of a RICERCA CHIMICA SCRUBBER (The picture it's just an example: each RICERCA CHIMICA SCRUBBER is tailored on the specific case)





RC ELECTROPOLISHING PLANT

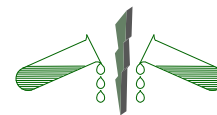
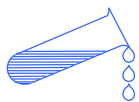
RICERCA CHIMICA Electropolishing System is the electrolytic removal of metal in a highly ionic solution through a perfect control of a determined electrical potential and electrons within the chemical bath, via the parameters set on the RICERCA CHIMICA Electropolishing Plant

It is realised through the New Generation of Chemical Products that are all Nitric Free.

RICERCA CHIMICA Electropolishing is the process able to remove a controlled and pre-determined thin layer of material on the surface of a metal part or component. It allows you to get a perfect decontamination of the surface and a significant reduction of the roughness.

RICERCA CHIMICA Electropolishing enhances the material properties.



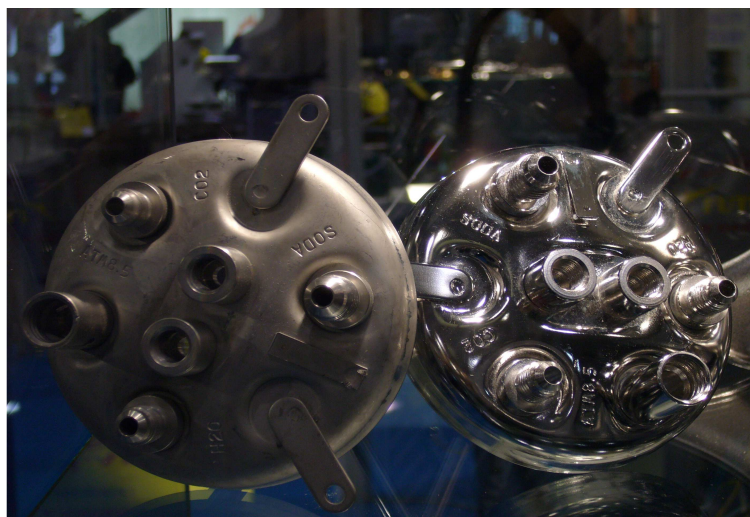


RICERCA CHIMICA Electropolishing Process is very important for levelling the surface.

At first glance the levelling effect improves the appearance of the part, the brilliancy of the surface. The smoothing effect results in levelling of the grain boundaries of the metal.

The effect can be so pronounced at times, that visual identification of the boundaries can no longer be made. With the grain boundaries smoothed edge to edge, the usual sites for stress cracking have been removed. This will enhance a part's strength up to the value of its bulk material properties.

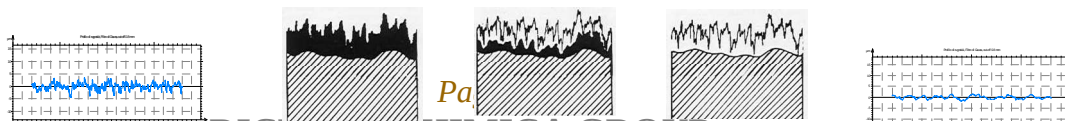
The removal of discontinuities in the edges of the grain boundaries will also remove residues of dirt, chemical and micro organisms.



A third benefit of the levelling is the reduction of the total surface area of the grain boundaries exposed to the process. This significantly reduces the amount of material from the grain boundary areas exposed to chemical attack. In the areas of high vacuum work, the smoothing effect is useful because it effectively reduces the total process surface area of the work piece. This reduces the gas load on the system allowing one to reach higher vacuums more easily.

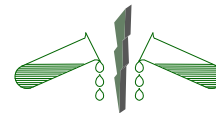
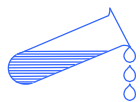
RICERCA CHIMICA Electropolishing Plant can be used to satisfy the need of many sector needs: Food, Beverage, Biogenetic, Chemical, Petrochemical, Pharmaceutical, Medical, Dental, Nautical, Semiconductor, Furniture, etc,

The RICERCA CHIMICA Electropolishing PLANT is versatile and easy to program.

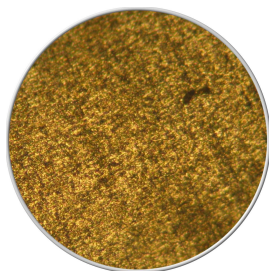
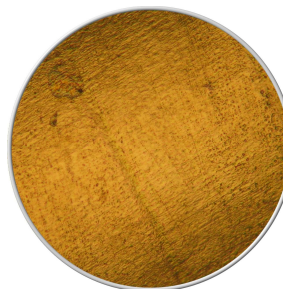


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BEFORE

AFTER BEING TREATED WITH
RICERCA CHIMICA PLANT

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MANIFESTO “Fiducia nella Industria Chimica Italiana”

<http://www.manifesto-industriachimica.it/>

RICERCA CHIMICA GROUP it's the **European Chemical Producer Leader** in producing **Chemical Products, Plants and Equipment** for metal surfaces treatment, especially for Stainless Steel, Titanium, Aluminium, Copper, Brass, Carbon Steel and other metals and in designing and building Electropolishing, Electropickling, WasteWater treatment and many other Plants for metal surfaces treatment. **Research and Development Laboratories** always manage to find out personalized solutions, gaining a prominent position not only on the international scene. **RICERCA CHIMICA GROUP** is steadily striving for the development of **up-to-date Technologies**, which guarantee to its national and international customers a significant **cutting in production time**, with **respect for the Environment and the Operator Safety**.