Silver Power GHA® Europe

INNOVATIVE & SUSTAINABLE TECHNOLOGY

METALCERAMIC Ag+ with SILVER IONS

INDEX

WHO WE ARE AND WHAT WE DO

The company G.H.A.® Europe Srl has been working in the field of high quality **ANODIC OXIDATION** of **ALUMINUM** since 2005.

We perform natural, semi-hard and hard anodizing treatments (high thickness and high hardness).

We are the licensee, for the entire European Community, of the **Patent N.EP1207220** called **"G.H.A.® Golden Hard Anodizing"**, which consists of a special hard or semi-hard oxidation of aluminum with Silver ion sealing. This innovative treatment combines the special properties of the noble metal (silver) with the already excellent characteristics of aluminum oxide, making the treated surface **antibacterial**, **anti-wear, anti-corrosion and anti-aging**.

These features make G.H.A.® technology unique in the world

Today, thanks to the entrepreneurial work of Prof. Franco Cicerchia (founder and owner also of the company Remet sas, leader since 1970 in the field of metallography) assisted by his sons and collaborators of top technical profile, G.H.A. Europe has two production units of last generation that allow the company to guarantee quick deliveries even with large dimensions and large volumes, keeping maximum quality and total traceability of treatments.

Sustainability has always been a priority for G.H.A. Europe that today has come to power its plants mainly with solar energy.

THE G.H.A.® TREATMENT

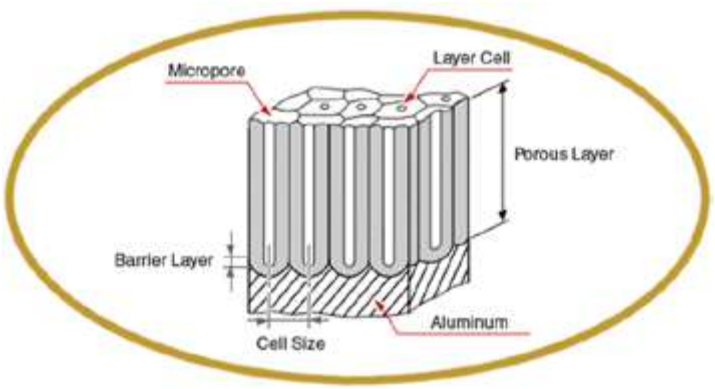
G.H.A.® IT IS THE MOST INNOVATIVE TECHNOLOGY APPLICABLE TO THE SURFACES OF ALL ALUMINUM-BASED ALLOYS, UNIQUE IN ITS KIND:

IT CONSISTS OF A SPECIAL ANODIC OXIDATION TREATMENT, WITH A THICKNESS RANGE FROM 10 TO 200 MICRON, FOLLOWED BY A SEALING OF THE MICRO POROSITY OF THE OXIDE LAYER (MICRO PORES) BY SILVER IONS (Ag^+).

THE TREATMENT G.H.A.® IS NOT A COATING, BUT A TRANSFORMATION OF THE BASE ALUMINUM, WHICH BECOMES ALUMINUM OXIDE (Al_2O_3), DURING THE GALVANIC PROCESS, GENERATING A VERY HARD CERAMIC PROTECTIVE LAYER, HEAT REFRACTORY AND UN-REMOVABLE.

ALUMINUM OXIDE CRYSTALS (Al_2O_3) HAVE AN APE NESTED STRUCTURE WITH VERY HARD AND COMPACT OCTAHEDRAL CRYSTALS, WITH A CAPILLARY HOLE IN THE CENTER OF THE OCTAEDRONS THAT PENETRATES ALMOST UNTIL THE BASE OF THE SAME.

UNFORTUNATELY THIS POROSITY CONSTITUTES A TRUE AND PROPER DEFECT WHICH LIMITS ITS APPLICATIONS, ESPECIALLY IN THE CASES IN WHICH THE SURFACE IS SUBJECT TO FRICTION OR MUST WORK IN CORROSIVE ENVIRONMENT, AS THE ALUMINUM BASE COMES INTO CONTACT WITH THE EXTERNAL AGRESSIVE ENVIRONMENT THROUGH THE PORES.



THESE PORES ARE ALSO A RECIPE OF DIRT AND BACTERIES AS MUCH AS ANODIZED SURFACES ARE STAINED. FOR THIS REASON, THEY ARE OFTEN COVERED WITH COLORING SUBSTANCES THAT SEAL THE PORES (BLACK OR OTHER COLORS).

THE GREAT INTUITION OF THE G.H.A.® PATENT TURNS THIS TYPICAL DEFECT OF THE POROSITY OF ANODIC OXIDE INTO AN ASSET.

IN FACT THE POROSITIES CONSTITUTE SMALL TANKS FOR THE IONS Ag^+, FINALLY RESULTING EVENLY DISTRIBUTED ON THE SURFACE AND PERMANENTLY PRESENT DURING THE WEAR OF THE SAME.

THE ADVANTAGES OF THE G.H.A.® TREATMENT

- HIGHEST RESISTANCE TO CORROSION AND ABRASIVE WEAR
- HIGH BACTERICIDAL AND ANTI-MOLD CAPACITY
- ANTI-LEACHING
- SELF-LUBRICATION
- HIGH THERMAL CONDUCTIVITY AND HEAT DISPOSAL
- REFRACTORY AT HIGH TEMPERATURES
- ANTI-STATIC AND SLIPPER PROPERTIES
- UN-REMOVABLE

The high hardness of anodic oxide, HV 500-600, joined to the extraordinary properties of silver ions, give the treated surface biotechnological characteristics of extreme interest and a wide range of applications, which go from the pharmaceutical and food industry to the technical and scientific field.

BIOTECHNOLOGICAL CHARACTERISTICS

MATERIAL	HARDNESS HV	MELTING TEMPERATURE	FRICTION COEFFICIENT	ANTIBACTERIAL CAPACITY	RESISTANCE TO CORROSION (SST)	WEAR RESISTANCE
Aluminium alloy	70 - 100	680°C	0,44	none	20-50 h	10^2 h
Aluminum oxide with G.H.A.® treatment	**500 - 600**	**2100°C**	**0,025**	**BACTERICIDE**	**5.000 - 50.000 h**	**10^6 h**
Hard oxidation	500 - 600	2100°C	0,15	none	200-300 h	10^3 h

SUPERFICIAL HARDNESS

The Al_2O_3 ceramic aluminum oxide layer obtained at low temperature guarantees surface hardnesses from 500 to 600 HV, according to the type of alloy used.

CORROSION RESISTANCE

Excellent resistance guaranteed by the combination between Al_2O_3 ceramic anodic oxide and silver with a duration of 5.000-50.000 hours in SST according to UNI EN ISO 9227 on samples specially prepared.

RESISTANCE TO ABRASIVE WEAR

The surface layer of Al_2O_3 ceramic aluminum oxide, in combination with the self-lubricating silver permanently present in the anodized layer, provides a very good resistance to wear, with a high drop of coefficient of friction. Tribological tests have demonstrated a minor loss in weight of the processed G.H.A.® sample, compared to all the other surface treatments tested as Hard Oxide, Nickel-Teflon coating and Electroless Nickel Plating.

Tribological test results on 3 anti-wear treatments
(performed by the Remet laboratory through the TRIBOMET machine)

Anticorodal sample 100 with surface treatment thickness 25 µm	Layer hardness shallow $HV_{0,005/15"}$	Δ Weight gr.	Furrow depth µm
Aluminum oxide with G.H.A.® treatment	**520**	**0,0006**	**4**
NICKEL-TEFLON	730	0,0013	19,5
ELECTROLESS NICKEL PLATING	780	0,0025	30

BACTERICIDAL EFFECT

Laboratory tests performed according to ISO 22196:11 e JIS 2801:10 standards, showed that the surface of parts treated with G.H.A.® have been bactericidal in relation to the most common bacteria such as Escherichia Coli, Stafylococcus Aureus, Salmonella Typhimurium, Legionella Pneumophila, and also to the common fungus Candida Albicans and lethal fungus Candida Auris.

FOOD GRADE TREATMENT

The G.H.A.® treatment, performed on food grade aluminum alloys according to the GMP standard, is suitable for contact with food according to Italian DM 21.3.73 and according to the Italian DM n°76 of 18/04/07; in compliance with the European regulations 1935/2004/CE and the technical regulations UNI EN 14392:08, it is also in accordance with the requirements of the FDA Title 21 CFR regulations.

FIELDS OF APPLICATION

and other…(Automotive, Thermal radiators, Heat exchangers, Solar panels, Filters for air conditioners, Domestic appliances)

The G.H.A.® treatment, thanks to the extraordinary properties due to the winning combination of aluminum oxide and silver , is extremely versatile and has a great variety of applications: from the packaging industry (in pharmaceutical and food particular) to the accessories for the healthy sector, from mechanics in general to the naval sector, from micro electronics to orthodontic accessories.

WHY CHOOSE G.H.A.®

If you are looking for INNOVATION to IMPROVE the PERFORMANCE of a product, to REDUCE COST and the MAINTENANCE, then the G.H.A.® technology is what you need.

ALUMINUM + G.H.A.® = A VALID ALTERNATIVE TO STAINLESS STEEL AND TO OTHER TREATMENTS

Mechanical parts in aluminum treated with G.H.A.® oxide can represent a valid alternative to those made in stainless steel, titanium, brass and so on, and they can result strategic for the replacement of traditional coatings as nickel plating, chrome plating, PTFE paiting and so on.

Important manufacturers of automatic machines for the packaging sector (**IMA Group, G.D, Tetra Pak, Polin S.p.a., JAC, GEA Group, etc.**) have already appreciated the performance of GHA® treatment and have chosen us as their collaborators adopting our technology on the productions lines they build and market.

OTHER TREATMENTS

Anodic oxidation is a treatment applicable to aluminum and its alloys, useful to improve the mechanical performance and the corrosion resistance of what is a light material, easily workable and with low costs and multiple benefits.

HARD OXIDE

Classic hard anodic oxidation, typical surface treatment of aluminum intended to improve the mechanical performance of surfaces. We have the possibility of carrying out a hard oxide at very low temperature (up to -5°C) which may guarantee high surface hardness.

ARCHITECTURAL OXIDE

Low thickness anodic oxidation, generally used to protect the surfaces from corrosion and spontaneous oxidation, mainly aesthetic treatment.

SEMI-HARD OXIDE

Higher thickness oxidation and hardness of the architectural one, with the possibility of keeping the light color of the details.

PROTECTION AND MASKING

The protection of tolerated holes or areas which have not to be treated is possible by using acid-resistant material. We provide and apply both commercial masking and special masking.

DEOXIDATION

Chemical removal of an oxide layer, possibly followed by surface finish before a new treatment.

PLUS® (special seal)

Both for G.H.A.® oxidation and for all treatments we provide, we have the possibility of carrying out a special sealing process that we tuned to maximize resistance to corrosion.
It is a hydro-thermal process that doesn't involve the use of nickel or other heavy metals, ideal also for the food and pharmaceutical sector.

SURFACE FINISHES

Machined surfaces often present scratches, signs of work or evidence of spontaneous corrosion; satin finishing and polishing are useful finishes to improve the aesthetics and the functionality of mechanical parts.

LABS

The possibility to take advantage of the laboratories and analysts of Remet has been crucial and extremely strategic during the years for G.H.A. Europe in order to be able to investigate and solve all the problems related to aluminum, not only in the surface treatment phase, but during the entire production cycle, this has provided the company a strong expertise for the realization of high quality treatments.

G.H.A. EUROPE S.R.L.

OFFICE

Via Scarlatti, 2
40033 Casalecchio di Reno (Bologna)
ITALY
tel +39 051 3514051
fax +39 051 752893
email: INFO@GHA-EUROPE.COM

PLANT 1 and 2

Via Piemonte, 7/1A
40069 Zola Predosa (Bologna)
ITALY
tel +39 051 6166914
fax +39 051 6187874
email: TECNICO@GHA-EUROPE.COM
GHAEUROPE@GMAIL.COM

PLANT 3

Via Buozzi, 8
San Martino Industrial area
61034 Fossombrone (Pesaro-Urbino)
ITALY
Tel : +39 0721 1798290
e-mail:
FOSSOMBRONE@GHA-EUROPE.COM

Silver Power GHA® Europe

www.ghaeurope.com