



surface
technologies

Stainihard[®] NC

surface hardening
of stainless steel



Stainihard® NC

Stainihard® NC is a process used to harden the surface of (austenitic and duplex) Stainless Steels without reducing the corrosion resistance - in some cases the corrosion resistance is even improved. The process is based on a traditional gas nitrocarburising treatment for steels. Stainihard® NC is a variant of this process which makes it possible to treat (austenitic and duplex) Stainless Steels, which cannot be easily treated with normal gaseous diffusion treatments. Stainihard® is a thermochemical process suitable for processing individual components or large batch volumes. The Stainihard® NC process enriches the steel surface with Nitrogen and Carbon to optimise the mechanical properties of the product.



Properties

- High surface hardness
- High wear resistance against abrasive wear
- High resistance against cold welding, galling or contact corrosion
- Corrosion resistance is not reduced, in certain cases even improved
- High resistance against slip
- No changes in appearance
- Low friction coefficient
- Improved fatigue strength
- Good, stable, dimensional and shape accuracy



How does Stainihard® work?

Depending on the application, there are several possible procedures in the Stainihard® process in order to optimize the required properties. During the Stainihard® process the surface is enriched in a special way with nitrogen and carbon. Normally in case when (austenitic and duplex) stainless steel is used this is not possible to do. The products are treated in a nitrogen and carbon releasing atmosphere. During this process, nitrogen and carbon diffuse in the product surface, whereby the diffusion for a certain period of time takes place at a temperature between 350°C and 500°C. As a result of the diffusion of these elements, the surface reaches a very high hardness (1200-1400 HV0,05). After the Stainihard® treatment, products can be given an additional treatment in order to optimize the corrosion resistance.

Composition of the surface

The Stainihard® layer is the so-called S-phase or expanded austenite zone. When Stainless Steel is treated with traditional nitriding, for example in salt bath or plasma, a surface layer is created which consists of a diffusion zone and sometimes also a compound layer. Characteristic to the traditional methods of treatment is the formation of Chromium Nitride (CrN) in this layer, which improves the surface hardness and wear resistance but distinctly reduces the corrosion resistance. In the Stainihard® treatment the formation of Chromium Nitride (CrN) or Chromium Carbide (CrC) is suppressed and a so-called S-phase is created. This layer consists of Stainless Steel which is super-saturated with Nitrogen and Carbon at the surface. The saturation creates high internal stresses in the layer and the hardness is increased significantly, without reducing the corrosion resistance. The depths of layers created with Stainihard® are depending on the type of Stainless Steel that is used and the amount of work hardening in the steel surface.

Suited Stainless Steels

Stainihard® is developed to be applied on austenitic and duplex Stainless Steels. In certain circumstances it is also possible to treat other Stainless Steels (e.g. Ni-base or PH stainless steels). The possibilities of using Stainihard® can be discussed if you contact one of our specialists.

Suited Stainless Steels

AISI 301, 302, 302HQ, 303, 304, 304L, 304S, 314, 314L, 316, 316L, 316LN, 316LVM, 316S, 316Ti, 317L, 318 LN, 321

DIN-Nummer 1.4301, 1.4305, 1.4306, 1.4307, 1.4308, 1.4310, 1.4319, 1.4401, 1.4404, 1.4408, 1.4429, 1.4435, 1.4438, 1.4441, 1.4462, 1.4541, 1.4547, 1.4550, 1.4567, 1.4571, 1.4841

Case depth

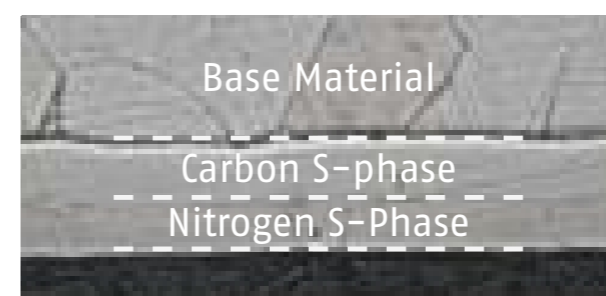
Stainihard® NC: 10-30 µm

The case depth depends on the selected grade of Stainless Steel and the amount of work hardening in the steel. With increased work hardening, the achievable layer thickness decreases.

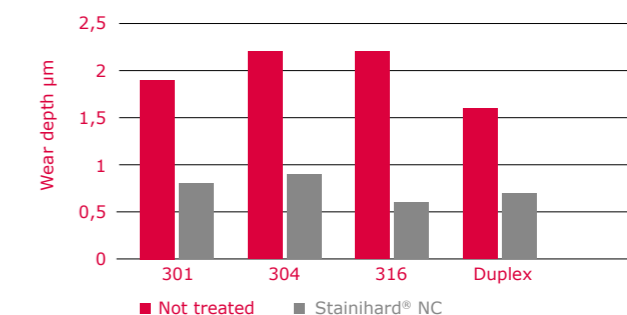
Hardness of the Stainihard® layer

Stainihard® NC: 1200-1400 HV0,05

Microstructure



Wear abrasion test



All, in this brochure, mentioned values/properties are dependent on the type and the condition of the stainless steel.



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