

# Stainihard<sup>®</sup> NC

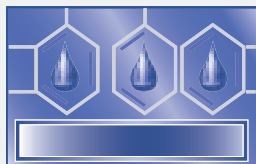
## Surface hardening of stainless steel



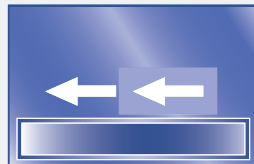
High wear resistance



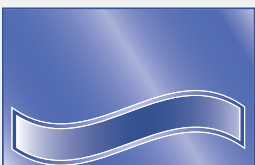
High surface hardness



Improved corrosion resistance



Reduction of the friction coefficient



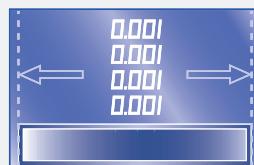
Improved fatigue strength



High resistance against slip



Uniform hardness depth



Good dimensional and shape accuracy



# Stainihard® NC

## Surface hardening of stainless steel

### What is Stainihard® NC?

Stainihard® NC is a process used to harden the surface of (austenitic) 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) 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.

### 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) 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 HV<sub>0,05</sub>). After the Stainihard® treatment, products can be given an additional treatment in order to optimize the corrosion resistance.

### Build up and structure of the surface

The Stainihard® layer is the so called S-phase.

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.

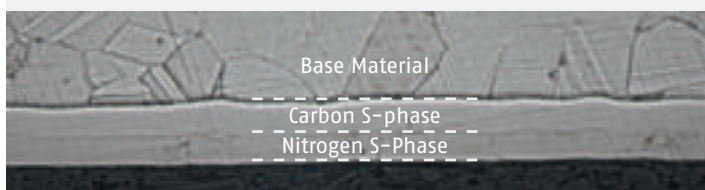
In the Stainihard® treatment the formation of Chromium Nitride (CrN) or Chromium Carbide (CrC) is suppressed and a so called S-phase is created. This layer consists of Stainless Steel which is super-saturated with Nitrogen and Carbon at the surface. The saturation creates high internal stresses in the 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 steel surface.

### Suited materials

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

### Microstructure



### Case depth

**Stainihard® NC: 10–30 µm**

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

### Examples of suited austenitic Stainless Steels

#### AISI:

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

#### DIN-Nummer:

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

### 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 dimensional and shape accuracy

### Hardness of the Stainihard® layer

**Stainihard® NC: 1200–1400 HV<sub>0,05</sub>**

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