



# Gas Nitriding Furnaces

SECO/WARWICK offers various furnace styles in Batch and Continuous for Gas Nitriding. SECO/WARWICK is a technology leader with the proprietary ZeroFlow® method of economical gas flow control.

Listed below are all the options of SECO/WARWICK furnace styles for gas nitriding. Equipment can achieve optimum results with gas nitriding using uniform, high convection heating, precision nitriding potential and ammonia control along with extensive experience with load mechanics and processing of various metals.

Experienced SECO/WARWICK process specialists can assist in furnace type selection and in product material handling/loading.

The SECO/WARWICK R&D facilities help customers in determining the correct cycle for their products. Optional tools such as a simulation and database programs for many common alloys and case requirements can help pinpoint potential cycles quickly.



VTR Vacuum Retort Tempering Furnace

## Why SECO/WARWICK?

- Experience
- Most Advanced Technology
- R&D assistance
- Value
- Global Resources

In addition to Gas Nitriding, **Ferritic NitroCarburizing** is a related nitriding process which is gaining much popularity due to the specific wear and anti-corrosion properties offered, including coupling with post-process high temperature oxidation.

## Equipment Styles Best Suited for Nitriding and NitroCarburizing

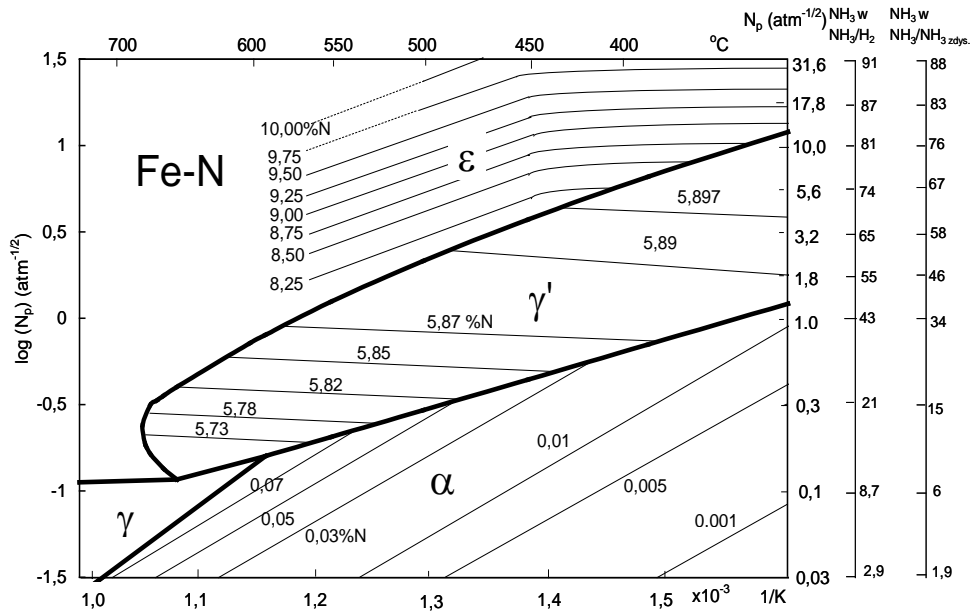
- Pit Retort Furnace
- Horizontal Front Loading Retort Furnace
- Bell Retort Furnace
- Roller Hearth Multi-Chamber

### Accessories

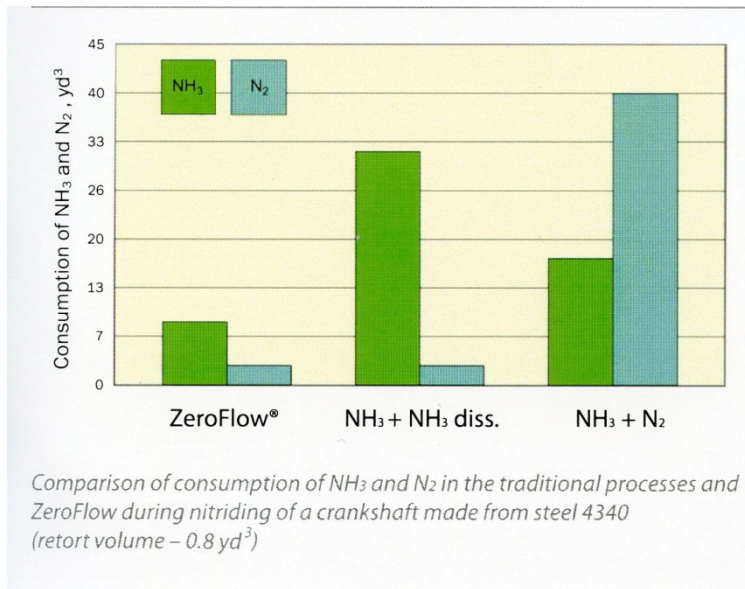
- Vacuum Purge
- Turbo Atmosphere Cooler
- Various Controls Options
- Emissions Burning



Pit Furnaces are an ideal choice for nitriding applications



T - N<sub>p</sub> Diagram (Lehrer, 1936) ( N<sub>p</sub> - T - [N]<sub>Fe</sub> )





## Gas Nitriding



### **ZeroFlow Control by SECO/WARWICK**

Decades of gas nitriding experience came with the realization that a large volume of process gas was required and that better options must be available that can accomplish two things:

1. Proper formation and control of the nitrided layer,
2. By reducing the volume of process gas, you can reduce the need for large storage of ammonia and nitrogen.

### **Does nitriding with the use of ZeroFlow control obtain the same results as other nitriding methods?**

Definitely yes. It is nitriding, based on continuous adjustment of the nitriding potential, which assures obtaining the proper structure of nitrided layers and offers the same results as in other nitriding methods. It has been confirmed in many industrial applications.

### **Does use of ZeroFlow control allow for nitriding without creating the white layer of nitrides?**

Definitely yes. That method, through proper adjustment of the nitriding potential, allows for nitriding without creating the white layer. In many cases a white layer might be desired and is still controllable.

### **Is it possible to adapt your existing furnaces with the ZeroFlow nitriding method?**

Definitely yes. In many nitriding furnaces there is no proper automatic atmosphere adjustment, or the processing costs are high with gases and royalties. Under ZeroFlow the gas system will be simplified, and the ZeroFlow control does not always require using materials with the very highest content of expensive nickel on the internal equipment surfaces.

### **What practical benefits are offered by ZeroFlow control in relation to other methods?**

The ZeroFlow option reduces operating costs and offers improved quality of the resulting nitrided layers.



## Gas Nitriding

### **Industrial Services**

A wide range of services are available for our equipment. These include rebuild projects, field service, spare parts, equipment supply, control and combustion upgrades, and fabrication services. As a result of these services, we have provided our customers improved performance, lower emissions, better efficiency and enhanced product temperature uniformity.

### **About SECO/WARWICK**

The SECO/WARWICK Group is one of the world's leading manufacturers of heat treatment furnaces and a technology leader. With our fully equipped research and development facility and cooperation with the leading academic centers in Europe, we are able to provide innovative solutions not offered anywhere else in the world.

The Group is made up of companies located in five countries on three continents, and we sell our products in 45 countries around the world. We supply furnaces to customers involved with steel, titanium and aluminum production as well as aluminum recycling, forging, automotive, aerospace, commercial heat treating, HVAC/R, electronics, wind energy, medical equipment and nuclear industries. Visit our website below for more information.

*The latest design, materials, and equipment specifications should be obtained from the company before any reliance is placed on this standard bulletin since changes may occur due to product improvement.*