



Attractive alternative

Variocarb-direct – efficient and decarburisation-free steel hardening while saving costs

Less is often more! This motto also holds true for metallurgical heat treatment because elaborate technology is really not essential to produce heat-treated steels of the highest quality. Proof of this is provided by the patented Variocarb-direct process from Messer, which allows steel materials to be hardened efficiently and more cost-effectively than before – and without decarburisation.

Heat treatment of unrivalled quality

The operating principle of the Variocarb-direct process is as simple as it is ingenious: heat treatment does not have to take place using endogas as a protective effect and whose production is technically complex. The protective furnace atmosphere is provided by nitrogen, which is added directly via gas inlets so that no ambient air can enter the furnace installation. Reactive propane is added to the nitrogen flow as required in order to effectively prevent decarburisation of the steel being hardened.

The quantity of propane needed is determined by means of an oxygen probe installed in the furnace, which measures the degree of conversion of moisture and carbon dioxide to hydrogen and carbon monoxide. If the oxygen content in the furnace atmosphere increases, more hydrocarbon

is automatically added. Above 600 °C, propane is broken down into reactive radicals which attack all the oxygen-containing molecules and render them harmless. If the propane demand drops during the hardening process, the hydrocarbon supply is also reduced automatically. The patented Variocarb-direct process is soot-free and more efficient than conventional methods.



The heat treatment is responsible for the properties of the components.



"Soft" bearing rings at the furnace entrance



Hardening bearings after the quenching bath

What the experts think

When the temperatures are sufficiently high, as is the case with steel hardening, there is no need for complex technology in order to create a carburisation-neutral furnace atmosphere.

The Variocarb-direct process developed and patented by the Messer Group meets the highest standards in the heat treatment of tempered steels and delivers top results at affordable prices.

Your benefits at a glance

The Variocarb-direct process from Messer

- protects heat-treatable steel safely and reliably. The workpieces are of a high quality and meet standards in terms of strength and surface carbon content.
- is suitable for almost all standard furnace types. Existing furnace installations can be easily modified and configured for the Variocarb-direct process.

- makes cost-intensive gas generators or methanol storage tanks unnecessary. You will minimise your costs and increase the productivity of your hardening plant.
- can also be operated with on-site nitrogen that has been produced with membrane or adsorption technology.

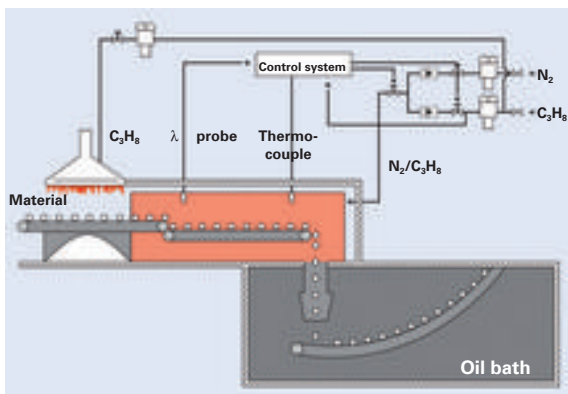
Last, but not least: all the necessary measuring and control equipment is supplied by the Messer Group, along with Messer's gas know-how. We provide you with both expertise and service.

Please do not hesitate to contact us if you have any questions regarding the Variocarb-direct process or would like to arrange a personal consultation with our application experts.

Contacts in your country can be found at:

www.messergroup.com/de/Standorte

This and many other brochures can also be downloaded from the Internet in PDF format:
www.messergroup.com



Measuring and control diagram for the precise metering of nitrogen and propane.

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