
Description

CARBOJET™ is a patented technology by Linde Gas which allows for better gas convection in heat treatment furnaces without ventilators. By injecting small amounts of nitrogen at high velocities (250-300 m/s) into several parts of a roller hearth furnace, CARBOJET™ creates a movement in the furnace gas to ensure homogeneous gas and temperature distribution. CARBOJET™ can be installed in every continuous furnace for neutral annealing, carburizing and decarburizing. CARBOJET™ can also be used in pit furnaces for wire annealing with nitrogen or natural gas/nitrogen mixtures.

Benefits

- CARBOJET™ homogenizes product quality in tube annealing and other heat treatment furnaces using endogas, exogas or monogas.
- CARBOJET™ increases the utilization of carburizing gases and reduces the soot formation in heat treatment furnaces (such as roller hearth furnaces and walking beam furnaces). The high-speed injection of gases also optimizes the functionality of analyzing equipment due to better gas mixing.
- CARBOJET™ increases the carbon transfer on material surfaces due to forced convection of protective gases.
- CARBOJET™ allows a faster switch of atmospheres.
- CARBOJET™ allows the use of higher carbon potentials due to advanced premixing of gases.
- CARBOJET™ optimizes the heat transfer in furnaces with convective heating.

System

The system consists of one or several CARBOJET™ lances with piping and flow train. The number of lances is adapted to the furnace size and the existing gas consumption. The lances can be controlled manually or through a CARBOFLEX® control unit. The specially designed lances are made of heat resistant material to ensure a long lifetime. In order to provide tailor-made solutions, Linde Gas adapts its CARBOJET™ systems to individual customer needs.

CARBOJET™ is a trademark of the Linde Group.
CARBOFLEX® and CRYOSS® are registered trademarks of the Linde Group.
CARBOJET™ is applicable to any continuous furnace for heat treatment. Linde Gas has extensive experience using CARBOJET™ in roller hearth furnaces and walking beam furnaces.

Nitrogen can be stored in and supplied by on-site liquid tanks, but Linde Gas also offers competitive CRYOSS® on-site gas production units. In order to allow for higher carbon potentials, acetylene, propane or natural gas can be added through CARBOJET™ lances. Propane is supplied in tanks or cylinders, acetylene is supplied in cylinders or bundles.

Linde Gas has installed several CARBOJET™ lances in several European tube annealing companies.

Fluent is a trademark of Fluent, Inc.

Atmosphere supply

Gas velocities in the endogas injection area of a roller hearth furnace, calculated with the CFD program FLUENT. The overall gas velocities are relatively low. Only in the region of endogas injection a significant gas velocity is visible.

Gas velocities in the endogas injection area of a roller hearth furnace with two CARBOJET™ lances, calculated with the CFD program FLUENT. The overall gas velocities are significantly higher. Red areas represent particularly high gas velocities. The overall gas consumption of both simulations is equal.

References

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Contact

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