

## CARBOTHAN®. Nitrogen-methanol based atmosphere system.



**Description** CARBOTHAN® is a nitrogen-methanol based atmosphere system, which generates a very flexible, high-quality atmosphere for carburising, neutral hardening, annealing and sintering of steel.

**Benefits** Linde Gas has installed hundreds of CARBOTHAN® systems worldwide. All have satisfied our customers with the following benefits:

- Very low dewpoint
- Reduced energy consumption and floor space requirements  
as no external generator is required
- Safe gas supply and distribution system
- High flexibility
- Possible use of existing carbon potential regulation systems
- Easy reduction of gas consumption during idling times
- Shorter conditioning and shut down times
- No resources needed for supervision and maintenance

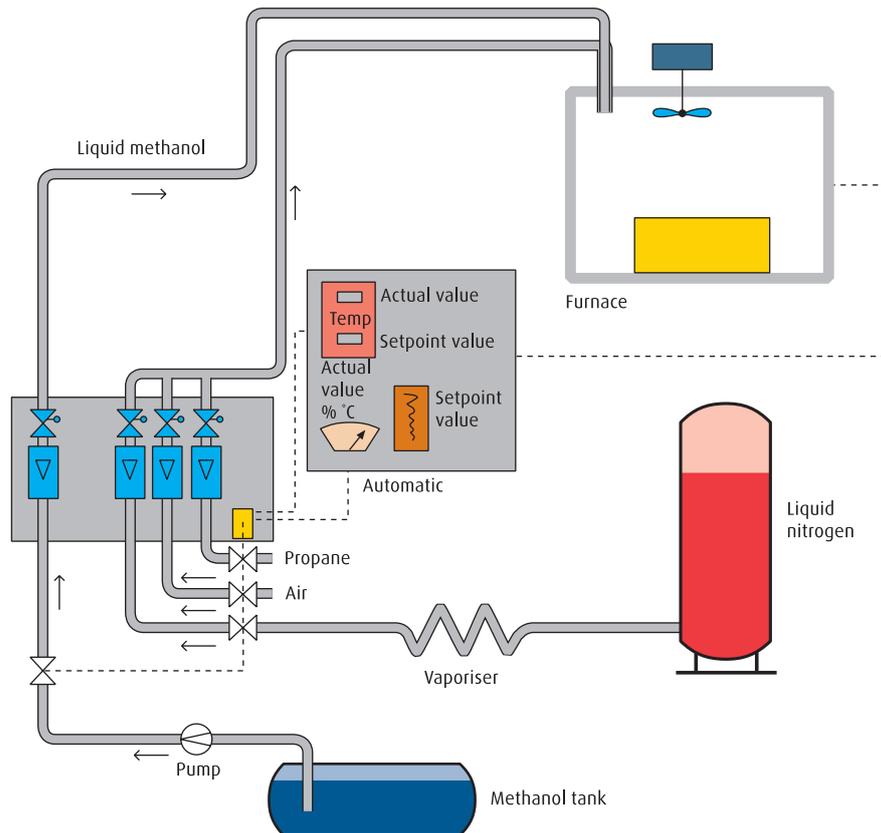
**System** The CARBOTHAN® atmosphere system includes media storage and supply, flow control, distribution to the furnace, intake into the furnace and atmosphere control.

### Media storage and supply

Nitrogen is usually stored in liquefied form in a vacuum-insulated tank. Methanol is stored in tanks of varying size depending on the rate of consumption. Small consumers fill their tanks from barrels, while large consumers fill them from road tankers. For propane and ammonia, small consumers use cylinders or cylinder bundles and large consumers use tanks. Propane and ammonia liquefy at relatively low pressures. These “gases” are therefore also stored in liquid form.

### Distribution to the furnace

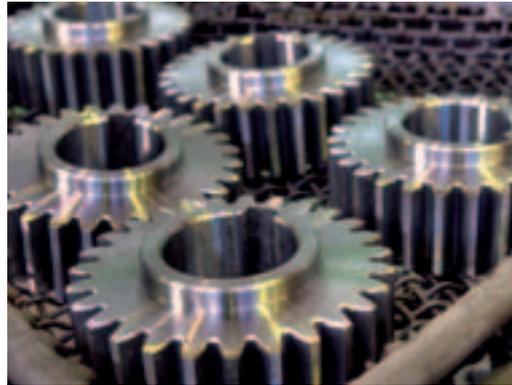
The nitrogen leaves the storage tank at a medium pressure set on the tank or cylinders. The pressure is reduced inside the industrial premises before the gas reaches the furnace. Methanol is introduced into the piping system by means of a pump. Propane and ammonia are transported by the pressure in the storage vessels.



Assembly of a nitrogen-methanol based atmosphere system

#### Intake into the furnace

Nitrogen based systems introduce the gaseous components in the same way as other gas based systems, i.e. to ensure optimum mixing and circulation. However, for methanol, a special technique is required as it is introduced in liquid form. Lances are therefore used in order to ensure good vaporising and cracking, regardless of the type of furnace, location of intake, or whether a fan is used or not.



Gears before heat treatment



Examples of methanol injection lances

#### Atmosphere control

Atmosphere control can be automatic, semiautomatic or manual. In fully automatic control, the flows of different media are automatically adjusted to ensure that the setpoints for the atmosphere carbon potential and composition are maintained. This is achieved by connecting gas sampling, gas analysis and flow control to the control cabinet that contains the required software algorithms, analysers and controllers. Nitrogen-methanol based systems for pusher furnaces have the option of injecting water at the end of the furnace in order to lower the carbon potential.

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