HUMIDIFICATION AND COOLING TECHNOLOGY

Munters PreCoolers Improving Gas Turbine Output All Over the World!

Application Analysis

The problem

The design and development of combined cycle and gas turbine power plants has been progressing rapidly during the last ten years. Output and efficiency have increased substantially and significant research time has been spent on performance enhancement. Gas turbine outputs of greater than 240 MW, and combined cycle efficiencies up to 60% have been achieved.

However, the power output and efficiency of gas turbines are strongly dependent on the ambient air conditions. An increase of the ambient air temperature decreases the power output rapidly.

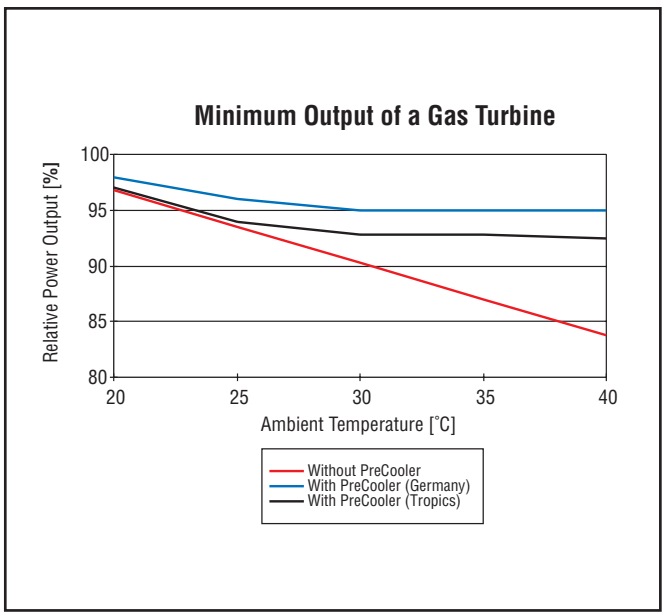
Munters

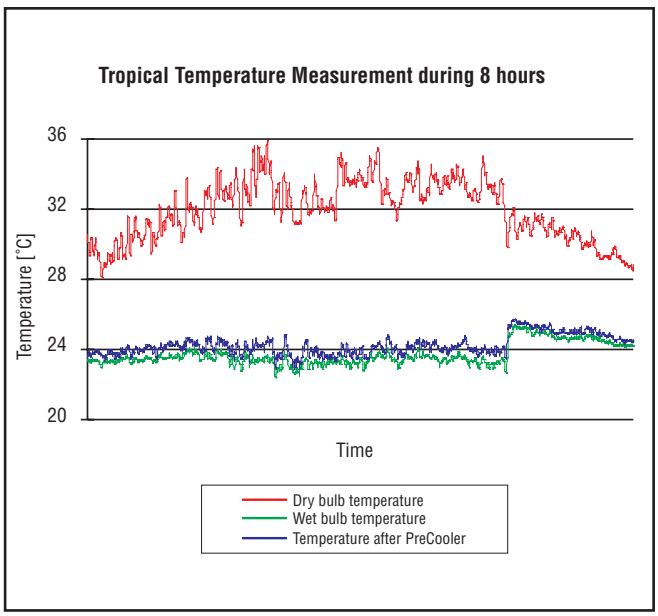
Inlet air treatment

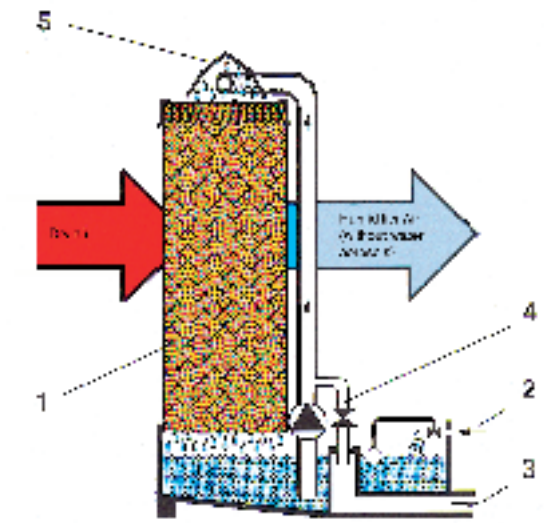
Munters have been actively researching and developing new air treatment systems, based on evaporative cooling technology. These systems have exceeded anything previously available in the power industry. This technology combines the optimization of the core components with the development of modular systems for turnkey installations.

We have researched, in depth, global weather conditions, and are able to accurately calculate and guarantee the power improvements available. These guarantees include the peak power output and the average incremental output.

The potential of Munters PreCooler technology offers a minimum peak power improvement of 5% for any gas turbine at any location in the world. Substantial power increases in excess of 25% are possible in hotter climates, on certain gas turbines. Even in the tropics, where evaporative cooling technology is the least effective, excellent cooling results have been achieved with the Munters PreCooler. This vast amount of incremental power is a very valuable benefit to any independant or national power producer. It can also be used to offset the progressing degradation of the installed gas turbines.







1. Humidifying pad GLASdek or CELdek
2. Water inlet
3. Drain
4. Bleed-off
5. Water distributor

Principle – The "Munters" method

The Munters method

Munters PreCooler is equipped with a high efficiency cooling media available in either CELdek® or the non flammable GLASdek®. The system is automatic in its operation, and the only utility required is water. Whether the requirement is for a retofit of an existing installation, or a completely new plant, Munters offer the total supply including any utilities, ie water treatment.

Design features

- Structural steel made from stainless steel or/and galvanized steel
- Stainless steel modules accomodating humidifier pads of CELdek or GLASdek
- Water circulating system including stainless steel piping, stainless steel valves and stainless steel watertank
- Stainless steel covers
- Biocide treatment
- Blow down unit
- Switchboard for automatic operation and remote start-up and shutdown

Benefits

- **Increased power output**

The water is evaporated to pure cold vapour by the Munters PreCooler. This produces the required cooling effect, providing an intake air at higher density. This allows the gas turbine to produce the increased power output and operating efficiency.

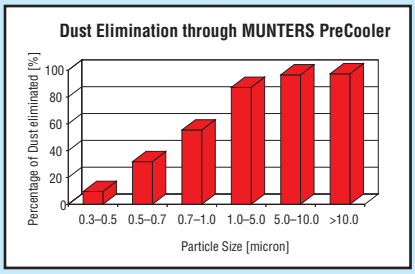
- **Low investment and operational cost**

By using natural principles, the Munters PreCooler has a low investment and operational cost. A short pay-back period of 12–24 months is possible due to very low operational costs. The utility costs of the system are water consumption of normally 0.6–1.2 m^3 per additional MWH produced and power consumed by the feed pumps which is less than 0.5% of the additional power produced.

For new installations Munters are able to offer the additional advantage of integration of the intake air filtration into the PreCooler. This substantially reduces the investment cost of both air filters and coolers by supplying one combined housing.

- **Filtration ability**

An additional benefit of the Munters PreCooler is the air filtration ability. If installed prior to the first filter stage, it will remove approximately 90% of the particles normally removed by the first air filter stage. This signigicantly increases service life and therefore reduces the maintenance costs. This benefit is also extended to the fine filters, where the dust load is reduced by approximately 30% by the PreCooler.



- **Noise control**

Due to the PreCooler's positioning on the intake air system, noise reduction of between 2–10 dB are produced dependant on the frequency band.

- **Low pressure drop**

Standard pressure drop of a Munters PreCooler is only 50–100 Pa, which is negligible when compared with the pressure drop of 250–1200 Pa by standard air filters. The PreCooler provides aerosol-free cooled air at a constant pressure drop throughout the year.

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The Humidity Expert