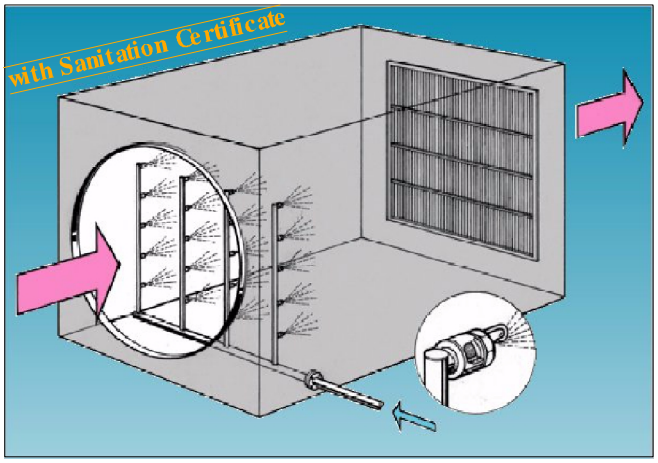
LTG Incorporated

High Pressure Humidifier and Airwasher Type HPH



LTG Incorporated
105 Corporate Drive, Suite E
Spartanburg, SC 29303
PO Box 2889, Spartanburg, SC 29304
USA
Tel: 864-599-6340
Fax: 864-599-6344
e-mail: info@LTG-INC.net
Internet: http://www.LTG-INC.net

LTG Aktiengesellschaft
Grenzstrasse 7, D-70435 Stuttgart
PO Box 40 05 25, D-70405 Stuttgart
Germany
Tel: 49-711-8201-180
Fax: 49-711-8201-720
e-mail: prozessluft@LTG-AG.de
Internet: http://www.LTG-AG.de

High Pressure Humidifier and Airwasher HPH

Function

The LTG High Pressure Humidifier works with fresh water that is sprayed and atomized at a high pressure. This atomization is so intensive that a mist is created. The fine water droplets evaporate very quickly and have an adiabatic cooling effect. The excess droplets (on average about 25% of the sprayed water quantity) are separated from the air by a special drop eliminator. For this reason, very little water is recirculated.

The humidification requirement determines the amount of water that has to be atomized. The water quantity can be controlled with the speed of the high-pressure plunger pump by using a frequency inverter. The LTG high-pressure atomizing nozzles build up a resistance depending on the water quantity. This resistance permits efficient atomization in the first place. The high-pressure atomizing nozzles are operated between 145 and 1700 psi (10 and 120 bars).

To prevent fouling of the humidifier and the air ducts, clogging of the high pressure atomizing nozzles and to prevent minerals from depositing in the room, it is important to have adequate water quality. LTG has the benefit of a long experience with many installations, and also works closely with water treatment companies. This gives LTG the competence to propose the optimum water treatment process.

Water quality also has a bearing on hygiene, fouling of the systems, air purity, humidification efficiency and water consumption.

housing with pump-and filter unit

Advantages

- Energy savings
  Compared with the conventional recirculating spray humidifier/air washer, there is an 85% pump energy savings (with Δx of 31 gr/lb (4.5 g/kg) of dry air).
  Compared with a steam humidifier, there is a 99% energy savings when taking steam generation into account, plus a saving of up to 50% of chiller energy due to adiabatic cooling.

- Hygiene
  Only fresh water is atomized, and not recirculated water, which prevents the accumulation of germs. The housing is sloped to dry it, which in turn eliminates lengthy downtimes.

- No touch system
  Thanks to the strict water quality requirements, there are no problems caused by lime scale in the humidifier. All maintenance can be performed completely outside the humidifier (oil change, filter cartridge change), and therefore almost no downtime is required.

- Efficient Control
  Thanks to the inverter-controlled high-pressure pump, the humidification capacity can be controlled quickly and accurately.

- Reduced water requirement
  High bleed-in factors that are required for the recirculating spray humidifier are not necessary, since the water used has been treated. Overall, the extra cost for water treatment pays off.

High-pressure nozzles

High Pressure Humidifier and Airwasher HPH

Applications

- Building air conditioning
  For office buildings, the hygienic alternative to the recirculating spray humidifier. Also suitable for use in hospitals, as a substitute for steam humidifiers.

- Hygiene industry
  Where hygiene is important for the production process, germs and minerals cannot be tolerated. The treated water is risk free, and eliminating the water tank of the air washer also has a positive effect.

- Chemical industry
  Maintaining specified air conditions within a narrow range is essential for best production results here, and since the materials used are impervious to aggressive components in the air, this is an ideal field of application.

- Tobacco industry
  In this industry too, the hygiene regulations are being tightened. Without recirculating water, there is no accumulation of organic particles in the water.

- Textile industry
  Heat loads from the production process have to be reduced here, and a constant relative humidity is required. High degrees of air saturation reduce the air quantity needed to do so.

- Surface treatment
  For an optimum and even drying of sheet metal parts, conditioning of the supply air has to be absolutely constant. Furthermore, no minerals should migrate into the drying process.

- Printing Industry
  To avoid electrostatic charge of the paper, a constant relative humidity of the production process is necessary.

Components

- Enclosure of reinforced fiberglass or stainless steel
  Used for years in conventional recirculating spray humidifiers; baffles and eliminator blades made of PPTV with a stainless steel holding structure.

- Nozzle bank
  Made of stainless steel, with stainless steel atomizing nozzles, generating a fine mist -SMD 20 µm at 1000 psi (70 bars), operated between 145 and 1700 psi (10 and 120 bars).

- High pressure pump
  Brass or stainless steel version depending on the water quality, but in either case with ceramic plunger with dry running prevention, supply stop and pressure monitoring, operating up to 1700 psi (120 bars).

- Water treatment
  Depending on the supply water quality, fine filter, softening and reverse osmosis is required.

- Control panel
  Equipment control panel with frequency inverter and safety functions.

Sizes

Air quantities:	12,000 to 300,000 cfm (20 000 to 500 000 m^3/h)
Air flow velocity:	600 to 1200 fpm (3 to 6 m/s)

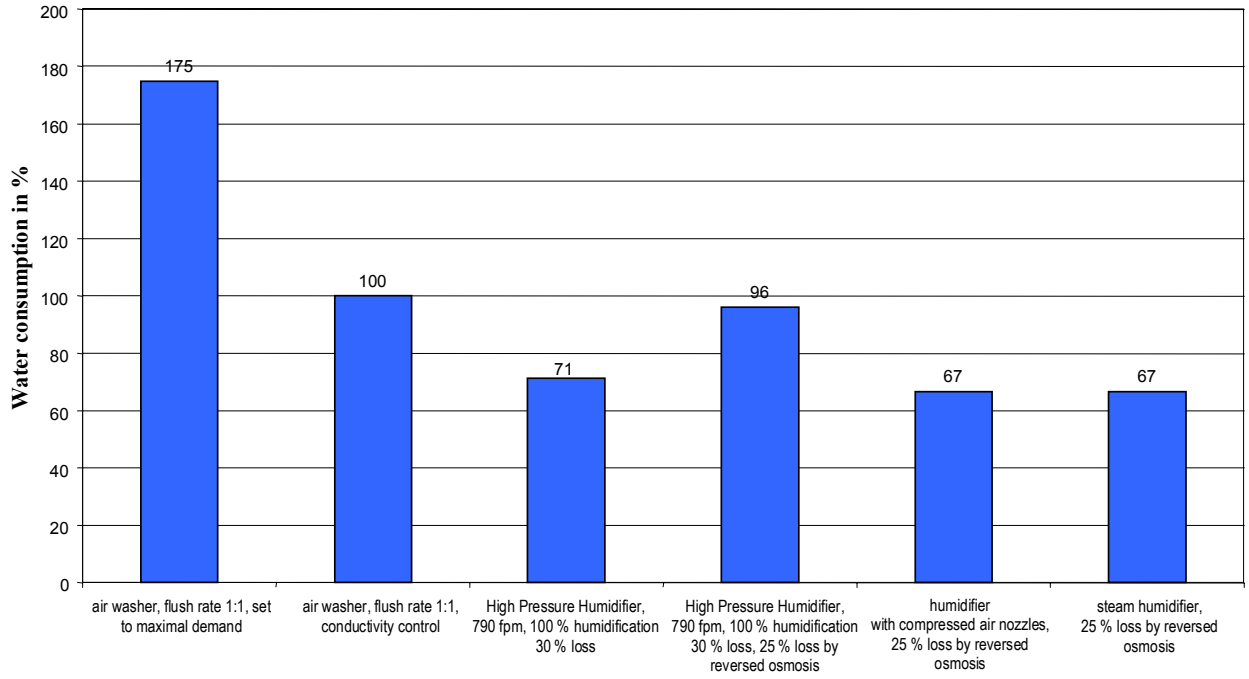
Housing dimensions:

Width:	5’ to 16’ (1500 to 5000 mm)
Height:	5’ to 16’ (1500 to 5000 mm)
Length:	10’ or 5’-9” (1750 or 3000 mm)

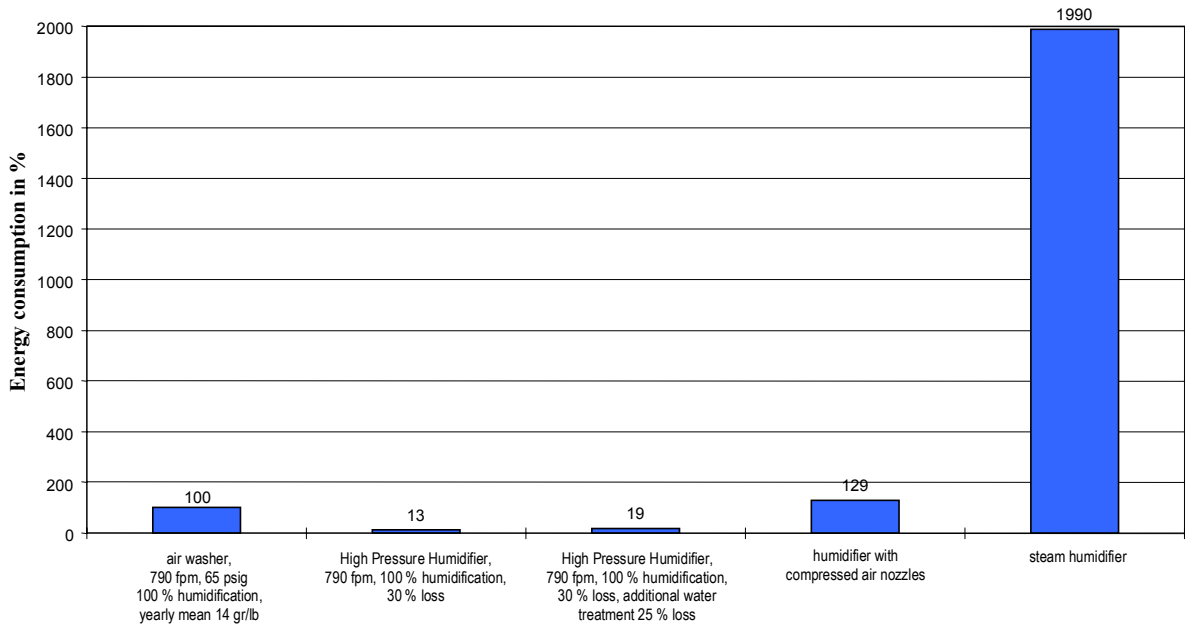
For high humidification ratios in addition to tight control accuracies, two nozzle banks are used.

Water consumption/ energy consumption

Comparison of the water consumption of different humidification systems



Comparison of the energy consumption of different humidification systems



High Pressure Humidifier and Airwasher HPH

Water treatment

The LTG High Pressure Humidifier requires a certain water quality, to increase the intervals between necessary maintenance, to eliminate nutrients for germ growth, and to achieve best atomization.

If the results of the water analysis are outside the required limits, the water needs additional treatment besides ultra-fine filtration. Above a hardness of 5 degrees, a softening device must be provided. Above a certain total mineral content, a demineralization unit, working on the reverse osmosis principle, must be installed in addition. It is however sufficient to mix the water to bring it below the limit.

Water requirements for recirculating water as used by standard air washers

An important and easily measured value is the electrical conductivity of the water. This conductivity is an indicator for the overall mineral content of water.

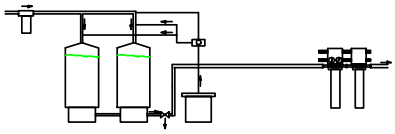
The limit value for the electrical conductivity is 1000 µS/cm for standard air conditioning. Requirements, 300 µS/cm for data processing rooms and 120 µS/cm for clean rooms.

This means that the water in the supply tank must not exceed these limit values. To minimize the water quantity that has to be replaced through bleed-in, the supplied water must be considerably below these limits regarding conductivity. To avoid having to bleed in more than the quantity that evaporates, the electrical conductivity must be less than 500 µS/cm.

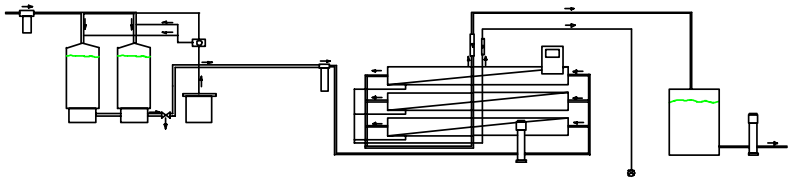
Nevertheless, the possibility of accumulation of germs in the recirculating spray humidifier remains.

Different possibilities of water treatment

fine filter



softener
and fine filter



softener,
fine filter
and reversed osmosis

High Pressure Humidifier and Airwasher HPH

Pump-, filter- and control-unit

2 to 10 hp (1,5 to 7,5 kW)

Dimensions:

Height:	74 inch	(1880 mm)
Width:	28.5 inch	(725 mm)
Depth:	19.7 inch	(500 mm)

15 - 20 hp (11 kW, 15 kW)

Dimensions:

Height:	74 inch	(1880 mm)
Width:	46 inch	(1170 mm)
Depth:	24.6 inch	(625 mm)

INSTITUT FÜR ANGEWANDTE CHEMIE
Gockel & Weischedel & Co GmbH
Stuttgart

BG
Berufsgenossenschaft
Druck und
Papierverarbeitung

Sanitation Certificate for High-Pressure Humidifier

of

LTG Aktiengesellschaft

Grenzstraße 7, D-70435 Stuttgart

Test Conditions

Microbiological testing of the LTG High-Pressure Humidifier was performed under actual use conditions (in 14-day intervals, first 10 measurements weekly). During the test period no cleaning activities using disinfectants were performed.

Test Requirements

Requirements for granting this Sanitation Certificate are based on the recommendations for air humidifiers given by BG Druck und Papier (German Trade Association for Printing and Paper Processing).

max. bacterial count in spraywater	< 1000 KBE/ml
max. bacterial count in the air	< 500 KBE/m³
max. mold in the air	< 100 KBE/m³

Test Certificate

The specified requirements were fully met. Measurements documented that the actual values in both the spraywater and the air are clearly below the allowed limits of BG Druck und Papier. Furthermore, no evidence was found for legionella pneumophila in additional tests. We may, therefore, confirm that the tested LTG High-Pressure Humidifier operates appropriately with view to sanitation provided that the specified operating instructions and maintenance schedules are observed.

INSTITUT FÜR ANGEWANDTE CHEMIE
(Institute for Applied Chemistry)
Gockel & Weischedel & Co GmbH

G. Weischedel