The Güntner Adiabatic Cooling System with hydroBLU™ technology is an advanced system which can be incorporated within the design and construction of Güntner’s air cooled condensers GVD/GW and dry coolers (fluid coolers) GFD/GFW either at the time of purchase or at a later stage as a retrofit.

Güntner’s product portfolio for heat rejection equipment presents to the end user a choice from fully dry to fully wet solution system. Energy efficiency and utility costs, associated with the system design, challenge the end user with a variety of possible solutions for the heat rejection equipment being selected. Specific job site location and the relevant utility costs will ultimately be the deciding factor when selecting the optimum equipment for each project.

When an Adiabatic Cooling System with hydroBLU™ technology is selected, it is essential to comply with the following guidelines. This manual shall be read in its entirety prior to the start-up of the equipment. This manual will form the basis for implementing a maintenance program specific to the location and the anticipated run hours of the hydroBLU™ Adiabatic Cooling System in order to promote safe, efficient and longstanding operation.

Table of Contents
1. Safety Information ................................................................. 4
   1.1 Safety Symbols ...................................................................... 4
   1.2 Safety Instructions ................................................................. 4
   1.3 Refrigerant/Fluid Safety .......................................................... 5
2. General Information ............................................................... 6
   2.1 Warranty Statement ............................................................... 6
3. Receiving and Inspection ....................................................... 8
4. Rigging .................................................................................. 9
   4.1 Pre-Rigging Inspection ............................................................ 9
   4.2 Rigging and Installation ........................................................... 9
5. Start–Up ............................................................................... 10
   5.1 System Inspection ................................................................. 10
   5.2 Preliminary Operation Mode .................................................. 11
   5.3 Operation Mode ................................................................. 14
6. Prolongued Shut Down ........................................................... 15
7. hydroBLU™ System Operation ............................................... 18
8. Water Quality Guidelines ....................................................... 20
9. Cooling Pad Media Guidelines .............................................. 21
10. Cooling Pad Media Maintenance .......................................... 21
11. Maintenance ................................................................. 22
12. Adiabatic Cooling System Controls ....................................... 22
   12.1 Guntner Hydro Management (GHM) ..................................... 22
   12.2 Dry Mode ......................................................................... 23
   12.3 GHM Water Saving Mode .................................................. 23
   12.4 GHM Manual Mode .............................................................. 23
       12.4.1 Manual Mode ON / OFF .................................................. 24
   12.5 Adjusting Settings on the GHM ........................................... 25
   12.6 Edit Mode ........................................................................ 26
1. Safety Information

1.1 Safety Symbols

- **DANGER**: Addresses a hazardous situation which, if encountered, will result in death or serious injury.
- **WARNING**: Addresses a hazardous situation which, if encountered, might result in death or serious injury.
- **CAUTION**: Addresses a hazardous situation which, if encountered, could result in minor or moderate injury.
- **NOTICE**: Indicates instructions that pertain to safe equipment operation. Failure to comply with these instructions could result in damage to the equipment.

1.2 Safety Instructions

- Installation and maintenance must only be carried out by qualified personnel who are familiar with this type of equipment.
- Always wear safety glasses, gloves and head protection when working on the equipment.
- Avoid contact with sharp edges and exposed finned surfaces as these can cause painful lacerations.
- All units must be properly evacuated prior to charging the system.
- Ensure all power sources are disconnected prior to any service work being done on the units.
- Never apply heat to a sealed refrigeration system.
- Keep hands away from fans when the unit is running.
- Ensure all mounting bolts are tight and are the correct length for the specific application.
- Maintain all safety labels on the unit in good condition. If required replace with new.

1.3 Refrigerant/Fluid Safety

Although halocarbon refrigerants are classified as safe refrigerants, certain precautions must be observed when handling them. Refrigerant can be harmful if inhaled. When released to the atmosphere in the liquid state refrigerants evaporate rapidly freezing anything they contact. Refrigerants must be used and recovered responsibly.

Failure to follow this warning may result in personal injury or death.

Anhydrous Ammonia (NH₃):
- Specific precaution must be adhered to when people are working with or are exposed to Anhydrous Ammonia.
- Ammonia is considered a high health hazard because it is corrosive to the skin, eyes and lungs. Exposure to 300 parts per million (ppm) is life threatening. Ammonia is also flammable at concentrations of approximately 15% to 28% by volume in air. When mixed with lubricating oils, its flammable concentration range is increased. It can explode if released in an enclosed space with a source of ignition present or if a vessel containing anhydrous ammonia is exposed to fire.
- Personal protective equipment must be worn at all times when working with Ammonia. For systems that have an operating charge greater than 10,000 lbs a process safety management program is mandatory. More information on this topic is available from OSHA.

Failure to follow this warning may result in personal injury or death.
2. General Information

Günther Adiabatic Condensers and Drycoolers are designed to provide optimum efficiency and an extended life when properly installed, operated and maintained. It is therefore highly recommended that a comprehensive maintenance schedule be developed and undertaken on a regular predetermined basis. This manual will assist in developing such a schedule.

This equipment is relatively complicated and the installation, operation, maintenance and servicing should only be carried out by suitable individuals who are qualified to carry out these functions. These individuals shall also be familiar with and comply with all applicable governmental standards and regulations pertaining to these functions.

The type of refrigerant must comply with what is indicated on the submittal drawings and/or the unit’s nameplate. Design operating pressures, as indicated on the nameplate, must never be exceeded!

Adiabatic drycoolers and all piping systems must be correctly evacuated prior to charging the system with refrigerant to ensure the complete removal of moisture and non-condensables from the entire refrigerant circuit.

Failure to comply with any of these requirements could result in serious damage to the equipment and/or the property where it is installed as well as personal injury and/or death to themselves and/or people at the specific location.

2.1 Warranty Statement

Günther U.S. LLC ("Günther") warrants the product to be free from defects in workmanship and materials under normal usage for a period of 24 months from the date of purchase (the “Warranty Period”), provided that the product is correctly installed and operated within the recommended limits of Günther’s technical documentation. This warranty is only valid if the product is given normal and proper use and complies with Günther’s installation and maintenance instructions. Günther assumes no responsibility for repairs to a product sustaining damages resulting from user modifications, attachments to the product, misuse, alteration or negligent use.

Günther, at its option, shall repair or replace, free of charge to the buyer, all components of the product which are or become defective during the Warranty Period as a result of defects in design, workmanship or materials; ordinary wear and tear excluded; provided however, that:

- The product is applied correctly.
- All operating and installation instructions for the product are complied with.
- System component and piping design is in accordance with state of the art HVAC practice.
- Nitrogen, or an inert gas, is introduced into the piping during the brazing of the piping installation.

In all instances, industry standard refrigeration practices must be observed and utilized by certified refrigeration technicians, mechanics, pipe fitters, design engineers, etc. when installing and servicing Günther products. This warranty shall not include ordinary maintenance or cleaning of the product, defects in the installation of the product, or defects in turning and moving parts. This warranty also does not cover physical damage to the product during transit; or otherwise, after purchase of the product but before installation.

The buyer must request repair or replacement of the defective component through a written notice delivered to Günther no later than two business days after the buyer becomes aware of the defect and the buyer must provide Günther with the time and opportunity to make such repair or replacement. Otherwise, Günther will be released from liability for the defect. Under no circumstances will Günther make any repair or replacement without Günther’s prior written consent, except to the limited extent permitted by Günther’s Service Policy.

Any transport and exchange costs for the repair or replacement shall be borne by the buyer. Günther shall also not be liable for costs incurred in dismantling or fitting replacement parts or for any independent inspection undertaken by the buyer. The buyer shall return any allegedly defective goods, postage or freight paid to Günther at the address below. Upon receipt of the goods and inspection thereof, Günther shall repair or replace, at Günther’s discretion, the defective components and shall return the same to the buyer, return postage or freight paid. This shall constitute full compliance with Günther’s warranty obligations hereunder. Günther accepts no liability for the direct or indirect consequences of any modifications of or repairs to the product made by the buyer or by a third party without the prior consent of Günther. Günther reserves the right to inspect the product for customer abuse during the warranty period if abnormal claims against the equipment should arise. This warranty shall not apply to Günther products which have been improperly installed or repaired; or altered in any way, outside of the manufacturer’s factory; or have been subject to misuse, negligence or accident. Equipment or component parts such as valves, electric motors, electric heaters, and electric accessories manufactured by others and used as part of or in connection with Günther products, carry only the warranty of the manufacturer thereof. This warranty shall be void if equipment has been
subjected to negligence, abuse, misuse, low voltage, corrosive chemicals, excessive pressure, accident, outward damage, or hidden damage while in transit, or if operated contrary to the manufacturer’s recommendations.

THIS WARRANTY APPLIES ONLY TO THE REPAIR OR REPLACEMENT OF THE PRODUCT AND/OR ITS COMPONENTS AND EXPRESSLY EXCLUDES RESPONSIBILITY FOR DAMAGES NOT OCCURRING TO THE PRODUCT AND/OR ITS COMPONENTS THEMSELVES AND FOR CONSEQUENTIAL DAMAGES. THIS WARRANTY IS THE BUYER’S EXCLUSIVE REMEDY AND ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS IS EXCLUDED. GÜNTNER SHALL NOT BE LIABLE TO THE BUYER OR TO ANY CUSTOMER OF THE BUYER, UNDER ANY CIRCUMSTANCES FOR ANY DIRECT OR INDIRECT DAMAGES, INJURY TO PERSONS OR PROPERTY OR ANY CONSEQUENTIAL OR INCIDENTAL DAMAGES, OR LOSS OF PROFITS INCLUDING, WITHOUT LIMITATION, LOSS OF REFRIGERANT, LOSS OF STORED GOODS, LOST SALES, ORDERS, PROFITS OR INCOME, EITHER GROSS OR NET, ARISING DIRECTLY OR INDIRECTLY, FROM DEFECTIVE GOODS OR WORKMANSHIP OR FROM ANY OTHER CAUSE WHATSOEVER.

3. Receiving and Inspection

All equipment is packaged for easy handling and storage. Upon delivery inspect all components for possible shipping damage and/or shortages.

A specific visual inspection of the cooling pads (media) should be done to confirm that these have not been damaged during shipment.

Record any unit damage or shortages on the Bill of Lading and report to the carrier and Güntner factory immediately. Shipping and handling damages are not warranty items.

Take photos of all damaged equipment and components. Damaged items are the responsibility of the designated carrier and should not be returned to the manufacturer unless prior approval is given to do so. Confirm that all items listed on bill of lading are received; especially all components required for the water distribution system and any loose items such as media pads, when shipped loose.

The unit(s) can be lifted using extended forks underneath the skid completely traversing the width of the unit and generally centered along its length. Do not allow the forks to make contact with the unit. Refer to the rigging instructions applicable to the specific condenser or dry cooler for greater detail.

4. Rigging

4.1 Pre-Rigging Inspection

Confirm that all components are secured in position and that nothing has come loose during shipment.

Confirm all fasteners, brackets and piping connections are tight.

Ensure that the cooling pad supports are firmly in place and all cooling media pads are securely in position.

4.2 Rigging and Installation

Refer to the rigging and installation instructions within the IOM for the respective unit (e.g. GFD/GVD or GFW/GVW).

Ensure that the unit is level. This is critical for the ACS as the gutter has an inclination to allow the water to free drain. If the unit is not level this inclination could be compromised to a point where water is allowed to stand in the gutter.

hydroBLU™ Water Distribution System

Figure 1. Major components of the Güntner hydroBLU™ Adiabatic Cooling System (ACS)

- Water distribution header
- Temperature and humidity sensor
- Water meter
- Water regulating valve
- Solenoid drain valve
- Y strainer
- Water inlet
- Water outlet
- Water drain

*GFD/GVD 2x8 and 2x9 models have 2 drain connections
5. Start-Up

5.1 System Inspection

Ensure that all piping and components for the water distribution system are tight and secure.

Check to ensure that all media pads are securely held in position and that there are no visible gaps between the pads.

If required, clean the media pads using low pressure water in a range from 30 to 45 psig (2-3 bar).

It is recommended to clean and flush the distribution headers prior to allowing any water to flow over the pads, opening the drain header valve.

cap. After flush, close the valve/cap.

This can be accomplished by opening the valve/cap at the end of the distribution header on the opposite end to the water inlet side and allowing water to flow through the headers until no dust, dirt or debris is visible.

Figure 2. Service ball valve for cleaning and flushing distribution headers

Confirm that all drain piping has been completed and water flows freely out of the gutters. Drain piping installation on site shall avoid overflow in gutters.

5.2 Preliminary Operation Mode

The inlet water pressure must be 20-60 psig (1.5-4 bar) for GFW/GWW and 25-60 psig (1.75-4 bar) for GFD/GVD. hydroBLU™ systems has been set according to factory setting table below.
There are only two set points, which must to be modified in field by the customer before to startup the unit:

- **Geodetic Height:** This value needs to be entered to GHM in order to consider the air density depending the height where the unit will be placed. This is a metric value, and must be entered in meters above sea level.
- **Outdoor temperature:** The switch point setting needs to be entered in the GHM. This set point will initiate the water flow over the adiabatic pads. This value can be a preset ambient temperature, or a specific fluid temperature.

For more information on the set-up and functioning of the GHM, please refer to the GHM IOM. Alternatively, see the Quick GHM startup video on Güntner websites: [http://www.guntnerus.com](http://www.guntnerus.com) and [http://www.guentner.com.mx](http://www.guentner.com.mx)

Prior to system start-up, verify the operation of the water distribution system with the following steps:

1. Enter an outdoor temperature set point that is lower than the actual ambient temperature on the GHM controller
2. Enter a water threshold (minimum water flow required to turn on the hydroBLU™ system) 10% lower than the unit requires
3. Modify set point on GMM to a value 20 °F lower than the actual process temperature
4. Once finished points 1 to 3 mentioned before, verify that the water regulating valve has being activated and allow water flow through media pads (The discoloration of the media, once wetted, will be clearly visible). This confirms a properly functioning of hydroBLU™ system

**Figure 3. The regulating valve will automatically meter the exact water flow rate to be evaporated as required by the GHM controller.**

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Prior to system start-up, verify the operation of the water distribution system with the following steps:

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1. Enter an outdoor temperature set point that is lower than the actual ambient temperature on the GHM controller
2. Enter a water threshold (minimum water flow required to turn on the hydroBLU™ system) 10% lower than the unit requires
3. Modify set point on GMM to a value 20 °F lower than the actual process temperature
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**Figure 3. The regulating valve will automatically meter the exact water flow rate to be evaporated as required by the GHM controller.**

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3. Modify set point on GMM to a value 20 °F lower than the actual process temperature
4. Once finished points 1 to 3 mentioned before, verify that the water regulating valve has being activated and allow water flow through media pads (The discoloration of the media, once wetted, will be clearly visible). This confirms a properly functioning of hydroBLU™ system

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- **Outdoor temperature:** The switch point setting needs to be entered in the GHM. This set point will initiate the water flow over the adiabatic pads. This value can be a preset ambient temperature, or a specific fluid temperature.

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Prior to system start-up, verify the operation of the water distribution system with the following steps:

1. Enter an outdoor temperature set point that is lower than the actual ambient temperature on the GHM controller
2. Enter a water threshold (minimum water flow required to turn on the hydroBLU™ system) 10% lower than the unit requires
3. Modify set point on GMM to a value 20 °F lower than the actual process temperature
4. Once finished points 1 to 3 mentioned before, verify that the water regulating valve has being activated and allow water flow through media pads (The discoloration of the media, once wetted, will be clearly visible). This confirms a properly functioning of hydroBLU™ system

**Figure 3. The regulating valve will automatically meter the exact water flow rate to be evaporated as required by the GHM controller.**
5. Ensure that there is no water carry over outside of the pad area

If water carry over outside the unit occurs, please contact your Güntner representative to evaluate the case. Please note that 5% of water carry over is permissible.

6. Confirm that all water caught in the gutters is able to free drain unobstructed

5.3 Operation Mode

1. Enter the desired ambient temperature set point in the GHM. This will be the switch point at which time, water supply to the adiabatic pads may be initiated.
2. The minimum water threshold is preset in the GHM and is dependent on the unit size.
3. Enter the desired temperature set point in the GMM.

Only when all three of the above parameters are met, will the water supply to the adiabatic pads be initiated.

When the ambient temperatures drop below 43°F (6°C) the system will drain automatically

6. Extended Shut Down

If the system will be shut down for a period of three weeks or more, please ensure the following:

- Lock out, and tag, all electrical power supplies.
- The hydroBLU™ water system uses a normally open solenoid valve to ensure water is drained from the system in the event of a power outage. Assure that drain solenoid valve is open.
- The media pads must be removed from the unit and placed in a well-ventilated storage area and not exposed to sunlight.
To remove the cooling pads:

- Remove the thumb screws and lift to open the header cover.

- With the header cover open, remove the top cooling pads by simply lifting them up and out.

- Loosen the thumb screws on the cooling pad support and slide the cooling pad support out and down to create space for the removal of the bottom cooling pads.

- Lift the bottom cooling pads up out of the gutter and then out to remove.
7. hydroBLU™ System Operation

The hydroBLU™ System is an adiabatic cooling process with an innovative and high technology control system which manages the water and energy consumption based in 4 main parameters:

1. Fluid Temperature
2. Ambient condition (Outdoor temperature and Humidity)
3. Fan speed
4. Water flow

The principle behind the adiabatic cooling process is that as water evaporates the surrounding air becomes cooler and more humid. This is a natural occurrence. Therefore, a portion of the water which is distributed over the media pads will evaporate. The heat that is needed for the evaporation process is removed from the air. The air that leaves the pad is therefore cooled and humidified simultaneously resulting in the temperature of the air entering the finned heat exchange surface being closer to the wet bulb temperature. This process permits a lower entering dry bulb temperature onto the finned heat exchange surface; effectively creating a greater approach and thereby utilizing less finned surface for the heat rejection requirement(s).

Each unit fitted with the adiabatic cooling media pads has a high cooling efficiency with maximum water flow for optimum operation. This water flow and fan speed will be controlled by GHM-GMM controls according 4 main parameters settings, provide accuracy fluid temperature with smart control for water and energy saving.

The hydroBLU™ system can operate at partial or full water flow, or dry, dependent on ambient conditions and the fluid temperature / pressure. Under normal operation, with either full or partial water flow, a portion of the water will be evaporated. Water which is not evaporated will flow across the pads, providing a “cleaning” function and into the gutter. The drain outlet (gutter outlet) should be routed to a waste water drain.

Partial wetting of the adiabatic pads is a normal operation for the hydroBLU™ system. The pads will only be completely wetted when water flow is at 100%.

Inlet supply water pressure MUST be between 1.5 bar (20 psig) and 4 bar (60 psig) for GFW/GVW, and between 1.75 bar (25 psig) and 4 bar (60 psig) for GFD/GVD.

### Table 2. hydroBLU™ Water flow for GFW / GVW

<table>
<thead>
<tr>
<th>Fan Quantity G_W</th>
<th>Maximum water flow for hydroBLU™</th>
<th>Minimum water flow (Water Threshold)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Maximum water flow US GPM</td>
<td>Minimum water flow US GPM</td>
</tr>
<tr>
<td>1</td>
<td>365 l/hr 1.6 US GPM</td>
<td>34 l/hr 0.15 US GPM</td>
</tr>
<tr>
<td>2</td>
<td>705 l/hr 3.1 US GPM</td>
<td>68 l/hr 0.3 US GPM</td>
</tr>
<tr>
<td>3</td>
<td>1070 l/hr 4.7 US GPM</td>
<td>102 l/hr 0.45 US GPM</td>
</tr>
<tr>
<td>4</td>
<td>1410 l/hr 6.2 US GPM</td>
<td>136 l/hr 0.6 US GPM</td>
</tr>
<tr>
<td>5</td>
<td>1775 l/hr 7.8 US GPM</td>
<td>170 l/hr 0.75 US GPM</td>
</tr>
<tr>
<td>6</td>
<td>2115 l/hr 9.3 US GPM</td>
<td>204 l/hr 0.9 US GPM</td>
</tr>
<tr>
<td>7</td>
<td>2480 l/hr 10.9 US GPM</td>
<td>238 l/hr 1.05 US GPM</td>
</tr>
<tr>
<td>8</td>
<td>2815 l/hr 12.4 US GPM</td>
<td>273 l/hr 1.2 US GPM</td>
</tr>
</tbody>
</table>

**IMPORTANT NOTE:** For GFW/GVW supplier water pressure must be 1.5 bar (20 psig) to 4 bar (60 psig).

### Table 3. hydroBLU™ Water flow for GFD / GVD

<table>
<thead>
<tr>
<th>Fan Quantity G_D</th>
<th>Maximum water flow for hydroBLU™</th>
<th>Minimum water flow (Water Threshold)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Maximum water flow US GPM</td>
<td>Minimum water flow US GPM</td>
</tr>
<tr>
<td>2x2</td>
<td>975 l/hr 4.3 US GPM</td>
<td>91 l/hr 0.4 US GPM</td>
</tr>
<tr>
<td>2x3</td>
<td>1460 l/hr 6.4 US GPM</td>
<td>136 l/hr 0.6 US GPM</td>
</tr>
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<td>2x4</td>
<td>1950 l/hr 8.6 US GPM</td>
<td>182 l/hr 0.8 US GPM</td>
</tr>
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<td>2x5</td>
<td>2435 l/hr 10.7 US GPM</td>
<td>227 l/hr 1 US GPM</td>
</tr>
<tr>
<td>2x6</td>
<td>2920 l/hr 12.9 US GPM</td>
<td>273 l/hr 1.2 US GPM</td>
</tr>
<tr>
<td>2x7</td>
<td>3410 l/hr 15.0 US GPM</td>
<td>318 l/hr 1.4 US GPM</td>
</tr>
<tr>
<td>2x8</td>
<td>3900 l/hr 17.2 US GPM</td>
<td>363 l/hr 1.6 US GPM</td>
</tr>
<tr>
<td>2x9</td>
<td>4380 l/hr 19.3 US GPM</td>
<td>409 l/hr 1.8 US GPM</td>
</tr>
</tbody>
</table>

**IMPORTANT NOTE:** For GFD/GVD supplier water pressure must be 1.75 bar (25 psig) to 4 bar (60 psig).

Determine the number of fans from the model nomenclature, as underlined in the following examples:

- GFW ###.*2 - "(*) - #/## has 2 fans (such as GFW 090.1/2 - L/L) - F4/01
- GFD ###.*2x2 - "(*) has 2 x 2 fans, or 4 fans total
- AGVD ###.*2x6 - "(*) has 2 x 6 fans or 12 fans total
8. Water Quality Guidelines

Typical municipal and well water supplies are suitable for use on the ACS. The application of other water sources, cleaning agents, or treatments must be compatible with the materials of construction. The ACS components include polypropylene piping, brass valves and fittings, PVC distribution headers, cellular media, and type 304L stainless steel frames and gutters.

<table>
<thead>
<tr>
<th>Designation</th>
<th>Lower</th>
<th>Upper</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conductivity</td>
<td></td>
<td>&lt; 450</td>
<td>microSiemens/cm</td>
</tr>
<tr>
<td>Calcium Hardness (as CaCO₃)</td>
<td></td>
<td>&lt; 170</td>
<td>ppm [mg/l]</td>
</tr>
<tr>
<td>Chlorides (as Cl)</td>
<td></td>
<td>&lt; 50</td>
<td>ppm [mg/l]</td>
</tr>
<tr>
<td>Total Alkalinity (as CaCO₃)</td>
<td></td>
<td>&lt; 170</td>
<td>ppm [mg/l]</td>
</tr>
<tr>
<td>pH</td>
<td>6.5</td>
<td>8.5</td>
<td>-</td>
</tr>
<tr>
<td>Sulfate (SO₄²⁻)</td>
<td></td>
<td>&lt; 250</td>
<td>ppm [mg/l]</td>
</tr>
<tr>
<td>Silica (as SiO₂)</td>
<td></td>
<td>&lt; 25</td>
<td>ppm [mg/l]</td>
</tr>
<tr>
<td>Iron (as Fe)</td>
<td></td>
<td>&lt; 0.2</td>
<td>ppm [mg/l]</td>
</tr>
<tr>
<td>Oil and grease</td>
<td></td>
<td>&lt; 2</td>
<td>ppm [mg/l]</td>
</tr>
<tr>
<td>Total dissolved solid</td>
<td></td>
<td>&lt; 550</td>
<td>ppm [mg/l]</td>
</tr>
<tr>
<td>Suspended solids</td>
<td></td>
<td>&lt; 5</td>
<td>ppm [mg/l]</td>
</tr>
<tr>
<td>Colony-forming units</td>
<td></td>
<td>&lt; 50</td>
<td>CFU/ml</td>
</tr>
</tbody>
</table>

Table 4. hydroBLU™ Water Quality Parameters

Failure to adhere to these water inlet quality parameters will reduce the lifespan of the adiabatic pads. Further, scaling, sometimes severe, can also occur.

9. Cooling Pad Media Guidelines

The functionality of the hydroBLU™ system is such that the evaporation of the water occurs at the pad media surface as it flows over and through the pads. Standard water treatment practices are therefore somewhat different to standard heat exchanger practices. The hydroBLU™ methodology is to provide just the required water quantity to the pads to maintain the process temperature, or pressure, set point.

Many water related problems can be avoided if good system design and basic housekeeping practices are followed.

- The hydroBLU™ system is designed to operate with partial or completely wetted pad media. In some conditions excess water will flow into the gutter(s).
- Clean and flush distribution PVC headers on a regular basis to prevent buildup of deposits or microbiological growth.
- Replace damaged or spent pad media.
- At times or specific locations when the pad media experiences extreme evaporation, a flush cycle is recommended every 24 hours with the fan off.
- Locate the equipment and use appropriate water sources to minimize or avoid ingestion of contaminants that can clog or damage the media pads. Some examples include airborne dust/debris and exhaust air from other processes or equipment.

10. Cooling Pad Media Maintenance

- Avoid harmful contaminants including dust, dirt, fumes and harsh cleaners.
- Use only low pressure water in a range from 30 to 45 psig (2-3 bar) to clean the pad media.
- Drain and disinfect the entire water distribution system quarterly with compatible concentrations of disinfectants with ball valve in PVC header open.
11. Maintenance

Recommended Inspection and Maintenance Frequencies

<table>
<thead>
<tr>
<th>Start-Up</th>
<th>Weekly</th>
<th>Monthly</th>
<th>Quarterly</th>
<th>Annually</th>
<th>Shut-down</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inspect and Clean as Required</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Visually inspect pads for bowing, sagging or dry streaks</td>
<td></td>
<td>x</td>
<td></td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Inspect gutters and remove any debris</td>
<td>x</td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Check water distribution system for leaks and clogged distribution holes</td>
<td>x</td>
<td></td>
<td></td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Flush water distribution system</td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Drain and disinfect the entire water distribution system</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Check water flow rate and adjust if necessary</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Check water distribution is even across entire length of unit</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Remove all dirt and debris from the media pads</td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Clean the Y Strainer’s mesh</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

12. Adiabatic Cooling System Controls

12.1 Guntner Hydro Management (GHM)

The wetting system is used to increase the capacity of heat exchangers at peak load times with high external temperatures and for more efficient heat dissipation with moderate ambient temperatures making efficient use of the water consumption. The adiabatic evaporation of the water on the media pads cools the air drawn in by the heat exchanger, which increases the heat exchanger’s capacity. The wetting controller GHM governs the regulation of the wetting process. The required water volume is calculated on the basis of the load state, the ambient temperature and the relative humidity. The GHM sets the appropriate water volume using the water regulating valve. The system’s frost protection is secured with automatic draining. The water supply to the unit must be protected separately against frost.

There are three possible operating conditions when the Güntner ACS accessory is included on a GF/VW unit when utilizing the Güntner Motor Management Controller

- Dry Mode
- GHM Water Saving Mode
- GHM Energy Efficiency Mode
- GHM Manual Mode

12.2 Dry Mode

This is the standard operating mode for the unit when ambient temperature and process are within the design operating conditions. In this operating mode the GMM (Güntner Motor Management) controls motors and regulate the speed to achieve the desired process set-point, no water is used in this operating condition.

12.3 GHM Water Saving Mode

Only as much water as the media pads can evaporate is applied. hydroBLU™ technologies works with this mode as standard.

12.4 GHM Energy Efficiency Mode

More water is used in this mode, as the focus is on conserving as much fan power as possible.

12.5 GHM Manual Mode

- Manual mode is used to operate the system’s water inlet valve and drainage valve by hand.
- Manual mode does not depends on DI1 enabling.
- Manual mode has the highest priority and switches all other control types off.
- The prerequisite for switching on the manual mode is the set external temperature.
- This must be above the frost temperature, as otherwise the manual mode cannot be switched on. Wetting is not permitted in the manual mode without recording the external temperature.
- The fact that manual mode is active is recorded permanently. In other words, it will still be active after you have switched the system off and back on.
12.5.1 Manual Mode ON / OFF

Manual mode - valve control value/draining

12.6 Adjusting Settings on the GHM

- Cancel and return to INFO menu
- Enter key for function selection; change to EDIT mode and value acceptance
- Right arrow for moving to the next menu level
- Left arrow for moving to the previous menu level
- Up / down arrows for scrolling through the menu level

1. Use this key to move from the “INFO” menu to the Operating menu
2. Use this key to return to the “INFO” menu at any time
12.7 Edit Mode

This mode is required to change values (control values, for example).

- Select menu option you want (top line)
- Change to menu option
- Change to writing mode (cursor flashes)
- Decimal point selection (cursor flashes)
- Change value
- New value acceptance

For more information on the set-up and functioning of the GHM, please refer to the IOM for the GHM or in GHM startup video on Güntner web site.
Air Cooled Condensers
Air Cooled Fluid Coolers
Air Coolers
Evaporators
Evaporative Condensers
Evaporative Fluid Coolers
Closed Circuit Fluid Coolers