

Customer: _____

Sales Representative: _____

Model Number: _____

Serial Number: _____

Field Start-Up Sheet

Evaporative Cooling Equipment

Please Print

INITIAL INSPECTION

I. Installer Responsibilities

1. Remote Panel: All interconnecting wires run from remote to unit ☐ Yes
Remote Panel Location: ☐ Inside Wall ☐ Outside Wall _____ Feet From Unit (approx.)
2. Electrical Supply properly installed to main panel, at the voltage and amperage as stated on the unit nameplate ☐ Yes
3. Multi-section units: joints caulked at mating frames, all bolts and nuts installed and tightened, seam tape applied ☐ Yes
4. Upright Units: Legs attached and bolted, shimmed properly so unit does not "rock" ☐ Yes
5. Duct connections made and sealed properly ☐ Yes
6. Discharge head installed secure, with diffuser blades tightened and in the open position ☐ Yes
7. All "shipped loose" items installed properly - filters, vibration isolators, smoke detectors, dampers, louvers, service lights supply fan belts, service platform, roof curb, humidistat, CO detector, etc. ☐ Yes
12. All shipping and rigging paint scratches have been properly touched-up ☐ Yes

Comments: _____

II. Miscellaneous Items

1. Visible Physical Damage? _____ NO IF YES, Specify _____
2. Type of Installation: ☐ Outdoor ☐ Indoor ☐ Roof Curb ☐ Platform ☐ Post ☐ Suspended ☐ Upright
3. Hardware Tight & Secure _____ 4. Damper Linkages Secure _____

Comments: _____

III. Fan & Motor Sheaves

1. _____ Fan & Motor Sheaves Secured Tightly to Shafts
 2. _____ V-Belts Aligned Properly
 3. _____ Fan Bearing Set screws Tight
 4. _____ Fan Motor Manufacturer _____
 5. _____ Bushing Bolts Secure
 6. _____ V-Belts Tensioned Properly
 7. _____ Fan Bearing Mounting Bolts Tight
- HP _____ FLA _____ Frame Size _____

Comments: _____

IV. Filters

1. _____ Filters Installed Properly
2. Type: ☐ Aluminum ☐ Pleated 30% ☐ Pad & Frame ☐ Other

Comments: _____

V. Electric Service

1. Electrical Service Provided to Unit: ____ Volts ____ Phase ____ Hertz ____ Amps
2. Unit Nameplate Electrical Requirement: ____ Volts ____ Phase ____ Hertz ____ Amps
3. Terminal Strip Wires Tight: Main Panel ☐ Yes Remote Panel ☐ Yes
4. Componentry and Relays Mounted Securely in Place ☐ Yes
5. Light Bulbs Installed in Sockets for Control Enclosure Lighting ☐ Yes
6. Main Fusing Size: ____ Volts ____ Amps 6. Overload Heater Size _____
7. The Unit has been grounded by the installer at the main unit panel ☐ Yes

Comments: _____

VERIFICATION OF OPERATION

NOTE: Refer to the Sequence of Operation & Wiring Diagram in the Owners Manual for specific data on this unit.
See Factory Start-up & Test Sheet in the Unit Owners Manual to note the unit settings prior to shipment.

I. Fan Operation

1. The Inlet Damper is fully open when fan comes on ☐ Yes ☐ NA Discharge Damper operates properly ☐ Yes ☐ NA
2. The low-temperature limit switch is field set at ____°F. (Factory set at 40°F.)
3. The low-limit by-pass timer completes its cycle in ____ minutes ____ seconds (normal: 5 minutes)
4. Fan Rotation is in the same direction as the rotation arrow ☐ Yes
5. Discharge External Static Pressure ____ " W.C.
6. Check the following:

	Unit Off	Unit Running	
Phase 1:	____ Volts	____ Volts ____ Amps	Verify the motor running
Phase 2:	____ Volts	____ Volts ____ Amps	amps does not exceed the
Phase 3:	____ Volts	____ Volts ____ Amps	motor nameplate FLA

II. Miscellaneous Operational Checks:

1. With the unit fan operating, the circuit check lights are illuminated ☐ Yes
 2. If furnished, the time clock has been programmed per owner instructions, and training provided to him by me ☐ Yes
 3. The electrical drawing and sequence of operation is taped to the enclosure door. ☐ Yes
 4. The owners manual was reviewed by me with the owner, and placed back inside the unit enclosure ☐ Yes
 5. The owner was instructed by me on the operation of the following controls and options (check those that apply):
 - ☐ Keyed Switches on remote panel
 - ☐ Smoke Detector
 - ☐ Magnahelic Gauge
 - ☐ 120V GFI Outlet
 - ☐ Fan Bearing Grease Type & Lube Cycle
 - ☐ Discharge Head Deflection Blade Adjustment
 - ☐ 3-phase Power Monitor
 - ☐ CO Detector
 - ☐ Photohelic Gauge
 - ☐ Dirty Filter Light/Alarm
 - ☐ Filter Maintenance
 - ☐ Fill & Drain Valves Piped and Wired & Operational
- ☐ _____ ☐ _____

Comments

THE ABOVE START-UP WAS PERFORMED BY

Company Name: _____ Date: _____

Phone Number: (____) - _____ Fax Number: (____) - _____

My Name (Service Tech) _____

- MAKE A COPY FOR YOUR FILES AS NECESSARY

The Owner Representative that I met with and discussed the unit controls and operation was:

NAME: _____ TITLE: _____
(Please Print)

CUSTOMER'S AUTHORIZED SIGNATURE

I acknowledge that I have been instructed on the operation of this unit:

Signature _____ Date: _____ Phone No. _____

After Completion, Return this start-up sheet to:

AbsolutAire, Inc.
5496 North Riverview Drive
Kalamazoo, MI 49004

Phone: (800) 804-4000 Fax: (616) 382-5291
www.absolutaire.com

(stupevap) 10/99

ABSOLUTAIRE
MAINTENANCE GUIDELINES
EVAPORATIVE COOLING UNITS

5496 North Riverview Drive / Kalamazoo, MI 49004
Phone (616) 382-1875 / Facsimile (616) 382-5291

Your ABSOLUTAIRE product is engineered to provide trouble-free operation.
In order to assure proper performance the following maintenance schedule is recommended.

MOTOR:

Check the motor sheave set-screws and the motor slide base bolts for tightness upon initial start-up and before each heating season. The motor bearings are pre-lubricated at the factory for initial operation but should be re-lubricated (when provided with grease fittings) at six (6) month intervals. AbsolutAire recommends the use of Shell Oil Company's "Dolium R", Chevron Oil's "SRI No. 2", or Texaco "Premium RB" lubricant. Clean the grease fitting and then apply the grease with a proper grease gun. Use two full strokes for each bearing.

CAUTION: Do not over lubricate.
Keep grease clean.
Lubricate motors at standstill.
Do not mix petroleum grease with silicone grease.

BLOWER:

After initial start-up, check the tightness of the fan sheave, fan hub set screws, fan bearing collar set screws, and fan bearing mounting bolts. Also when re-tensioning the v-belts, when re-lubricating the fan bearings, and before each heating season.

"AA" Model Units: Most AA units with 18" and smaller blowers are provided with pre-lubricated sealed bearings which require no additional lubrication for the life of the bearing. "AA" units provided with pillow block bearings should be lubricated after the first one hundred (100) hours of operation, and re-lubricated at three (3) month intervals.

R300 Model Units: All R300 fan bearings should be lubricated after the first one hundred (100) hours of operation, and re-lubricated at monthly intervals thereafter.

AbsolutAire recommends the use of the following (or equivalent) lubricant:

MOBIL SHC460

Clean the grease fitting and then apply the grease with a proper grease gun. Inject enough grease until a small amount shows between the seal and the bearing race.

Examine the blower wheel at six (6) month intervals for accumulation of dust and dirt on the fan blades. Any build-up must be cleaned off to maintain performance. If the accumulation is heavy, more frequent cleaning may be required.

BELTS: Due to belt stretching, adjust belt tension after the first one hundred (100) hours of operation. Check belts every three months thereafter for proper tension. Do not over tighten. Adjustment should result in a belt deflection of 3/4" to 1" for each foot of span when applying medium thumb pressure inward at the center of the span.

FILTERS: Inspect monthly until an appropriate schedule can be established, based on need. Replace or clean as necessary.

AIR PRESSURE SWITCHES: An annual check of the tube for the air flow switch, and the entering and leaving side of building pressure switches, should be made to insure against blockage.

DAMPER AND MOTOR: Check linkage connection and/or set screws for tightness. Lubricate the damper bushings as required.

PAINTING: After unit installation, touch up any scratches caused by handling. Periodic touch-up painting should be done thereafter as needed.

GASKETS: Inspect door gasket seals annually. Replace those showing damage or deterioration.

ABSOLUTAIRE
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Your ABSOLUTAIRE Evaporative Cooler is engineered to provide trouble-free operation. In order to assure proper performance, certain maintenance schedules are recommended.

There are three water related problems associated with evaporative coolers: scale, micro biological infestation, and corrosion. All three of these issues must be addressed on a periodic basis to ensure efficient and trouble-free operation of your evaporative cooler.

Scale. The build-up of scale will foul the media, affect operating efficiency and reduce the service life of the media.

1. Clean and flush the distribution header every six months of operation.
2. Replace damaged or spent media.
3. Flush the media (with fan off) every 60 days of operation.
4. Bleed off (and replace) adequate tank water to minimize accumulation of algae, fungi, molds and yeasts in sump tank.
5. If necessary, chemical treatment of the water with crystal modifiers followed with a thorough flushing of the media with clean fresh water.

Micro biological Infestation can foul the media and affect operating efficiency. It can also produce objectionable odors downstream, reduce the service life of the media, and induce corrosion of system metal. An effective program to control algae, bacteria, fungi, molds and yeasts should be an essential part your evaporative cooler water treatment program. Individual locations will have different problems, so you may want to consult with a local water treatment supplier. But remember, biological control should not be used in place of good housekeeping.

1. *Oxidizing Biocides.* Chlorine or Bromine can be added to the sump water at the rate of 1.0 to 2.0 PPM to clean and flush the evap media, piping and sump. It is very important to use a correct dosage of algacide. Too much can burn the media or corrode the pumps and sumps.

Example: Commercially available laundry bleach (Clorox) is 5.25% active.

When treating a sump with 5.25% chlorine bleach, use the following formulas to find the proper dosage:

1.0 PPM Concentration: *Dose Size (oz.) = Sump Capacity in Gallons / 204.75*

2.0 PPM Concentration: *Dose Size (oz.) = Sump Capacity in Gallons / 409.5*

Thus, a 250 gallon tank to be treated to 2.0 PPM would require **1.22 oz.** of Chlorine Bleach
 $(250 / 204.75) = 1.22$

2. *Non-Oxidizing Biocides.* These are effective over a wide PH range, are persistent, and control a broad range of organisms. (Available from a water treatment supplier).

Housekeeping. All too often, a major influence on microbial growth and resulting odors is the lack of an effective, consistent housekeeping program.

Every 90 Days: The sumps and surrounding areas should be drained, cleaned, and flushed thoroughly.

Annually: The entire cooling water loop should be cleaned, flushed and disinfected.

Ongoing: Maintain conventional slime and algae control through effective water treatment practices.

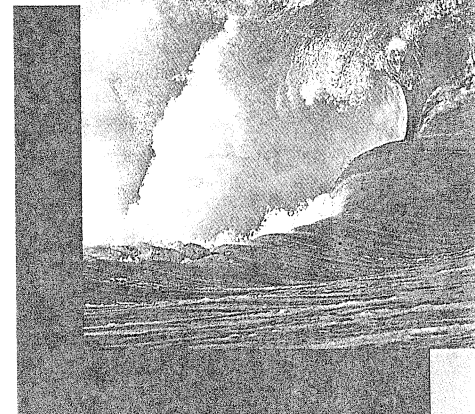
Corrosion will reduce the service life of the framing, sumps, piping and support systems. Again, good housekeeping will help to minimize the effects of most corrosion. Badly corroded metal parts should be replaced and/or repaired to ensure longevity of the overall system.

Important Notice:

The Munters CelDek® or GlasDek® evaporative cooling media installed in your AbsolutAire evap cooler is highly efficient and industry proven to be the best available. To ensure continued excellent cooling transfer rates, examine it annually and keep it clean.

Consider replacing the media every five years of operation.

EVAPORATIVE COOLING



In the past three decades, engineers, architects and industrial hygienists have made great strides in learning the relationships between temperature, humidity, comfort, health and productivity. Process and chemical engineers have also learned of the benefits of temperature and humidity for improvement to industrial processes.

Evaporative cooling has gained rapid acceptance today because the process relies solely on water evaporation with extremely low energy consumption – relying on nature's own process without any mechanical means – to produce a significant amount of cooling.

COOLING AND HUMIDIFYING THROUGH EVAPORATION

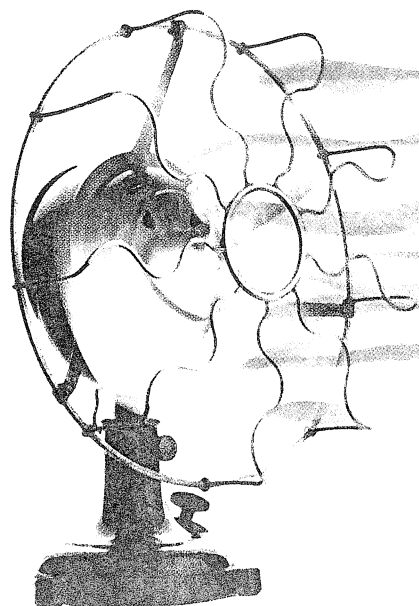
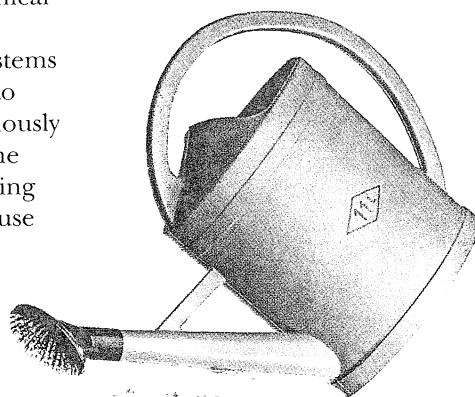
The interaction between air and water are fundamental to our existence. Realizing the importance of this, the engineers and scientists at Munters have studied these principals for more than 30 years. Using nature's old but efficient way of humidifying and cooling air – evaporation of water – they have optimized the most effective ways to achieve ideal indoor climates. By developing the most evaporative cooling in the smallest space with the least resistance to air flow, they have created the most energy efficient means of cooling and/or humidifying available: CELdek® and GLASdek® cross corrugated media.

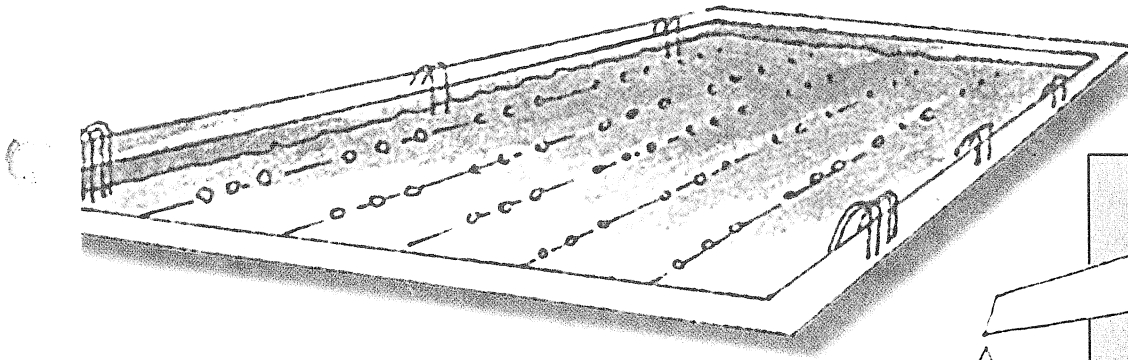
Today, with this very economical form of cooling, CELdek® and GLASdek® media equipped systems are providing climate control to spaces where cooling was previously considered impractical. In some instances, they are even replacing mechanical refrigeration because

they are more economical and use no environmentally sensitive refrigerants. The energy efficiency of a CELdek® or GLASdek® media equipped system can be seen when one examines two facts:

1. Operating costs are about one-tenth that of mechanical compressor refrigeration.
2. One quart of water produces the same cooling effects as about 15 lbs. of ice.

Munters CELdek® and GLASdek® media have the highest efficiency, lowest pressure drop and highest drift free velocity. It is the most compact media for evaporative cooling and humidification because Munters offers the only media designed and developed expressly for evaporative cooling/humidifying applications.





The media of an average sized evaporative cooler has the same wetted surface area as a 50m swimming pool.

HOW EVAPORATIVE COOLING WORKS

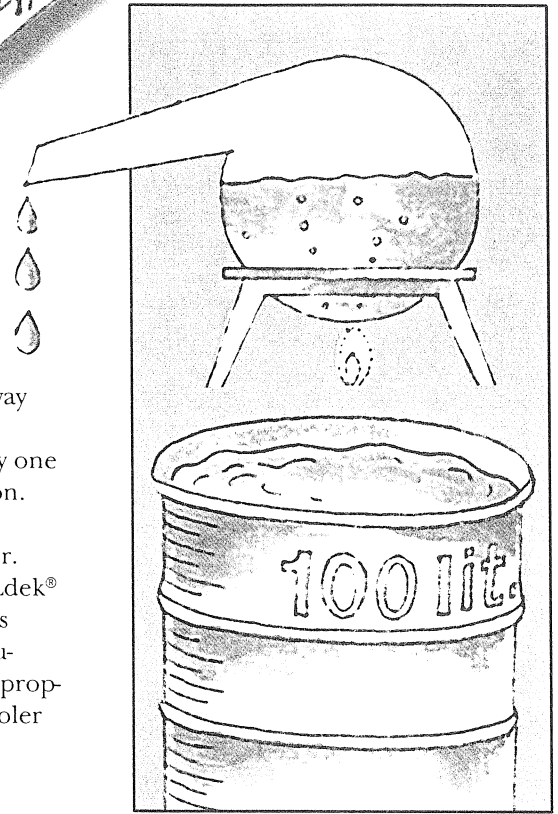
Water is supplied to the top of the media and allowed to trickle down. The water is soaked up and spread out by the highly absorbent surface and adhesive. Air is passed through the fluted openings where it mixes turbulently with the wetted surfaces. The evaporation of water into the air takes the "heat" from the inlet air as it both cools and humidifies the air.

The wave-formed surface of CELdek® and GLASdek® media has a unique structure which ensures a very large contact area. The media of an average sized evaporative cooler, 6' x 10' (1.8m x 3m), capable of handling up to 30,000scfm (1800m³/hr), has the same wetted surface area as a 50m swimming pool.

CELdek® and GLASdek® are constructed of highly absorbent materials. Both the corrugated sheets and the adhesive which binds them allow the water to pass through the surface. The water is absorbed by the material to fully wet the evaporative surface. The additional water flowing over the media as "sheet flow" replaces that which is lost to evaporation. Excess water is directed to

the air entering side to wash away deposits. One cubic foot of GLASdek® holds approximately one gallon of water during operation. One cubic meter of CELdek® absorbs about 100 liters of water.

The distilling process of CELdek® and GLASdek® media produces pure water vapor – free of pollutants, minerals and bacteria. A properly maintained evaporative cooler will "act" as an air cleaner and purifier.



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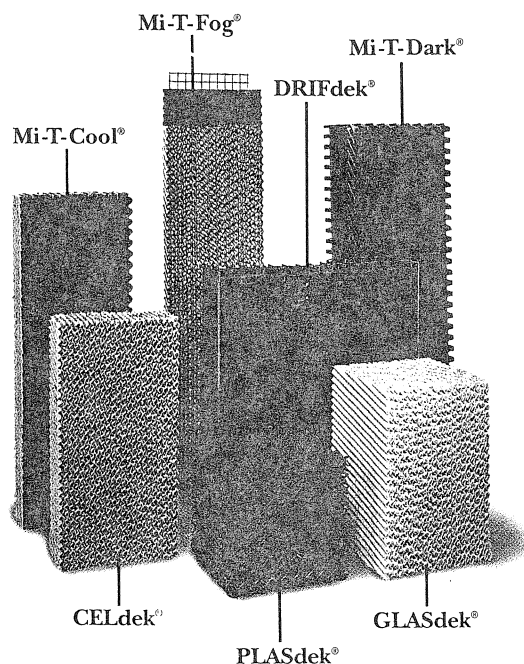
THE BENEFITS

CELdek® and GLASdek® equipped systems have many advantages over other types of evaporative coolers:

- Simple, compact units require little space and have low initial cost.
- Minimal required maintenance results in low operating costs.
- Because of consistent and predictable performance throughout the life span of the media, the cooling efficiency is normally "maintained" within $\pm 2\%$ during its useful life.
- The media "acts" as a self-cleaning air filter and gas scrubber.
- At 500fpm (2.5m/s) velocity, a 12" deep x 12" wide x 72" high (30cm x 30cm x 183cm) CELdek® pad requires only 200 watts of power to overcome an air friction loss of 0.25" WG (62Pa) and to pump 1.5gpm (0.1 l/s) of water at a head pressure of 30 ft (10m).

THE EVAPORATIVE COOLING PRODUCTS

Munters makes seven evaporative cooling products, each designed for maximum performance and long service life. Unique design characteristics assure even airflows and higher cooling efficiency, while preventing problems such as clogging and biological degradation.



CELdek® CELLULOSE EVAPORATIVE COOLING MEDIA

With its unique structure, CELdek® media was developed especially for direct evaporative cooling and humidification. It is manufactured from special cellulose material which is impregnated and treated with anti-rot salts to resist biological degradation and give high absorbency. This combination of materials produces a rigid, self-supporting product that has proven to be strong, resistant to deterioration and reliable over many years of service. It is used in applications all over the world where low maintenance and high efficiency are essential.

GLASdek® UL® FIRE RATED FIBERGLASS EVAPORATIVE COOLING MEDIA

GLASdek® media is manufactured from a wettable, water resistant fiberglass. It was developed for applications requiring UL 900 Class II fire rating or compliance with NFPA codes. It is commonly used for humidification after gas fired furnaces, as pre-coolers of large natural gas compressor stations and for air conditioning in schools.

DRIFdek® DRIFT ELIMINATORS

Used with CELdek® and GLASdek® to remove entrained water droplets from the cooled air.

PLASdek® PVC HEAT EXCHANGE MEDIA

Used when high quantities of water must be circulated over the media, such as water or cooling tower applications.

Mi-T-Cool® EVAPORATIVE COOLING MEDIA

High velocity, low pressure drop cooling pads developed for poultry confinement buildings. Mi-T-Cool® features Mi-T-edg® algae resistant edge coating. US Patent numbers 5,143,658 and 5,248,454.

Mi-T-Fog® FOGGING PADS

Low cost and ease of installation are features of this pad developed for the poultry industry. It is installed without frames or gutters. Water is introduced to the pad with fogging nozzles. Patent pending.

Mi-T-Dark® PVC LIGHT TRAPS

Used for air inlets into darkout pullet housing, Mi-T-Dark® has the highest light reduction with the lowest resistance to airflow available.

CELdek®, GLASdek®, PLASdek®, DRIFdek®, Mi-T-Cool®, Mi-T-Fog®, Mi-T-Dark® and Mi-T-edg® are registered trademarks of Munters Corporation. UL® is a registered trademark of Underwriters Laboratories, Inc.

THE DATA AND SUGGESTIONS CONTAINED HEREIN ARE BASED ON INFORMATION MUNTERS BELIEVES TO BE RELIABLE. THEY ARE OFFERED IN GOOD FAITH, BUT WITHOUT GUARANTEE, AS CONDITIONS AND METHODS OF USE ARE BEYOND OUR CONTROL. WE RECOMMEND THAT THE PROSPECTIVE USER DETERMINE THE SUITABILITY OF OUR MEDIA AND SUGGESTIONS BEFORE ADOPTING THEM ON A COMMERCIAL SCALE.

Evaporative Cooling Division – Munters Corporation

P.O. Box 6428
Fort Myers, FL 33911
TEL: (813) 936-1555 or (800) 446-6868
FAX: (813) 936-2657

Member of the Incentive Group



AN EFFICIENT TECHNOLOGY IN DIVERSE APPLICATIONS

Pre-Coolers

The capacity of an air-cooled condenser drops as the outdoor temperature rises and the demand on the condenser is the greatest. An evaporative pre-cooler equipped with CELdek® or GLASdek® will lower the temperature of the supply air the most when the air is the hottest. The pre-cooled condenser can operate at restored capacity when it is needed the most.

Greenhouses

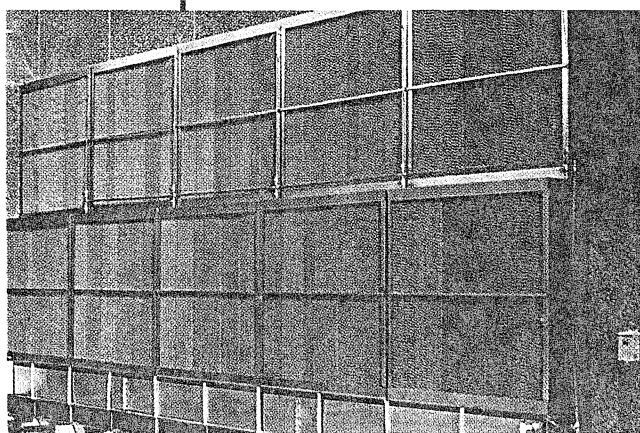
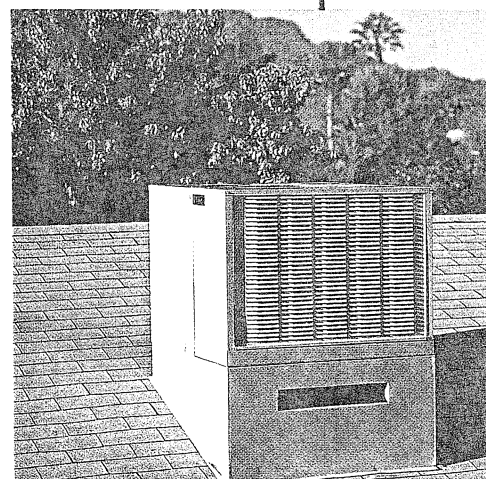
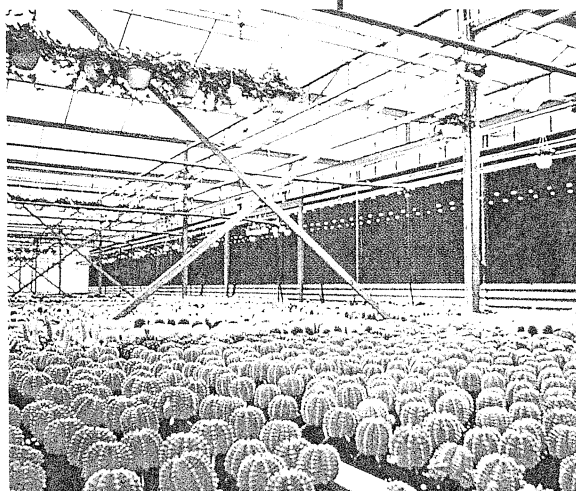
Continuous year round cultivation of plants requires full control of the greenhouse climate. Due to the transpiration of the plants and the tremendous heat load from the sun, the ventilation rate in a greenhouse is usually in the order of one air change per minute. Fresh air entering the house is cooled and humidified with 4" to 6" (10cm to 15cm) depth of CELdek® media. Greenhouse operations from Yuma, Arizona to St. Petersburg, Florida; and from Calgary, Alberta, Canada to Mexico City, Mexico depend on CELdek® media for temperature control.

Industrial Humidification

Many industrial processes require exact and consistent humidity control. Automobile spray booths are often maintained at 75°F (23.9°C) and 70% RH \pm 5%. This finite control is accomplished by pre-heating the air with gas-fired furnaces and subsequently cooling and humidifying using staged banks of CELdek® and GLASdek® media. Even when the outdoor temperature drops down to -10°F (-23°C), 12" of media will provide sufficient humidity.

Residential Cooling

In climates where outdoor temperatures above 100°F (38°C) are common, it is not always practical to cool with mechanical air conditioners. Roof mounted "swamp coolers" are part of the skyline in the Rocky Mountain states, as well as the desert southwest area of the United States. Munters media last up to 10 times as long as conventional pads with little change in performance. Since CELdek® or GLASdek® pads operate at much higher velocities, it is more common to see these coolers with smaller, more compact inlets.



Gas Compressor Stations

When natural gas is pumped through pipe lines over long distances, it is compressed at substations along the way. The heat of compression must be removed from the gas before it leaves the station. In the southwestern United States, air-cooled heat exchangers will not sufficiently cool the gas. To overcome the "problem," operators have installed GLASdek® pads to pre-cool the air prior to passing over the heat exchangers. The cool air, in turn, cools the gas as well as the water used in the cooling jackets for the compressors.

Commercial Applications

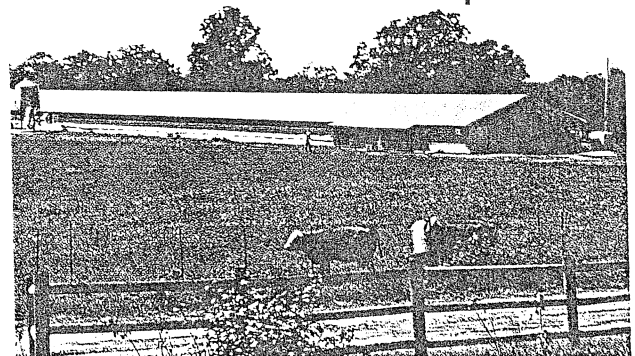
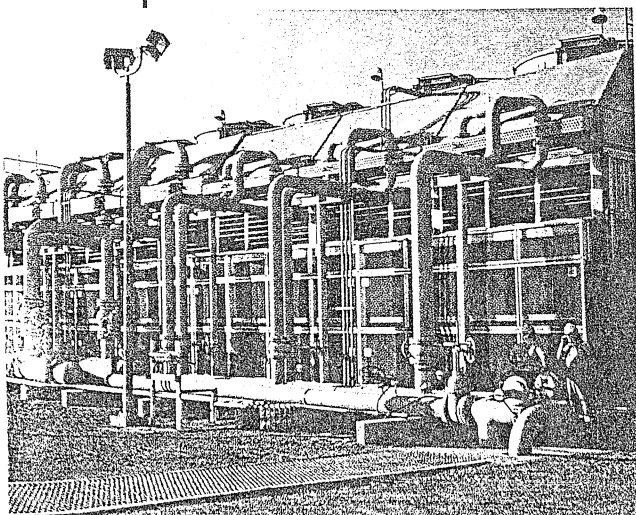
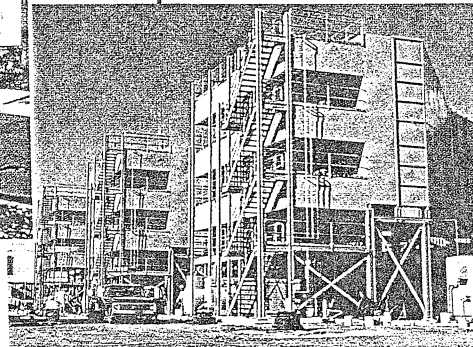
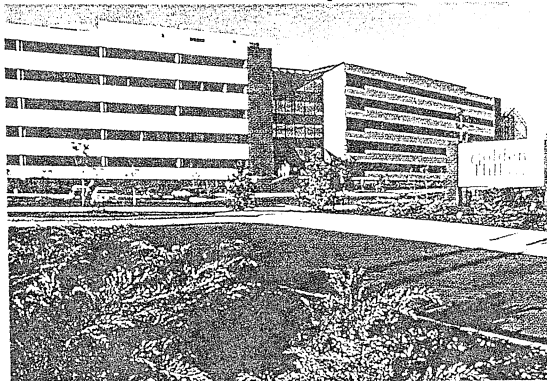
Winter humidification and summer cooling are achieved using CELdek® or GLASdek® media in many large office buildings, dormitories and shopping malls. When heating cold outdoor air in the winter time, it is necessary to add some moisture to the air to improve health and human comfort. In some applications, such as the Golden Hill Office Centre, located at 12600 West Colfax Avenue, Lakewood, CO, the media was used for both winter humidification and summer cooling.

Gas Turbines

The power output and fuel consumption of a gas turbine generator is highly dependent upon mass flow and quality of the air drawn into the combustion chamber. CELdek® media installed in the turbine inlet section will significantly cool and densify the air when the supply air is the hottest and power demands are the greatest. Increase in output of up to 24% has been documented – even in humid climates. This is one of the few applications where DRIFdek™ drift eliminators are used after the media to avoid entrainment of any fugitive water droplets.

Livestock Confinement

Producing and marketing poultry, eggs, pork and dairy items has become extremely competitive in terms of quality and cost (mostly measured in terms of feed conversion). Each segment of the industry has different requirements. Munters manufactures a high efficiency CELdek® media to cool poultry (egg layers, breeders, broilers, pullets, etc.), sows and dairy cows. Meat producing poultry require only enough cooling to avoid heat stress on the hottest days – but not enough to become too dependent on the cooled air.





Munters®
Evaporative Cooling Division

Engineering Bulletin
EB-904-EPC

DETERMINATION OF WATER EVAPORATED BY CELdek® OR GLASdek® USING THE PSYCHOMETRIC CHART

1. Find the starting point by plotting the intersection of the Entering Dry Bulb Temperature (EDBT) and the Wet Bulb Temperature (WBT).
2. Determine the Humidity Ratio (W1) by following the horizontal line all of the way to the right.*
3. The Leaving Dry Bulb Temperature (LDBT) is calculated using the formulation:

$$\text{LDBT} = \text{EDBT} - \text{Efficiency} \times (\text{EDBT} - \text{WBT})$$

(for practical purposes it is assumed the Wet Bulb Temperature does not change when passing through an evaporative cooler).

4. Find the leaving conditions on the psychometric chart using the Leaving Dry Bulb Temperature and the Wet Bulb Temperature. Follow the horizontal line across to find the leaving Humidity Ratio (W2).*
5. Read from the chart, the specific volume (v) of the air in cubic feet per pound of dry air. Use (v) of the **entering** air if you know the cubic feet per minute (CFM) entering the pad and use (v) of the **leaving** air if you know the CFM leaving the pad.
6. Now substitute these values into the formula:

$$\frac{\text{gallons evaporated}}{\text{hour}} = \frac{(\text{W2} - \text{W1}) \times \text{CFM} \times 60 \text{ minute/hr}}{8.33(\text{lbs./gal.}) \times v}$$

* (W) should be expressed in pounds of moisture per pound of dry air. If it is expressed in grains of moisture per pound of dry air, divide by 7,000 to convert the grains to pounds.

If this calculation seems a little drawn out, or you are in a hurry, here is a quick way to estimate the evaporation: Be sure to express the temperature in degrees fahrenheit.

$$\frac{\text{gallons evaporated}}{\text{hour}} = 1.2 \times \frac{\text{CFM} (\text{EDBT} - \text{LDBT})}{10,000}$$

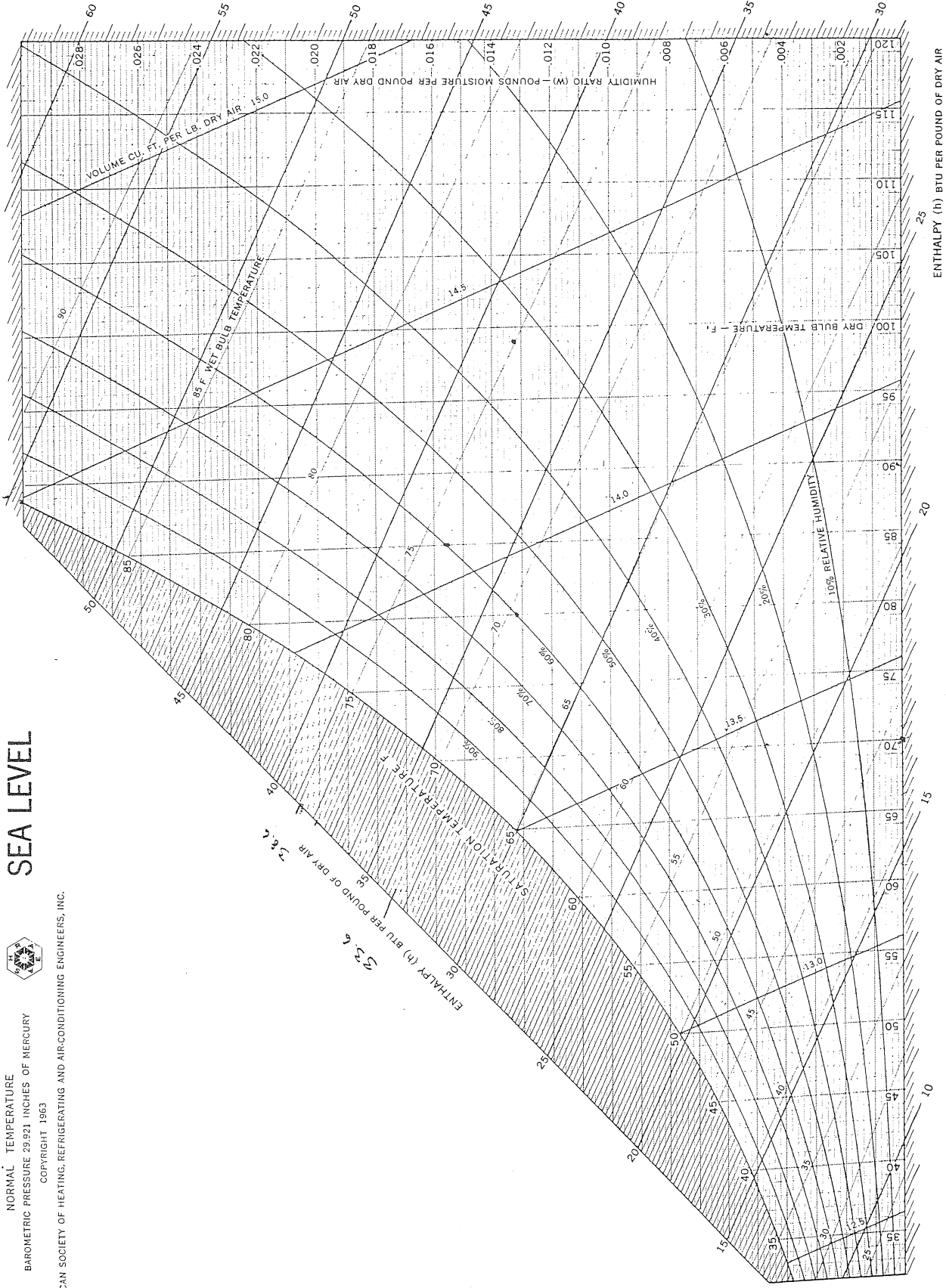
ASHRAE PSYCHROMETRIC CHART NO. 1



NORMAL TEMPERATURE
BAROMETRIC PRESSURE 29.921 INCHES OF MERCURY
COPYRIGHT 1963

AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR-CONDITIONING ENGINEERS, INC.

SEA LEVEL



MUNTERS HumiCool™

Evaporative Cooling Pads

HumiCool™ ...is a broad name used to describe CELdek® and GLASdek® evaporative cooling pads. CELdek® is made from a special high cellulose paper, which is impregnated to resist degradation. GLASdek® is made from glass matt and rigidifying agents. GLASdek® is fire rated with UL 900, Class II for depths up to 12".

Munters® unique crossfluted design of the pads induces highly turbulent mixing of air and water for optimum heat and moisture transfer. Munters® further enhances this design using unequal angles in the slope of the corrugations. The 45° and 15° corrugations are offset to continually direct the water to the air entry side of the pad.

This results in:

■ **1. High cooling efficiency** -- up to 90% in the 400-500 FPM velocity range for a 12" depth of CELdek®...slightly higher in GLASdek®. Since the most intense evaporation is within the first few inches of the pad, it is important that the water be concentrated here.

■ **2. Much higher face velocity** -- The natural tendency is for the air to push to water out of the pad. Because of the unequal angle the maximum air velocity without water carryover is approximately 700 FPM. Most engineers design systems for an average velocity of 550 FPM or less to allow for variance in air distribution.

■ **3. Self-cleaning design** -- Munters® CELdek® and GLASdek® resist clogging due to atmospheric dust or sand. When the recirculating water is turned on, especially without air flow, the water flushes the surface with more flushing at the entering side where debris normally accumulates. This also serves to reduce mineral build-up.

Sizes Available

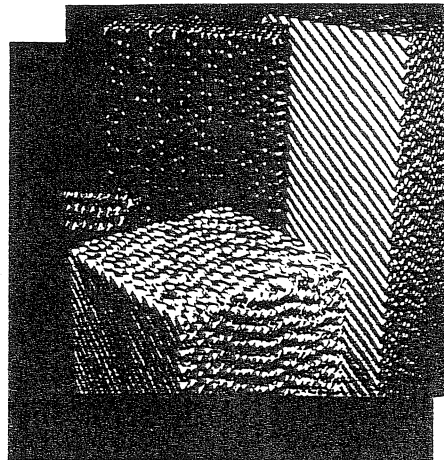
CELdek® and GLASdek® evaporative cooling pads are installed side-by-side with no intermittent joints or framing. Maximum size is: 24" D X 12" W X 72" H. The pads can be cut down to 4", 6", 8", 12", or 18" in depth and to any height in multiples of 12" up to 72". For taller pad walls, the media can be stacked to a height of 12', using intermediate supports along the horizontal joints.

Water Distribution

Water flow is based on the depth of the pad. Both CELdek® and GLASdek require 1.5 gallons per minute per square foot of horizontal surface area. For installations having intense evaporation and pads taller than 72 inches, an additional 10-20% of water may be required.

Distribution over the length of the pad wall is made by jetting the water up through the small holes (1/8" to 5/32" diameter) spaced every 3"-4" along a pipe. This allows the water to impinge on the larger cover pipe and run down its side in a fine curtain. To avoid plugging, the holes should be located along the top of the pipe. The use of flush valves at the ends of the distribution pipes assures easy cleaning.

Sumps should be designed to hold a quantity of water equivalent to 10% of the volume of the pad. When designing and operating the system it is important that the bottom of the pad remain above the water level in the sump.



Distribution Pads

Distribution pads supplied in 2" or 3" sections of crossfluted pads with special edge reinforcement, are made to disperse the water laterally across the top of the pad.

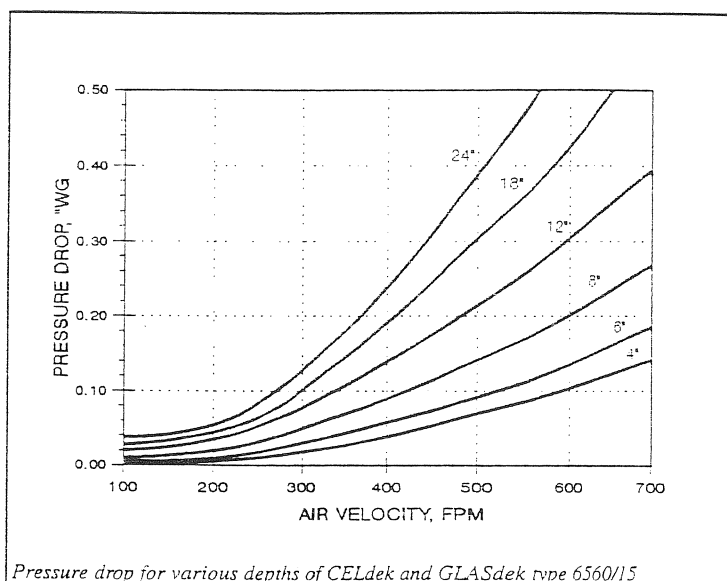
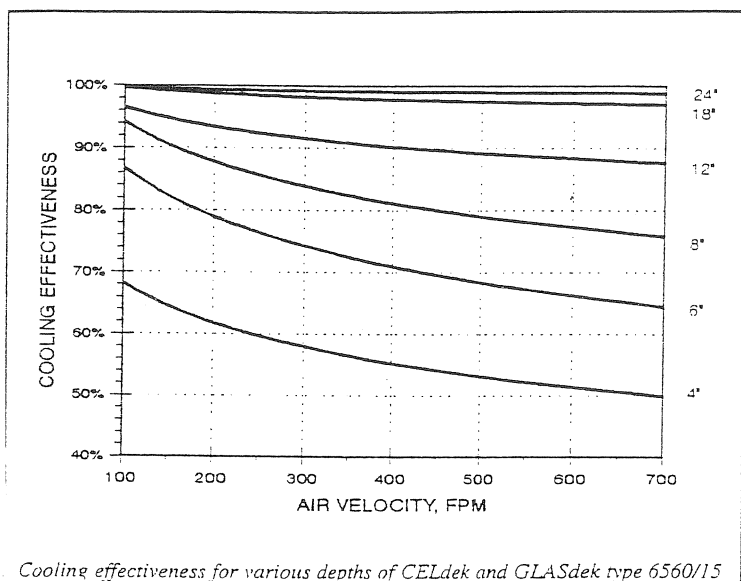
For more details about installation, request bulletin EB-IDI-411.

Scale Control

Scale formation looks like frost and normally shows up on the air entry side of the pad. To prevent scale formation, a bleed-off equal to 10-50% of the amount of water evaporated may be required. The exact amount will depend on the pH and hardness of the water. Once the bleed-off rate is established, the scale can be controlled.

Algae Control

Although algae may grow on a HumiCool evaporative cooling pad, it will not cause deterioration or rot. But, if allowed to grow freely, it may eventually clog the passages and inhibit the flow of air. Algae buildup is controlled by implementing simple maintenance techniques. The program should be started early. For more information request bulletin EB-WTM-502



SPECIFICATIONS FOR CELdek® AND GLASdek® 6560/15

Condition	Celdek®	Glasdek®
Angles	45° and 15°	45° and 15°
Base Sheet	Cellulose	Glass matt
Maximum Intermittent Water Temperature	130°F	130°F
Maximum Intermittent Air Temperature	300°F	300°F
Maximum Continuous Air Temperature	150°F	150°F
Maximum Continuous Water Temperature	100°F	100°F
pH Range	6-9	6-9
Dry Weight	2.4 lb/ft³	1.4 lb/ft³
Wet Weight	5.6 lb/ft³	7.0 lb/ft³
Operating Weight	6.0 lb/ft³	9.0 lb/ft³
Water Load (gpm/sq.ft.)	1.5	1.5
Maximum Size D x W x H	24" x 12" x 72"	24" x 12" x 72"
Fire Rating, UL [®]	None	900 Class II
Flame Spread Index, E84-81a	450	5

CELdek, GLASdek, and Munters are registered trademarks and HumiCool is a trademark of Munters Corporation

THE DATA AND SUGGESTIONS CONTAINED HEREIN ARE BASED ON INFORMATION MUNTERS BELIEVES TO BE RELIABLE. THEY ARE OFFERED IN GOOD FAITH, BUT WITHOUT GUARANTEE. AS CONDITIONS AND METHODS OF USE ARE BEYOND OUR CONTROL, WE RECOMMEND THAT THE RESPECTIVE USER DETERMINE THE SUITABILITY OF OUR MEDIA AND SUGGESTIONS BEFORE ADOPTING THEM ON A COMMERCIAL SCALE.