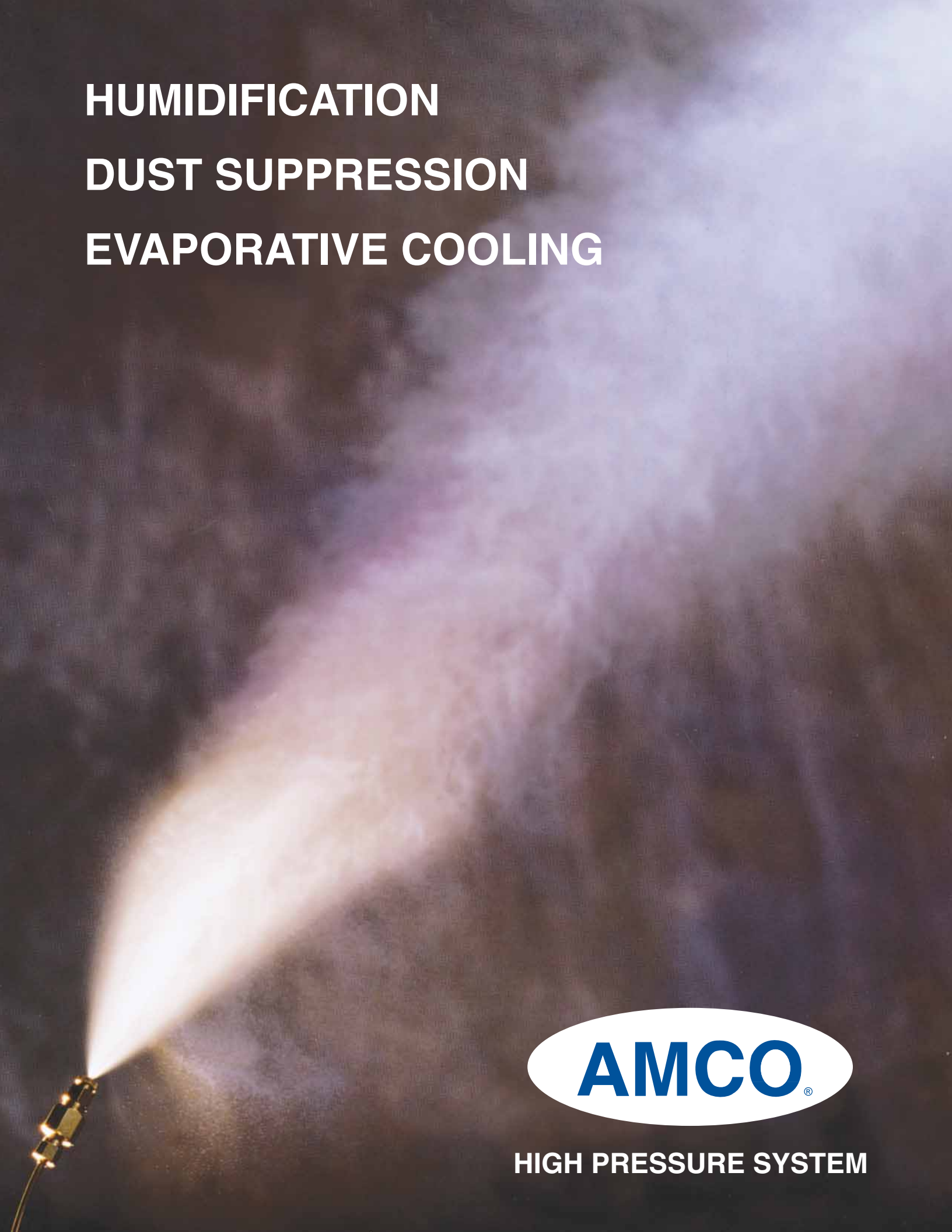


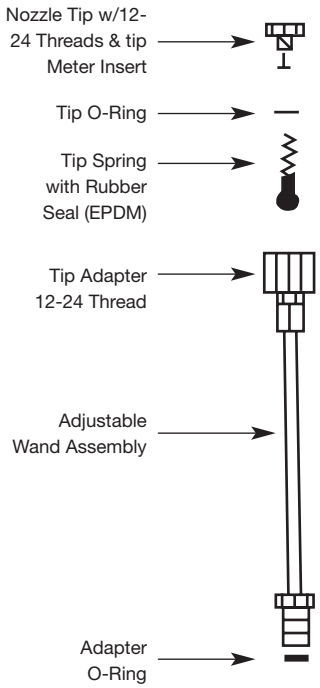
# HUMIDIFICATION
# DUST SUPPRESSION
# EVAPORATIVE COOLING

AMCO®

HIGH PRESSURE SYSTEM

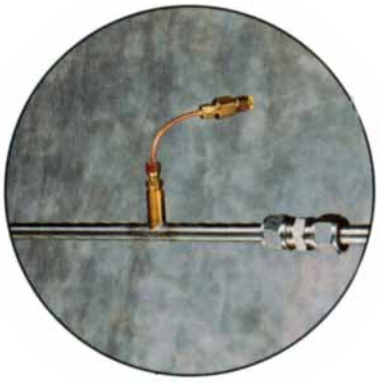
# Nozzle Selection

| NOZZLE TYPE (part #) | OUTPUT | | DROPLET SIZE |
|---|---|---|---|
| | LBS/HR | GPM | |
| IMPINGEMENT NOZZLE IMPACTION PIN | 16.0 | 0.032 | <50 um |
| SWIRL-JET | 7.0 | 0.014 | 25-45 um |
| SWIRL-JET | 10.0 | 0.020 | 30-55 um |
| PRESSURE DUCT | 6.0 | 0.012 | 3-10 um |




# Pump Selection

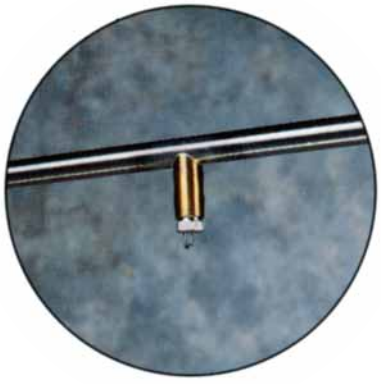
| MODEL # | FLOW | POWER | SPEED | NOZZLE QUANTITY | | |
|---|---|---|---|---|---|---|
| | GPM | HP | RPM | 7 LB. | 10 LB. | 16 LB. |
| HP-1-SF30 | 10 | 1.0 | 1250 | 71 | 49 | 31 |
| HP-2-B270 | 2.0 | 2.0 | 810 | 142 | 99 | 62 |
| HP-3.5-B270 | 3.5 | 3.0 | 1420 | 749 | 174 | 109 |
| HP-4-B310 | 4.0 | 3.0 | 950 | 285 | 199 | 121 |
| HP-5-B310 | 5.0 | 5.0 | 1200 | 356 | 249 | 153 |
| HP-7-B1050 | 7.0 | 5.0 | 700 | 199 | 349 | 218 |
| HP-10.5-B1050 | 10.0 | 7.5 | 1000 | 749 | 524 | 327 |



**Welded Nipple Construction**

**Pump**


**Controller**



**Impingement Nozzle**


**Pressure Duct**

**Motorized Zone Valve**

Example: Find the moisture required to raise the humidity from 20% to 65% at 80°F in a room with dimensions L=200 ft., W=100 ft., and H=25 ft. and 2 air changes per hour.

Solution: (see Psychrometric Chart)

$$\text{lbs moisture / hour} = \frac{[\text{Vol air, ft}^3] \times [\text{grains moisture/lb dry air}]}{[7000 \text{ grains/lb water}] \times [\text{ft}^3/\text{lb dry air}]}$$

$$= \frac{[200 \times 100 \times 25] \times [2] \times [70]}{[7{,}000] \times [13.9]}$$

= 719.5 lbs of moisture/hour (or, 1.43 gpm)

Choose 72, 10 lb/hr nozzles.
Place 2, 180 ft. lines 50 ft. apart, with 36 nozzles each.
See Fig. 1.

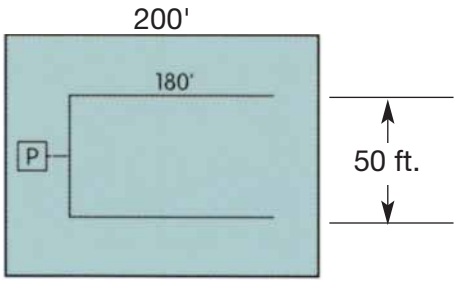
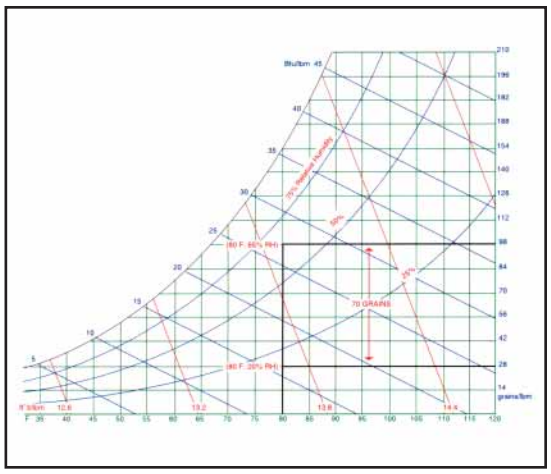


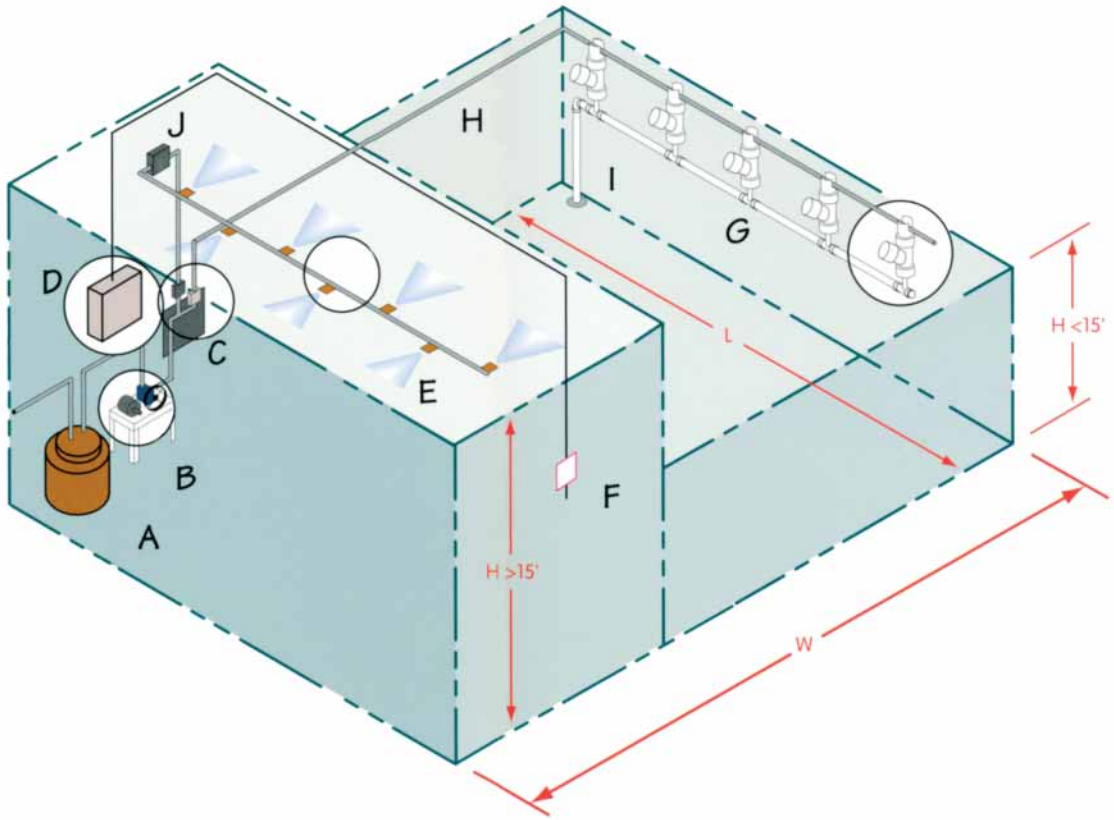

FIG. - 1

## Psychrometric Chart



## Legend

| | |
|---|---|
| A | WATER TREATMENT |
| B | PUMP |
| C | MANIFOLD |
| D | CONTROLLER PANEL |
| E | SWIRL-JET NOZZLES |
| F | HUMIDITY SENSOR |
| G | PRESSURE DUCT |
| H | COMPRESSION FITTINGS |
| I | DRAIN |
| J | PRESSURE RELIEF VALVE |



# RECOMMENDED RELATIVE HUMIDITY

## PRINTING AND PAPER INDUSTRIES

| MATERIAL | DESCRIP-TION | RELATIVE HUMIDITY % | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 |
| M.F. Newsprint | Wood Pulp - 24% ash | 2.1 | 3.2 | 4.0 | 4.7 | 5.3 | 6.1 | 7.2 | 8.3 | 10.8 |
| H.M.F. Writing | Wood Pulp - 3% ash | 3.0 | 4.2 | 5.2 | 6.2 | 7.2 | 7.3 | 9.9 | 11.9 | 14.2 |
| White Bond | Rag - 1% ash | 2.4 | 3.7 | 4.7 | 5.5 | 6.5 | 7.5 | 8.8 | 10.8 | 13.2 |
| Comm, ledger | 75% rag - 1% ash | 3.2 | 4.2 | 5.0 | 5.6 | 6.2 | 6.9 | 8.1 | 10.3 | 13.9 |
| Kraft Wrapping | Coniferous | 3.2 | 4.6 | 5.7 | 6.6 | 7.6 | 8.9 | 10.5 | 12.6 | 14.9 |

**Moisture Content Expressed in % of Dry Weight of Paper (75˚F)**
**The recommended EMC for paper is 5-7%**

## WOOD AND WOOD PRODUCTS

| MOISTURE CONTENT FOR: | MOST AREAS OF UNITED STATES | | DRY SOUTHWESTERN AREA | | DAMP, WARM COASTAL AREAS | |
|---|---|---|---|---|---|---|
| USE OF WOOD | AVERAGE EMC | R.H. | AVERAGE EMC | R.H. | AVERAGE EMC | R.H. |
| **Interior:** Woodwork, flooring, furniture, wood trim | 6.5% | 35% | 6% | 25% | 11% | 45% |
| Laminated timbers, cold-press plywood | 7% | 40% | | 30% | | 55% |

## TEXTILE, APPAREL, HOSIERY & KNITTING INDUSTRIES

| DEPARTMENT | COTTON % | MAN-MADE FIBERS % | DEPARTMENT | WOOL % |
|---|---|---|---|---|
| Opening & Picking | 55-70 | 50-55 | Raw Wool Storage | 50-55 |
| Carding and Spinning | 50-55 | 50-60 | Mixing & Blending | 65-70 |
| Silver and Ribbon Lapping | 55-60 | 55-65 | Carding-Worsted, Woolen | 60-70 |
| Combing, Winding & Spooling | 55-65 | 55-65 | Combing-Worsted | 65-75 |
| Drawing, Roving | 50-60 | 50-60 | Drawing-Worsted | |
| Winding & Spooling | 55-65 | 60-65 | Spinning-Bradford Worsted | 50-55 |
| Twisting, Knitting | 60-65 | 50-65 | French (Mule) | 75-85 |
| Warping | 55-70 | 60-65 | Woolen(Mule) | 65-75 |
| Weaving | 70-85 | 60-70 | Warping - Worsted | 50-55 |

# HUMIDIFICATION BENEFITS

### BENEFITS TO THE WOODWORKING INDUSTRY

EQUILIBRIUM MOISTURE CONTENT (EMC)
The practical objective of all wood seasoning, handling and storing methods should be to minimize moisture content changes in wood during service. The EMC is a moisture content at which the wood is neither gaining nor losing moisture. An EMC between 5% and 8% is recommended. This is the percentage of moisture of its bone-dry weight. Wood is dimensionally stable when the moisture content is above the fiber saturation point. Wood dimensions change as it loses or gains moisture below that point. Since wood shrinks when losing moisture and swells when gaining moisture, this shrinking and swelling may result in warping, checking, splitting, or performance problems. The shrinkage of wood is affected by a number of variables. In general, the greater the density of the wood, the greater the shrinkage.

ADVANTAGES:

- Maintains proper EMC, therefore eliminating stress and dimensional change which causes cracks, checking, warping, splitting, cupping, bowing, twisting and telegraphing. The defects from these stresses are usually irreparable.
- Machine quality is improved and tool life is increased by decreasing blow-out and constantly maintaining machining reference points.
- Dowel and tenon alignment and fit remain constant and breakout is eliminated.
- Dust fires and static explosions are almost eliminated.
- Airborne dust is decreased by as much as 60%.
- Evaporative cooling is provided.

### BENEFITS TO THE PRINTING AND PAPER INDUSTRIES

Paper receives and loses moisture readily as the surrounding humidity changes. A moisture content of 5% to 7% provides suitable strength and workability. To achieve this moisture content, a RH of 40% or 50% must be maintained.

- Eliminates static electricity and decreases or eliminates curl and warping.
- Increases flexibility and dimensional stability through EMC.
- Increases productivity with higher speeds and decreases rejects.
- Improves sheet separation.
- Allows better ink transfer and enhances ink and glue chemistry balance.
- Aids in dust suppression and produces evaporative cooling.
- Improves conditions of workplace and reduces hear load through evaporative cooling.

### BENEFITS TO THE TEXTILE INDUSTRY

It is necessary to properly maintain both temperature and humidity control to produce high quality textiles with minimum down time and rejects. Humidity has the following effects on textiles:

- Increases tensile strength of natural fibers and reduces waste.
- Improves product quality and increases production.
- Reduces static electricity and personal shock is eliminated.
- Yarn is more controllable and fiber discharge and fly settle time is shortened.
- Meets knitting machine manufacturers recommended 55% RH levels for best operations.
- Helps control cotton fly and lint and reduces yarn separation.

AMCO

**AMERICAN MOISTENING COMPANY**
**OF PINEVILLE, NC**
10402 Rodney Street • Pineville, NC USA 28134 • Tel.: 704-889-7281 • Fax: 704-889-7270
**Visit us at www.amco.com**