

plications, they might be used if the air must be provided in the immediate vicinity of equipment in the center of an open space. Modifications to elevate the grille face above the floor and provisions for cleanout are desirable.

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PRINTING PLANT AIR CONDITIONING

Paper Characteristics, Multicolor Offset Lithography, Air Conditioning the Multicolor Offset Lithography Plant, Collotype Printing, Sheet-Fed Relief Printing, Sheet-Fed Gravure, Platemaking, Web Printing, Air Conditioning the Web Press Room, Control of Paper, Air-Conditioning Systems

THIS chapter will outline the air-conditioning requirements of the various printing operations and discuss the application of equipment to obtain the desired results. The problems in the various printing processes and the behavior of paper and other materials due to variable moisture content will be discussed to provide a better understanding of how the air conditioning system will reduce production problems, help maintain uniform production throughout the year, and in certain operations improve quality.

Air conditioning of printing plants is a means of solving some of their most troublesome problems by providing uniform moisture content and temperature of the air in the working spaces. Paper, the principal raw material used in printing, is hygroscopic and very sensitive to variations in the humidity of the surrounding air, as are some of the other materials and operations. The problems due to the expansion and contraction of paper in the printing process are satisfactorily solved by controlling the moisture content of the paper from the time it leaves the mill until the printing is complete. This requires control of the temperature and moisture content of the air in the plant. The temperature and humidity requirements are not the same for all types of printing and printing operations, and certain printing processes require more exacting control of the moisture content of the ambient air. For this reason, careful consideration of the problems existing in the process is essential in calculating the needs of a specific plant.

Symptoms of varying air conditions in the printing plant include: (1) distorted, curled, or buckled paper; (2) static electricity; (3) wrinkling of sheets or web in printing; (4) misregister of color prints; (5) failure of ink to dry; and (6) swelling or shrinking of composition rollers. Other indications of changing humidity conditions are changes in the light sensitivity of the coatings used in preparing the printing surfaces in photolithography, gravure, and photoengraving. The difficulties result from reactions of paper and the other hygroscopic materials when their moisture content is not in equilibrium with the ambient air.

The value of controlling the temperature and humidity of the air to correct the preceding problems is not the same for all printing operations. The control of relative humidity is of prime importance where the problem is one of maintaining constant moisture content in the paper during the entire printing operation. Installations have been made with only humidity control and no provision for cooling. This approach is not recommended because the dry-bulb temperature is far

above the comfort zone due to the high motor load in the press room. Also, the variation in dry-bulb temperature is beyond the limits required for constant control of the process. For best results the air-conditioning system should provide separate control of the relative humidity and temperature of the air in the conditioned space during the entire year. This also includes filtering the air, providing ventilation air, and exhausting the air from certain areas.

PAPER CHARACTERISTICS

The moisture content of paper is controlled by the relative humidity of the surrounding air. Fig. 1 indicates how the history of the hygroscopic state of lithographic paper determines its equilibrium condition at different relative humidities.¹

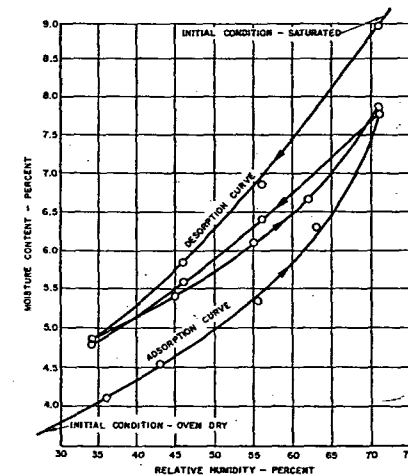


Fig. 1 Equilibrium Moisture Content of Papers at Various Relative Humidities