

which the goods would be in hygroscopic equilibrium after prolonged exposure. Committee D13 on Textiles of the *American Society for Testing Materials* has adopted a relative humidity of 64 to 66 per cent and a temperature of 70 to 80 F as the standard atmosphere for textile testing.

ATMOSPHERIC CONDITIONS REQUIRED

The most desirable relative humidity during processing depends upon the product and the nature of the process. As far as the behavior of the material itself and its desired final condition are concerned, each material and process represents a different problem. The best relative humidity may range up to 100 per cent. Similarly the most desirable temperature may range between wide limits for different materials and treatments. Extremes in either relative humidity or temperature require relatively expensive equipment for maintaining these conditions and controlling them automatically. Also, in departments where people are working, their health, comfort and productive efficiency must be considered. A compromise often is desirable.

It is generally considered that relative humidities below 40 per cent are on the dry side, conducive to low regains, a brittle condition of fibrous materials, prevalence of static electricity and a tendency toward dryness of the skin and membranes of human beings. At the other end of the scale, humidities above 80 per cent are relatively damp, conducive to high regains, extreme softness and pliability.

Table 2 lists desirable temperatures and humidities for industrial processing. In using this table, care must be taken in qualifying the process. In preparing many materials, conditions are not maintained constantly, but different temperatures and humidities are held for varying lengths of time.

AIR CONDITIONING OF LIBRARIES¹

Temperature has little effect on the preservation of books. A temperature over 100 F, combined with low relative humidity, may cause the book materials to become brittle, while a temperature much below freezing may cause permanent deterioration of the glue in the binding. The relative humidity should be maintained between 40 and 70 per cent, although these limits need not hold for short periods of time. If the relative humidity gets much below 40 per cent, first the glue and then the paper will tend to become brittle which will not cause any permanent damage unless the book is used while in this condition, as a subsequent increase in humidity will bring the materials back to their normal condition. If the relative humidity gets above 80 per cent, the growth of mildew may be expected.

One of the principal agents of destruction and deterioration of paper and books in libraries is sulphur dioxide gas in the air. If air containing sulphur dioxide is allowed to come in contact with cellulose, the principal constituent of paper, sulphuric acid is formed on the surface. This acid is not volatile at ordinary temperatures and therefore accumulates throughout the life of the paper. The destructive effect of the acid on the

¹See U. S. Bureau of Standards Bulletin No. 128 entitled, A Survey of Storage Conditions in Libraries, by Kimberly and Hicks.

TABLE 2. DESIRABLE TEMPERATURES AND HUMIDITIES FOR INDUSTRIAL PROCESSING

INDUSTRY	PROCESS	TEMPERATURE DEGREES FAHRENHEIT	RELATIVE HUMIDITY PER CENT
AUTOMOBILE.....	Assembly line.....	65	40
BAKING.....	Cake icing.....	70	50
	Cake mixing.....	75	65
	Dough fermentation room.....	80	76 to 80
	Loaf cooling.....	70	60 to 70
	Make-up room.....	75 to 80	55 to 70
	Mixing room.....	75 to 80	55 to 70
	Paraffin paper wrapping.....	80	55
	Proof boxes.....	80 to 90	80 to 95
BIOLOGICAL PRODUCTS.....	Storage of flour.....	70 to 80	60
	Storage of yeast.....	28 to 40	60 to 75
BREWING.....	Vaccines.....	below 32	
	Antitoxins.....	38 to 42	
	Fermentation in vat room.....	44 to 50	50
	Storage of grains.....	60	30 to 45
CERAMIC.....	Drying of auger machine brick.....	180 to 200	
	Drying of refractory shapes.....	110 to 150	50 to 60
	Molding room.....	80	60
	Storage of clay.....	60	35
CHEMICAL.....	General storage.....	60 to 80	35 to 50
CONFECTIONERY..	Chewing gum rolling.....	75	50
	Chewing gum wrapping.....	70	45
	Chocolate covering.....	62 to 65	50 to 55
	Hard candy making.....	70 to 80	30 to 50
	Packing.....	65	50
	Starch room.....	75 to 85	50
	Storage.....	60 to 68	50 to 65
DISTILLERY.....	General manufacture.....	60	45
	Storage of grains.....	60	30 to 45
DRUG.....	Storage of powders and tablets.....	70 to 80	30 to 35
ELECTRICAL.....	Insulation winding.....	104	5
	Manufacture of cotton covered wire.....	60 to 80	60 to 70
	Manufacture of electrical windings.....	60 to 80	35 to 50
	Storage of electrical goods.....	60 to 80	35 to 50
FOOD.....	Butter making.....	60	60
	Dairy chill room.....	40	60
	Preparation of cereals.....	60 to 70	38
	Preparation of macaroni.....	70 to 80	38
	Ripening of meats.....	40	80
	Slicing of bacon.....	60	45
	Storage of apples.....	31 to 34	75 to 85
	Storage of bananas (See discussion p. 53).....		
	Storage of citrus fruit.....	32	80
	Storage of eggs in shell.....	30	80
	Storage of meats.....	0 to 10	50
	Storage of sugar.....	80	35