Table 2. Drying Time and Conditions for Representative Materials

Kind and Thickness of Material	Temperature Deg. Fahr.	Drying Time
Bedding	150–190	
Cereals	110–150	
Cocoanut	145–155	4–6 Hours
Coffee	160–180	24 "
Cores, Oil Sand, for molding ½ in. – 1 in. thick	300	30 Minutes
Black sand with Goulac Binder about 6/10 of time for oil sand cores 3 in. "	480	2½ Hours
Black sand with Goulac Binder about 6/10 of time for oil sand cores 8 in. "	480	4½ "
Black sand with Goulac Binder about 6/10 of time for oil sand cores 16 in. "	700	10 "
Feathers	150–180	
Films, Photographic	90	
Fruits and Vegetables	140	2–6 "
Furs	110	
Glue	70–90	2–4 "
Glue Size on Furniture	130	4 "
Gut	150	
Gypsum Wall Board (Start Wet)	350	60 Minutes
Gypsum Wall Board (Finish)	190	
Gypsum Blocks	350–190	8–16 Hours
Hair Goods	150–190	1 Hour
Hats, Felt	140–180	
Hops	120–180	
Hides, Thin leather	90	2–4 Hours
Ink, Printing	70–300	
Knitted Fabrics	140–180	
Leather, Thick Sole	90	4–6 "
Lumber, Green Hardwood	100–180	3–180 Days
Lumber, Green Softwood	160–220	2–14 "
Macaroni	90–110	
Matches	140–180	
Milk and other Liquid Foods (Spray Dried)	250–300	Instantaneous
Molds, Green Sand; C. I. Flasks (one Surface only exposed)		
8 in. thick	600	6 Hours
13 in. "	700	13 "
Nuts	75–140	24 "
Paper, Glued	130–300	
Paper, Treated	140–200	
Rubber	80–90	6–12 "
Sand, loose, 1 in. deep	300	10–15 Minutes
Shade Cloth	240	1–2 Hours
Soap	125	12 "
Starch	180–200	1–4 "
Stock Feed, Mixed	180–220	20–30 Minutes
Sugar	150–200	20–30 "
Tannin and other chemicals (Spray Dried)	250–300	Instantaneous
Terra Cotta (air-drying in conditioning room)	150–220	12–96 Hours
Wall Board	200–250	12–24 "

labor and loss of time. Fire resistance of doors is also important, in case of outside exposure to fire risks. Insurance rates must be considered in their relation to fire protective arrangements such as automatic sprinklers, fire doors and walls, steam jets for use in smothering fires that may start inside the dryer, etc. Ceilings of dryers should be as flat as possible and the space between the material and the walls and ceiling should be held to a minimum. A factor often overlooked is suitable provision for ventilation of the space around the dryer openings so that warm moist air which may escape from the dryer when the doors are opened may be carried away before it has a chance to condense on the ceiling or windows of the building in which the dryer is located or into which it opens. Convenient arrangements for the operator should also be provided where tests can be made, records kept, and clothes changed, in case it is necessary for the operator to work inside the dryer.

SPECIAL PROBLEMS

Practically every problem in air processing and drying presents its individual considerations which affect the over-all efficiency of the final installation. The peculiarities of the material to be dried, the allowable temperature and humidities, the most efficient means of handling the material, the speed with which the process must be effected, and the mechanical or physical limitations imposed by the plant conditions themselves are all factors which must be carefully considered in the design of air processing and drying equipment.

The selection of the type and size of dryer, the method of heat supply, the method of moisture removal, the location and layout of the equipment with reference to handling the material to best advantage, are problems which may require a different solution for each installation. Engineers who specialize in the design of drying equipment have found it best to treat each case individually and develop a design and arrangement that will most nearly meet the specific requirements on the basis of research and experience.

Drying is an extraordinarily interesting problem in engineering, and thousands of the products that are in common use every day go through some sort of drying process during their manufacture. Wood when dried becomes a workable and dependable material, the leather used in shoes must submit to the drying operation, and the manner of its drying determines its value in the finished product. Clay when dried becomes ceramic ware, flour mixed with water when dried becomes macaroni, wood pulp dried becomes paper and gelatine dried and sensitized becomes photographic film. All textiles require the drying process at some time during their manufacture so that it is easy to see why the handling of each is a special problem.

REFERENCES

The American Society of Heating and Ventilating Engineers Transactions, Vol. 22, p. 479, Commercial Drying Apparatus, L. P. Dwyer; Vol. 23, p. 231, Artificial Drying with Special Reference to the Use of Gas, G. C. Shadwell; p. 255, Drying By Evaporation, F. R. Still; p. 265, Drying in Industrial Plants, J. G. Ross; pp. 339, 511, 529, 537, 545, Food Drying; Vol. 24, p. 7, High Temperature Drying, Burt S. Harrison;