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Yankee dryer steam condensing rates

Scope

This technical information paper defines the area basis for condensing rate calculations, references separator rise-time method for measuring condensing load, and provides condensing rate data from Yankee dryers producing tissue and towel paper grades. This data gives an indication of the expected range of condensing rates, effect of steam pressure on the rates, and expected scatter in the measured data.

Safety precautions

Yankee dryers typically operate with high steam pressure and temperature. Measurement of Yankee dryer steam condensing rates should be done with care. Follow procedures specified in TAPPI TIP 0404-18 “Measurement of Dryer Condensing Rates (Vertical Separator Method)” (1).

Content

Steam condensing rate data (107 points) were measured on numerous Yankee dryers and used in preparing this technical information paper. The measurements were made by industry personnel familiar with steam systems, each using procedures outlined in TAPPI TIP 0404-18.

Some dryers included in this survey had shells with plain (smooth) bores, some dryers had plain bores with dryer bars, and other dryers had shells with internal circumferential ribs. This sampling represents a wide range of dryer diameters and web widths:

	<u>Ribbed bore dryers</u>	<u>Plain bore dryers</u>
Number of dryers	86	21
Dryer diameters, m	3.0 – 5.5	3.0 – 4.9
Web widths, mm	2390 – 6730	1880 – 4650

For each set of measurements, records were made of the dryer diameter, web width on the dryer, shell type, internal steam pressure, and steam condensing load.

From this data, the condensing rate was calculated using the following equation:

$$R_c = W_c / (\pi D L)$$

where:

R_c	=	Dryer steam condensing rate, kg/hr m ² (lb/hr ft ²)
W_c	=	Dryer steam condensing load, kg/hr (lb/hr)
D	=	Dryer outside diameter, m (ft)
L	=	Web width on the dryer, m (ft)
π	=	3.1416

Data is shown on two separate graphs in Fig. 1-2. The first shows the data in English customary units. The second shows the data in SI units.

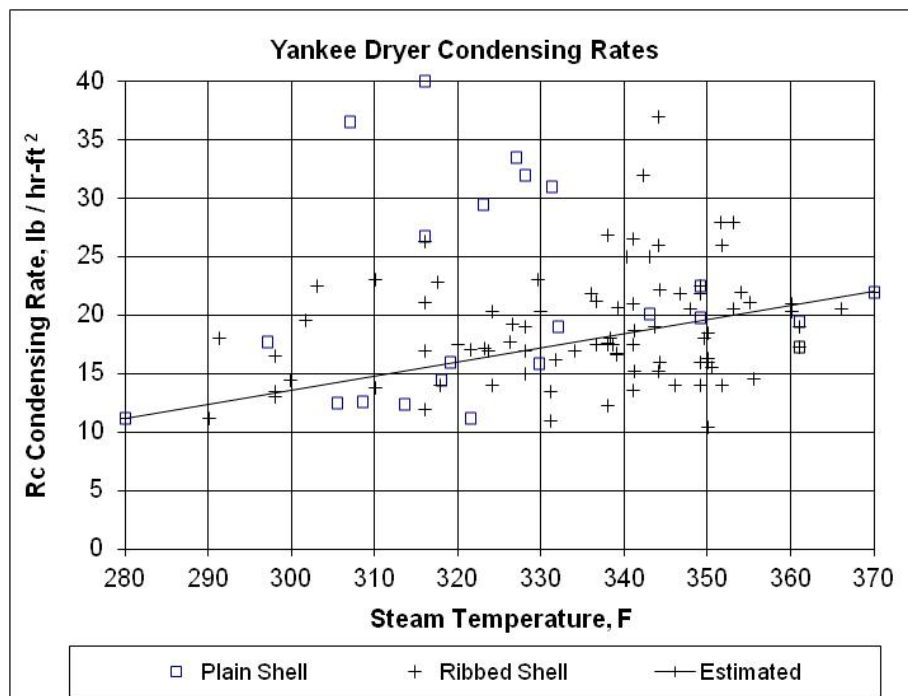


Fig. 1. Yankee dryer condensing rates – English Units

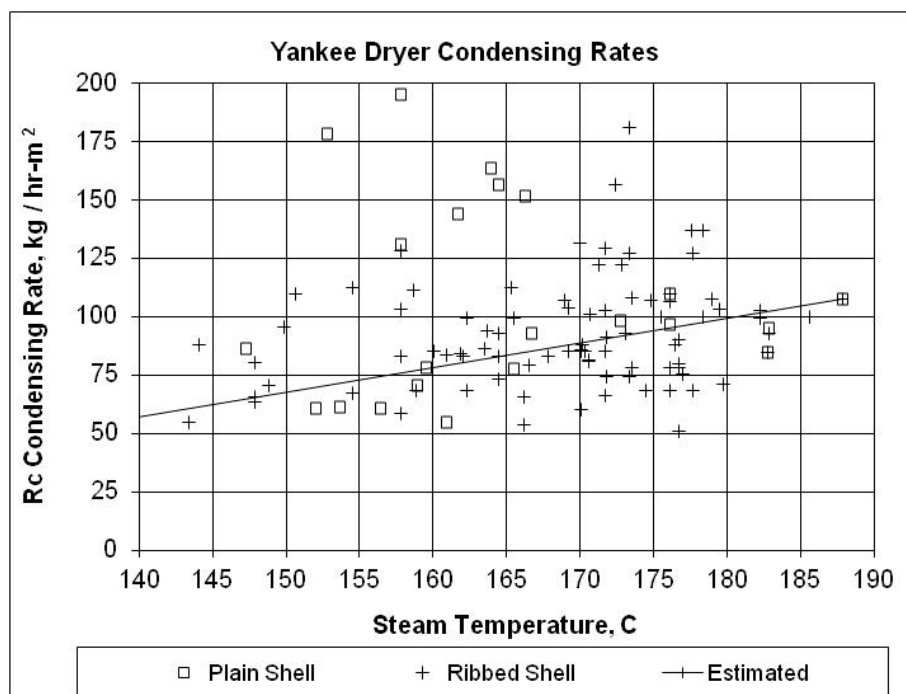


Fig. 2. Yankee dryer condensing rates – SI Units