

Forced Circulators in Batch Vacuum Pans

Batch Strike Elaboration

In the elaboration of batch strikes on a vacuum pan the conditions vary at every moment, being the initial parameters always the best.

As the mass becomes concentrated and the hydrostatic pressure increases at the bottom of the calandria, the temperature differential and thus the evaporation, decrease as a consequence of a reduction in the flow circulation and the thermal convection coefficient.

Knowing that this behavior is inevitable in the operation of batch vacuum pans, it is important to recognize that any action that improves circulation by natural thermal convection will improve the efficiency and capacity of the station and/or will enable the consumption of lower pressure steam. A vigorous circulation improves the even growth of the crystal, reduces the formation of conglomerates and induces a greater exhaustion of the molasses.

The improvement of the evaporation coefficient at the beginning and at the end of the batch strike elaboration as a consequence of a well-designed mechanical circulator can be seen in Table 1.

	Natural circulation (W / m ² K)	With stirrers (W / m ² K)
Start	570	640
End	32	224

TABLE 1: Comparison of coefficients with and without forced circulation.
Reference: Peter W Rein et al. Circulation in vacuum pan. Audubon Sugar Institute

The effectiveness of a mechanical circulator is more obvious when it is used to improve the performance of old-designed pans usually equipped with long-tube calandrias and with a less than 40% of the diameter central downspout. In this scenario, the return of the initial cost of the equipment and its maintenance will be quicker. In any case, it is also recommended to install circulators in pans with modern designs.

As for the quality of refined sugar, the use of circulators on their vacuum pans is almost mandatory.

The power consumption of the mechanical circulators is considerable, and it is estimated in a range of 1.4 kW/m³ to 1.6 kW/m³ of capacity of the vacuum pan. In general, it is recommended to use an installation power of 1.7 kW/m³.

