

# A SHORT DESCRIPTION OF GLEDHOW REFINERY

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The affinated raw sugar is stored in two 50-ton bins thus affording up to about four hours buffer period to smoothe out any fluctuations in the production rate from the raw house as well as the flow to the refinery. It is also useful to allow the refinery to stop before the raw house and "boil off" for the week-end shut downs and at the same time gives a useful stock on hand for the refinery to restart again early.

From the bins the raw sugar passes through a Servo Balans weigher prior to entering the melter. The density of the melt is controlled by a Micro switch on the scale operating an electronic timer so that each dump of the scale opens the water valve for a given time.

Continuous single carbonatation is practised so automatic proportioning of lime to melt is necessary. This is effected through a lime and liquor wheel, motor driven through a variable speed gear so as to give a wide range of throughput and at the same time variable between lime and liquor so as to vary the proportion of lime to melt. As the whole operation is a volumetric one it is most important that the density of the melt and the milk of lime be consistent. Under normal conditions the melt is 55° brix and the milk of lime 20° brix. As temperature has quite an effect on the absorption of CO<sub>2</sub> it is desirable to hold the melt at 50°C to 55°C, hence the necessity for an ample capacity melter, but it is usually nearer 60°C.

Gassing is done in three similar saturators, with a 9 ft. head of melt. The last one, however, is fitted with a calandria, the temperature of which is thermostatically controlled for optimum filtration which is usually about 85°C. The bulk of the gas is admitted in the first saturator to bring the pH down to about 10.0, the second one down to 9.0 pH and finally corrected to 7.5–7.8 pH in the last one.

The first filtration is accomplished in four Auto Filters of 1,260 square feet area each. No filter aid is used but precoating is done by gravity from an overhead tank. The cloudy filtrate is returned to No. 1 saturator where it serves as a nucleus for floc formation, the clear filtrate goes to the sulphitation plant, and the sludge to plate and frame filter presses for de-sweetening. The water for de-sluicing and de-sweetening is 85 p.s.i.g. and 85°C.

The sulphitation plant comprises a small rotary burner of the Glen Falls type and a wooden absorption tower. The draught is created by a Keebush fan which so far appears to be quite impervious to SO<sub>2</sub>. Very little sulphur is required as the liquor is only brought to a pH of 6.8–7.0. The sulphited

liquor is then heated again for the second time in a vertical heater thermostatically controlled to about 90°C before the final filtering in plate and frame filter presses again. The plate and frame presses for sulphited liquor and de-sweetening are all standard 42-inch, have a filtering area of 970 square feet each and are hydraulically operated.

This completes the clarification but to assist the pans and economise in steam, the liquor, which has by now dropped approximately 4° in Brix, is evaporated in a triple of 4,000 square feet heating surface to raise the density to about 65° Brix.

Instrumentation is quite extensively installed and is mostly centralised at two points—the saturator floor and the filter floor. In brief, it comprises:

1. Tachometer indicator and recorder reflecting refinery intake of melt.
2. Visible and audible alarms for all prime movers.
3. Indication of levels of all tanks as well as visible and audible alarms for both high and low level.
4. Automatic shutting down of lime and liquor wheels in the event of the flow of the melt or milk of lime failing.
5. Indication and recording of CO<sub>2</sub> content of the gas.
6. Indicating and recording flow meters of the total CO<sub>2</sub> being used as well as that going into each saturator.

It is intended to operate automatic pH control of the refinery sulphitation plant and the 2nd and 3rd saturators during the coming season.

The other instrumentation is mentioned elsewhere.

On the pan floor, a straight three boiling system is employed in three pans. The first and second boilings are done in two 1500-cu. ft. calandria pans with a heating surface of 2,250 square feet. The third boiling, and, if desired, an occasional seed for the first or second, is done in an 850 cu. ft. pan, also calandria heated, of 1,275 square feet heating surface. All the discharge valves are hydraulically operated and can be controlled either from the pan floor or near the strike receivers.

The centrifugal station consists of eight machines, 42" × 24" at 1,000 r.p.m. Refinements installed are greens and rich runnings separation as well as automatic dilution of same and tip chutes on the sugar discharge to avoid drippings entering the main stream of sugar.

The lime kiln is of the most modern design and is capable of producing up to 25 tons of lime per day,

although, up till now, the maximum demand has been in the vicinity of only 15 tons per day. The dimensions of the kiln proper are 52'6" high  $\times$  6'6" diameter, but as it is elevated 33 feet above ground level to give storage space for burnt lime and thence gravity feed through the slaker, screens, storage tanks and milk of lime pumps, its overall height is over 85 feet.

The complete operation of the plant is from the ground floor. The skip is first loaded with the requisite quantity of coke from a pre-determined scale via a vibrating conveyor and then filled with limestone in a similar way. A turntable brings the skip into its correct position for hoisting up the shaft.

It is impossible to overcharge the kiln because the operator must discharge sufficient burnt lime to make space to receive a new charge before being able to operate the hoisting motor switch. From then until the return of the empty skip the whole operation is automatic and the seal off at the kiln throat is so effective that no perceivable drop in the CO<sub>2</sub> content of the gas is apparent. There is a counter and recorder to keep a tally of the number of skips and a Rotameter takes care of the density of the milk of lime.

Coke per cent limestone for the past season was 9 per cent and the CO<sub>2</sub> is usually between 36 per cent and 40 per cent.

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