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BLOW HEAT RECOVERY SYSTEM

A. H. Lundberg Associates, Inc. has been designing and furnishing Blow Heat Recovery Systems to the industry for many years. This experience covers both batch and continuous digester systems, as well as direct and indirect contact condensers.

The blow steam vapor is discharged from the top of the blow tank and travels through a fiber separator, which removes fibers entrained in the large volume of blow steam, along with any liquid. Blow steam discharges out of the separator at the top and enters the primary condenser. Water from the bottom of the accumulator tank is pumped to the primary condenser for condensing the steam.

The accumulator tank is provided so that a reservoir of cold water is available throughout the blow for condensing the steam. The accumulator tank then stores the hot water for continuous heat removal. The accumulator tank design incorporates internal baffles near both the top and bottom. These baffles still the flow of water and assist in keeping the hot cold water interface within the tank. The water inlet piping to the primary condenser is incorporated in the upper internals design.

For protection of the system against pressurization or overcondensation (vacuum), a Lundberg Associates pressure vacuum relief valve is supplied. This mechanical valve will open as required to pass steam to atmosphere, or to admit air under vacuum conditions.

The primary condenser design permits a low head circulation pump to be used. Water is lifted to the center of the condenser for overflow across a weir. The lower baffles within the condenser create a turbulent cascading water flow and provide for intimate mixing with the condensing blow steam. The low head requirement of the primary condenser permits the use of an axial flow or propeller type circulation pump.

The heat accumulated can be most efficiently recovered when the condensing water is heated to its highest possible temperature. In order for the temperature at the top of the accumulator to be maintained near boiling, a portion of the steam must pass through the primary condenser. Further condensing occurs in a second stage unit where an excessive quantity of cooling water can be used resulting in a lower condensate outlet temperature. The use of this secondary condenser, or vapor pre cooler, also permits the further cooling of noncondensible gases. This secondary condenser can be either direct contact or indirect contact. The proper selection will depend upon the mill's supply and disposition of cooling water. In some cases, when the blow gases are high in turpentine, the condensate from an indirect contact condenser can be piped to the turpentine decanter. The latest technology in most applications dictates the use of an indirect secondary condenser.

When a direct contact condenser is used, the condensing water is returned to the bottom of the accumulator tank and/or the section of the condenser pump. This prevents internal mixing and cooling in the accumulator tank. With an indirect contact condenser (tube and shell), the heated process water can be utilized in the mill hot water system.

Exclusion of air from the blow heat recovery system between blows is desirable in order to minimize

surges of noncondensible gases. Padding steam is added to prevent the intrusion of air into the system between blows. In order to contain the padding steam, a low pressure water seal is incorporated internally on the inlet of the direct contact secondary condenser. When an indirect contact condenser is used, a pressure control valve instrumented to close on low pressure is included on the inlet line. Thus, excessive padding steam condensation is prevented between blows.

Typically, a two-inch padding steam line is tied in to the blow tank or the vapor pipe. Padding steam flow is controlled by the pressure in the blow heat system vapor space and is normally maintained at a minimum of about one half psig just high enough to prevent leakage of air into the system.

A number of methods are available for utilizing the high volume of low quality heat produced by a properly operating Blow Heat Recovery System. Most frequently, the heat is exchanged to process water used for brown stock or bleach plant washing. It can also be exchanged to boiler feed water or can be used in the pre-evaporation of kraft weak black liquor.

The hot water is continuously removed from the top of the accumulator tank with a transfer pump. After heat removal, cooled water is returned to the bottom of the accumulator tank and is available for the next blow demand.

In order to remove any fiber bundles that may plug heat transfer equipment, fiber filters are utilized in the discharge of the transfer pump.

Lundberg Associates is experienced in all phases of Blow Heat Recovery Systems including pressure vacuum relief valves, fiber separators, condensers, accumulators, fiber filters, pumps, heat exchangers and control systems for efficient automatic operation.