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Applicationbrief

Eclipse Product: TFB030 Burners

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Application: Lead Melting Pots at Exide Battery

Description: Exide manufactures a full line of batteries for the Automotive, Marine and Industrial Markets. Most of their Melting Furnaces draw off at or near the Surface level of the molten lead but they have three that are “Bottom Pour” Vats and are used for higher quality lead cores. The purpose for bottom pour is to ensure no dross is contained in the molten lead feeding the molds. This also requires that the Burners be tube fired. The Pots are top fired and top loaded, have a holding capacity of 4000 pounds and operate at 800° F with the Burners sized for 600 pounds per hour melt rate. The existing system was premix utilizing nozzles mounted in the bottom of 2 each 4" straight (single pass) fire tubes. With the mounting configuration, the burners required manual torch lighting and had no flame safety. Each Pot is also installed in an enclosure with doors to prevent lead fumes from migrating into the workspace. These enclosures are kept under a negative condition and ducted back to a common fume collection system. Exide contacted Thermal Specialties, Inc. of Tulsa, Oklahoma requesting recommendations for adding an automatic ignition system and flame safety as the current system was unsafe and unreliable. I reviewed the application with them and we determined with the current system there was no way to accomplish this with any degree of dependability.

In discussing other approaches to this application, we decided to remove the existing straight tubes and replace with one U-Tube using a TFB per Pot with a common air header supplied by an SMJ Blower using an automatic butterfly valve as firing rate control back loaded to a proportionator. Each Pot has a ½” valve train and individual control panel built by TSI.

It was determined during start-up that the negative pressure affected the TFB’s greatly in that the product would not achieve desired operating temp and the flame was very unstable. In short, the flame was lifting off the nozzles and the flue gasses were being drawn form the tubes before transferring ample heat. We placed steel over the exhaust leg in attempt to create backpressure on the tube which helped but did not solve the problem completely. With the assistance of Jim Roberts we tried various nozzle settings relative to the air sleeve and modified the air sleeve somewhat. We also added fire bricks to both the firing leg and exhaust leg of the firetube in order to enhance tube uniformity. While these modifications did provide the desired results from a production standpoint we had problems during high to low to high fire transition each time the burners cycled causing the flame safety to trip. This too was caused by the negative environment in which the burners were required to operate. We then experimented with the proportionators and found that if we only applied loading air pressure after the air butterfly achieved high fire setting then the flame signal remained stable. To accomplish this we placed a solenoid valve in a tee serving the air loading line energized off an end switch in the Actuator at the high fire position.

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