PLAINTIFF'S EXHIBIT

PLI-113

PLIBRICO SPECIFICATION A-1
FOR
CATALYST REGENERATOR LININGS

A. General

1. The lining shall be made up of two (2) components to provide both insulation and an erosion resisting surface.

2. The insulating component of the lining shall be made up of a light weight refractory, having a density of not more than forty two (42) pounds per cubic foot, shipped weight, as manufactured by the Plibrico Company, of Chicago, Illinois under the trade name of "Verilite" or its equal. The thickness of this component shall depend upon the hot face temperature of the wear resistant surface and the desired shell temperature.

3. The wear resisting component of the lining shall be made up of a dense refractory having a density of one hundred ten to one hundred twenty (110 - 120) pounds per cubic foot, shipped weight, as manufactured by the Plibrico Company, of Chicago, Illinois, under the trade name of "Petromix" or its equal. The thickness of this component shall be one inch.

B. Supporting and Retaining Structure

The supporting structure of the lining shall be made up of one half (1/2) inch studs welded-to the shell on eighteen (18) inch centers both vertically and horizontally. These studs are to be plain round studs with no head attached. The head shall be flat strip, 1/4" thick, 3" long and 1" wide with a 17/32" hole in the center, this head to be welded on after the insulation component has been applied.

The retaining structure for the insulating component shall be composed of 2" x 2" x 14 gauge mild steel wire mesh attached to the studs with tie wires.

The retaining and supporting structure for the erosion resisting component shall be composed of 1 - 3/4" x 1 - 3/4" gauge, carbon steel, 3/4" thick supporting armor, welded to each stud with two (2) fillet welds each a minimum of 1/2" long.

C. Application Procedure

1. The studs shall be placed, maintaining vertical rows on eighteen (18) inch centers. The horizontal rows shall be so located that the seventh row is ten (10) feet above the base on which the armor rests and each suceeding seventh row is spaced ten (10) feet apart. The six rows between shall be evenly spaced. The lower stud row shall be located as near to the bottom edge of the armor as possible; if this distance exceeds nine (9) inches special stud anchorage must be provided. In no area shall the spacing exceed eighteen (18) inches in either direction.

2. The retaining structure, 2" x 2" x 14 gauge carbon steel wire mesh, shall be put in place and fastened to the studs with tie wires. It shall be spaced out from the shell such that it falls within the inner one third of the insulating component. Thus with a three (3) inch insulating component the mesh would be approximately two (2) inches from the shell. All joints in the mesh shall be made with a "one square" lap and care shall be taken to see that all openings are 2" x 2". On curved and irregular sections all excess or double thickness mesh shall be trimmed out.

3. A circle of ten (10) gauge plate shall be tacked to the inside face of all nozzles to keep material from entering the piping system during application of the lining.

4. The insulating component of the lining, Veritite or equal, shall then be placed to the required thickness, by approved pneumatic process. Care shall be taken to apply this component with a minimum of compaction.

   The installation shall start at the lowest point and work upward. On shutdowns of over four (4) hours all spatter on the mesh and studs shall be vibrated off before resuming operations. The material shall be applied or trimmed to within one fourth (1/4) inch of the top of the studs. No water curing is required. Material rebound is waste and is not to be reused.

5. The stud washers shall be installed, in general, in a horizontal position. The plate shall be put on flush with the face of the stud and a full weld made around the stud.

6. The retaining and supporting structure of the erosion resistant component, shall be installed and welded in place. The armor in general shall be applied in standard three (3) foot by ten (10) foot panels with the ten (10) foot length applied vertically. Each standard panel shall be clinched together at each strand resulting in continuous armor wall construction. Horizontal joints must be clinched together or welded together. Non-standard panels may be required to close odd shaped sections; these are to have a minimum of two (2) studs per piece. The edges of all non-standard panels are to be welded on all edges to the adjacent panels. No openings in the armor surface, as caused by irregular panels, are to be smaller than one inch in any direction. The cut edges of the armor around all nozzles, braces and other appurtenance which protrude through the lining shall be tacked such that there are no loose edges or small pieces of steel. The openings shall be cut as near to the outside dimensions of all appurtenances as possible but in no case shall the armor be over one inch from the appurtenance.

7. Pneumatically apply the "Petromix" to a finished thickness flush with the outer face of the armor. Care must be taken to eliminate all voids in the dense refractory and all "pockets" of rebound shall be removed and replaced with sound material. If the application is halted for a period of over two (2) hours, all incompleted hex holes must be cleaned out back to the insulating refractory and all loose material

blown out and the starting edge washed down. It is recommended that the major portion of this cleaning be done while the material is damp, at the end of a shift, and the remainder be vibrated off the following morning, blown down and washed out.

8. All Petromix must be water cured. This is vitally important. After the surface has set to the point where it is hard to the touch, about four (4) to six (6) hours after application, it shall be treated with a fine mist spray of water. The spray should be gently applied to the wall surface for a period of twelve (12) to sixteen (16) hours. Where the application is made on an eight (8) hour day basis the water spray is to be applied during the two (2) night shifts. If the application is to be continuous the spray treatment should be started as soon as the surface is in proper condition and continued without interruption. Under no condition should the surface be allowed to become "dry" to the touch during the first twenty four (24) hours after application.

9. In areas where it is not feasible to "shoot" the material it shall be hand trowelled into place. These areas should be done first and the pneumatically applied areas worked to them, never in the reverse order.

10. Both the insulating component and 1" wear resisting component must be pneumatically applied in such a manner that each material is a homogenous mass without lamination. The full thickness should be built up at one time if possible, or successive layers must be applied immediately after the preceding layer has taken its initial set and considerably before it has taken its final set.

CORRECTIVE REPAIRS TO EXISTING LININGS

D. Where this refractory lining is to replace an existing suspended tile lining and it is desired to maintain the original thickness of the lining, the construction shall be as follows:

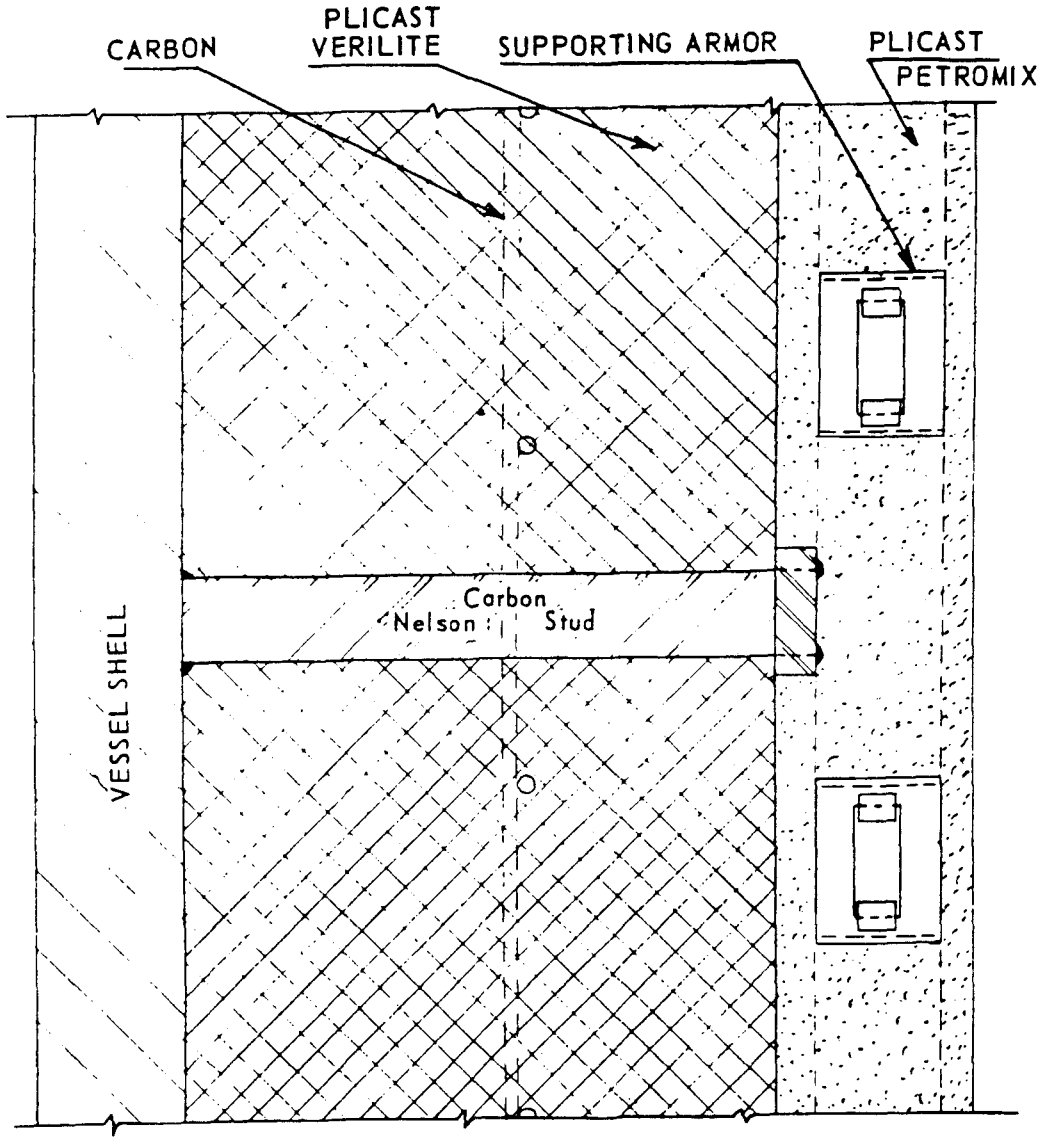
1. The thickness of the Verilite insulating component shall be 1" less than the desired overall wall thickness. The 2 x 2 - 14 gauge carbon steel wire mesh shall be located 2" from the inside surface of the Verilite insulating lining.

2. The stud length shall be suitable to retain the armor 1/4" clear of the inside face of the insulating refractory lining.

3. The balance of the construction and the method of installation shall be as outlined in this specification.

4. Where the vessel shell has warped or buckled out of round more than 1/2" plus or minus, it should be placed back to original shape or the studs must be individually sized so that the armor is uniformly round.

PLIBRICO LINING SPECIFICATION A-1



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