

ELECTROWINNING CELL TECHNICAL DESCRIPTION

MODEL RPA-C84 ELECTROWINNING CELL

The RPA-C84 electrowinning cell is a structurally rigid polypropylene vessel with a total volume of 1.20 m³. The 12 cathodes and 13 anodes are supported in slots milled into “Tufnol” support racks and secured by a hinged, self stayed lockable fume cover.

“Tufnol” is a heat resistant insulating material that is used exclusively in all PEI cells to overcome the possibility of fire caused by localised overheating of electrical connections. Polypropylene is generally used to support and insulate the anodes and cathodes however there have been incidents where it has melted and eventually ignited due to a poor electrical connection. “Tufnol” eliminates this area of concern.

CATHODES AND ANODES

The cathodes consist of a heavy duty copper conductor bar fixed to a stainless steel frame, around which the plating medium is wound horizontally. One end of the conductor bar is bent at 90° to facilitate connection to the *cathode busbar*, running the full length along one side of the cell.

The stainless frame has internal cross member, rather like a window frame, which provides stiffening to prevent distortion during the winding process. Each cathode frame also incorporates a central lifting eye to enable removal by overhead hoist.

The PEI cathode does not require a polypropylene basket. It is spaced from the adjacent anodes by the locating slots in the support racks and by a two pairs of full height polypropylene spacer blocks attached to the anode mesh. Refer to the section drawing.

This method of insulating the anodes and cathodes from each other has been used very successfully on all PEI cells to date. It has the benefit of reducing the cathode weight and bulk of the box and also eliminating the ongoing need to repair or replace the boxes as they deteriorate and crack during the normal course of constant handling in the production goldroom. It also ensure that the stainless anode mesh remains flat and hangs vertically, eliminating the chance of the bottom of the mesh curving and touching the cathode next to it.

Another benefit is that it avoids the necessity for vertical grooves in the cell side plates (typically in polypropylene cells) to accommodate the anodes and cathode boxes, as is common on other designs. This produces smooth internal sides making clean out far easier and removing the “gold trap” action of the slots.

The anodes feature a similar sized copper conductor bar secured to a heavy gauge stainless steel mesh panel. Again, one end of the conductor bar is bent to attach to the *anode busbar*, fixed to the opposite side of the cell.

The cathodes are provided with a slot in their conductor bar and are locked to the busbar with a grade 316 stainless steel bolt and wingnut arrangement. This provides a positive electrical connection whilst still permitting ease of removal without the need for tools.

ELECTRICAL CONNECTIONS

It is common practice to use a spring clip style of cathode connector which is, in fact, a section of a 250 amp fuseholder, offering a neat solution to the requirement for a quick release connection. PEI utilised this method until feedback from gold room operations personnel indicated that after some time in service the spring steel "E" clip which provides the gripping action becomes affected by corrosion and eventually breaks.

The requirement for total reliability has prompted the redesign of this area of the cells to incorporate the bolt and wingnut, thus providing a simpler, yet effective method of connection.

The connection between the anodes and the busbar is by means of stainless steel bolts which are a semi-permanent fixture, since the anodes are not removed as a function of the normal operation of the cell. The anode and cathode busbars are heavy duty copper bar which protrude through the end of the cell and are provided with suitable holes to accept the bolted connection of the cable terminating lugs.

CELL CONSTRUCTION DETAILS

The cell body is fabricated in 20 mm thick polypropylene with external stiffening webs to prevent distortion of the side and end plates and are designed to withstand the pressures imposed when the cell is operating. The mid level horizontal stiffener is further reinforced by the inclusion of a steel flat bar fully enclosed with-in the polypropylene. Nozzle flanges are stainless steel drilled to the client's specified standard, however flange thickness is limited to 12 mm as the pressure rating afforded is far in excess of that required.

The horizontal winding of the steel wool onto the cathode frames, finishing well below the top of the cell walls, providing a fail-safe overflow feature.

Should any of the cathodes plate out to the extent that the solution cannot pass through, it will flow over the top of the windings on the affected cathode and on down the cell.

In addition an overflow nozzle is provided in the feed end of the cell as a backup in the event of a blockage in the discharge piping external to the cell.

With the fume cover closed a seal is produced along the sides of the cell with the air inlet being through a series of holes in the feed end wall. The fume extraction nozzle, at the discharge end of the cell, thus draws fresh air from the feed end passing over the entire length of the cell, ensuring the positive evacuation of all gaseous emissions and promoting a cooling stream of air through the cell. The fume cover is provided with padlocking points for total security.

The vessel is supported on an epoxy coated mild steel base suitably stiffened and reinforced to accommodate the loads imposed by the weight of the cell when full. The base incorporates an



Telephone: +61 411 107 535

PROCESS EQUIPMENT INTERNATIONAL PTY LTD

access step and also features a pair of cable clamps to support the incoming power cables, thus removing the cable loads from the busbars and their connections.

SITE ASSEMBLY

The electrowinning cell is delivered fully assembled but if steel wool has been nominated by the Client as the plating medium, the cathode frames are supplied bare (ie without the wool) There are a variety of grades of steel wool available and from experience we have found that the Client generally has his own preferences for this particular consumable.

If the specified plating medium is stainless mesh the cathodes will be installed in the cell pre-wound with Grade 316 stainless steel knitted mesh stocking.

MODEL RPA-C84CW CATHODE WINDER

The cathode winder is normally shipped fully assembled but If required it can be supplied in a "knocked down" form to minimize packing requirements. It is readily assembled on site following the instructions provided on the installation drawing included with it.

The unique clamping method of holding the cathodes at their top end permits rapid and uncomplicated installation / removal of the cathodes into the winder.

A hand-wheel in lieu of the more familiar crank type handle provides the operator with better control of the winding process. This enables him to more accurately position the steel wool onto the cathode frame and ensure the appropriate overlapping.

FUME EXTRACTION FAN

The fume extraction rate required for the C84 cell is 1000 l / min and we can offer a suitable fan fabricated from polypropylene with stainless fittings to resist corrosion and chemical attack for this duty.

Details of the goldroom fume extraction ducting would be required to enable fan sizing.

CATHODE LIFTING FRAME

The cathode lifting frame offered is epoxy coated mild steel is designed to carry 6 cathodes.