

AZSA CELLHOUSE A AND B EQUIPMENT INVENTORY:

CELLS

ANODE CLEANING MACHINES

CATHODE STRIPPING MACHINES

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1. SCOPE

In July 2022, the new Cellhouse E was started in the facilities of Asturiana de Zinc S.A.U. in San Juan de Nieva, Asturias, Spain, to replace two old cellhouses, namely Cellhouse A and Cellhouse B. The production capacity of new Cellhouse E is slightly greater than Cellhouse A and Cellhouse B production capacity together.

Cellhouse A and Cellhouse B will be dismantled shortly. The purpose of this document is to show an inventory of the equipment to be dismantled in both cellhouses and that is available for reuse.

2. GENERAL DESCRIPTION

2.1. CELLHOUSE A. INVENTORY OF THE EQUIPMENT

The inventory of the equipment to be dismantled in Cellhouse A is as follows:

- a) Six hundred and seventy two (672) polymeric concrete electrolytic cells, three hundred and thirty six (336) type A and three hundred and thirty six (336) type B (see attached drawings N° AZ-11-3-69 and AZ-11-3-70). Cells type A and B are symmetrical with the same overall dimensions: 3314 x 1070 x 1560 mm (L x W x H external dimensions). Each cell has capacity for thirty six 1,26 m² area cathodes.



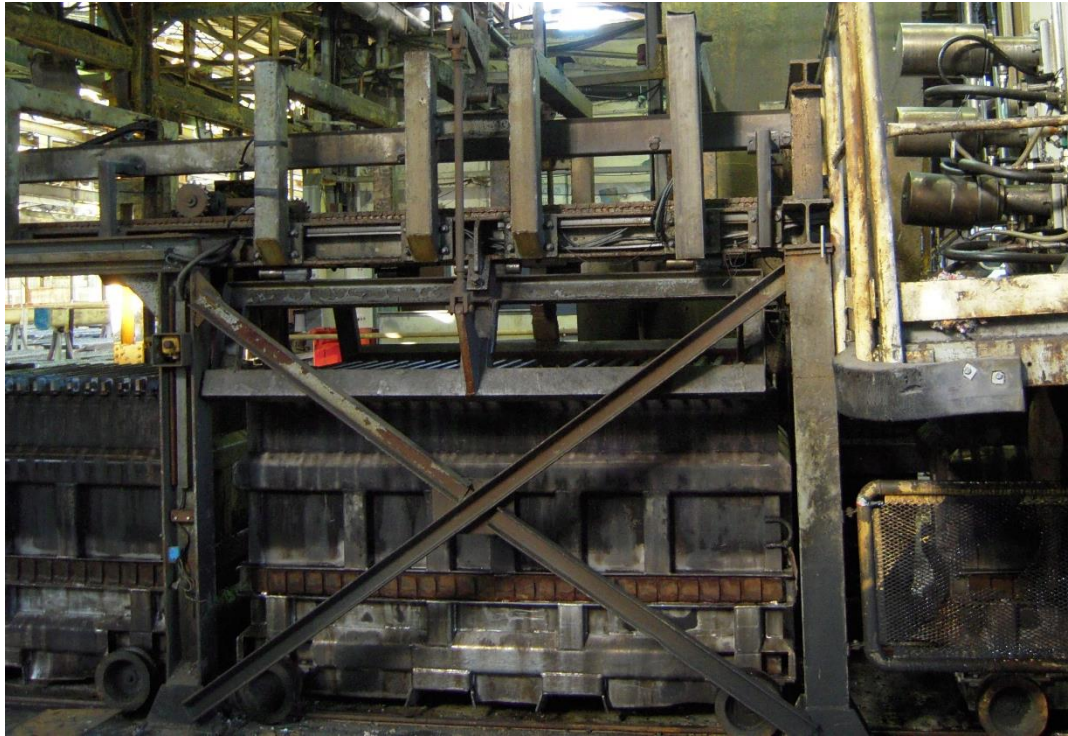
Picture 1 Polymeric concrete electrolytic cells

- b) One (1) anode cleaning and flattening machine comprised of:
 - ✓ Anode wagons, manufactured in Stainless Steel equipped with wheels which allows the wagon displacement onto parallel railways.



Picture 2. Anodes wagon

- ✓ Lugging system: an electric equipment to locate the anodes wagon in a centering and flattening position
- ✓ Centering system: A mechanism to align the anodes position in the wagon. It is comprised of two plates driven by means of a hydraulic cylinder.



Picture 3. Lugging and Centering system

- ✓ Driving system: To move the anodes wagon to locate the anodes in the lifting system vertical line.
- ✓ Fixing system: To fix the anodes wagon during the anodes are being reconditioned. It works in combination with the driving system.
- ✓ Lifting system: To lift the anodes and locate them at the flattening plates height.
- ✓ Flattening system: Two plates driven by means of hydraulic cylinders that press the anodes to straighten them.
- ✓ High pressure water washing system: A pump injects high pressure water during the anodes up and down movement.
- ✓ Hydraulic unit.
- ✓ Safety systems.

- c) Three (3) cathode stripping machines. All the mechanisms operated by cylinders are pneumatic.



Picture 4. Cellhouse A Stripping Machine

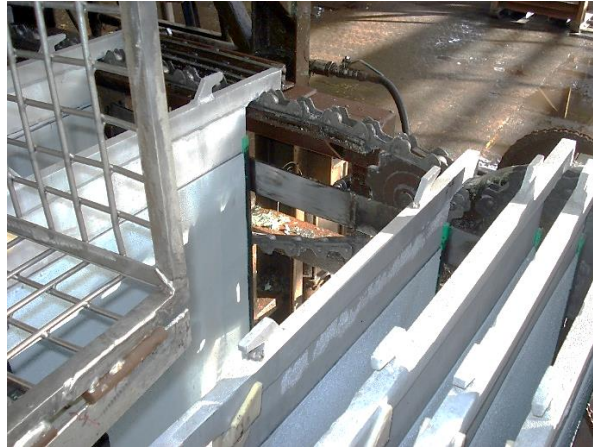
These stripping machines are comprised of the following sub-units:

- ✓ Cathode Inlet Conveyor: The Inlet Conveyor consists of a pair of chains which move the cathodes one by one through the Stripping Station. Each chain holds one edge of the cathode head bar.



Picture 5 and 6. Inlet conveyor

- ✓ Stripping Station: The Stripping Station is equipped with a stripping conveyor (also driven by chains) and two sets of guided blades, namely horizontal blades and vertical blades. The cathodes have a riveted, non-conductive tilting plastic piece which produces an unplated area of the cathode surface to allow the horizontal shearing blades to start separating the zinc sheets from the cathode blank. A mechanism to tilt this plastic piece is also included.



Picture 7. Stripping conveyor



Picture 8. Mechanism to tilt the plastic piece



Picture 9. Vertical blades

- ✓ Cathodes Transfer: A chain moves stripped cathodes from the Stripping Conveyor to the Outlet Conveyor.



Picture 10. Cathode transfer

- ✓ Cathode Outlet Conveyor: It consists of a pair of chains which move cathode blanks to their final position to be picked up by the overhead crane and returned to the cell. A mechanism to relocate the non-conductive tilting plastic piece to its original position is included. A cleaning station is also placed in the Outlet Conveyor. Every cathode blank is washed after the stripping operation as part of the standard cycle



Picture 11. Cathode Outlet Conveyor

- ✓ Zinc Discharge Belt Conveyor: The zinc discharge belt conveyor transfers the stripped zinc sheets to the stacking unit. It is a flat belt conveyor with a rubber-reinforced belt.
- ✓ Stacking Unit: The stacking unit is designed to receive zinc sheets from the belt conveyor and to place them in stacks of a fixed number of sheets onto a bundle outlet conveyor.



Picture 12: Stacking Unit

- ✓ Bundle Outlet Conveyor: It moves the bundles to the end of the Cathode Stripping Machine where they will be collected.



Picture 13. Bundle Outlet Conveyor

2.2. CELLHOUSE B. INVENTORY OF THE EQUIPMENT

The inventory of the equipment to be dismantled in Cellhouse A is as follows:

- d) Five hundred and twenty eight (528) polymeric concrete electrolytic cells, two hundred and sixty four (264) type A and two hundred and sixty four (264) type B (see attached drawings N° AZ-11-3-69 and AZ-11-3-70). Cells type A and B are symmetrical with the same overall dimensions: 3314 x 1070 x 1560 mm (L x W x H external dimensions). Each cell has capacity for thirty six 1,26 m² area cathodes
- e) One (1) anode cleaning and flattening machine just like Cellhouse A anodes cleaning and flattening machine
- f) Two (2) cathode stripping machines, just like Cellhouse A cathode stripping machines
- g) One (1) cathode stripping machine named F, with the following differences

All the cylinders are hydraulic instead of pneumatic.



Picture 14. F Cathode Stripping Machine

- ✓ Cathode Inlet Conveyor: The Inlet Conveyor consists of a pair of walking beams (instead of chains) driven by hydraulic cylinders.



Picture 15. Hydraulic Walking Beams

- ✓ Stripping Station: The Stripping Station also consists of a pair of walking beams (instead of chains) driven by hydraulic cylinders
- ✓ Cathodes Transfer: This system changes from a chain where the cathodes blank hanged to a linear actuator mounted on a steel support connecting the stripping station to the brushing/cleaning station.



Picture 16. Cathodes Transfer

- ✓ Cathode Outlet Conveyor: It also consists of a pair of walking beams (instead of chains) driven by hydraulic cylinders
- ✓ Bundle Outlet Conveyor: It moves the bundles to the end of the Cathode Stripping Machine where they will be collected. It is a chain conveyor system



Picture 16 and 17. Bundle Outlet Conveyor