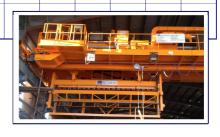


TANK HOUSE CRANE FOR BABAK COPPER CO. IRAN

PROJECT DATA

| Year of manufacture | 2014 |
|-----------------------------------|--|
| Customer name | Babak Copper Co. |
| Plant location | Babak, (Kerman) Iran, 2100 asl |
| Duty Cycle | |
| Hours per Day | 2x8 hr shifts (2x7 effective hr) |
| Days per week | 5 (capable of 7) |
| Days per year | 260 (capable of 365) |
| Ambient Conditions | |
| Environnent | corrosive H ₂ SO ₄ acid mist |
| Operation Requirement | |
| Refinery capacity | 50,000 mtpy |
| Electrodes to be processed by THC | 20 electrodes per pull |
| Electrolytic Cells | |
| Operation | 24 hr/day-365 days/year |
| No. of cells | 152 |
| No. cathodes per cell | 60 |
| No. anodes per cell | 61 |
| Centre to centre anodes/cathodes | 100 mm |





THC Main Characteristics

| Span | 17.830 mm |
|----------------------|---------------------|
| FEM | A8 U9 Q4 |
| Max deflection | Span/1600 |
| Bridge long travel | |
| Power | 2x7,5 kW |
| Speed | 0-90 m/min |
| IP and type of brake | IP 65 EH integrated |
| Trolley travel | |
| Power | 2x2,2 kW |
| Speed | 0-40 m/min |
| Main winch | |
| Lifting capacity | 12.000 kg |
| Power | 30 kW |
| Lifting speed | 0-12 m/min |
| IP and type of brake | IP 65 EH |
| Service Winch | |
| Capacity | 3200 kg |
| Hydraulic powerpack | 7,5 kW IP 65 |
| | |

| Control panels on board Bale characteristics Lifting capacity Selection system Type of hooks Bales movements centring system Bale centering tolerance Combs for electrodes Drip tray Control & automation Remote control unit Missions programming Operating mode Lifting 4x 20 electrodes 1 every three hydraulic pyramids on cells 2 2-3mm 2 yes Control & 2 Pendant 1 Missions programming Operating mode Memote control unit Pendant 1 | Winch travel control | VFD |
|--|--------------------------|-------------------|
| Lifting capacity Selection system Type of hooks Bales movements Centring system Bale centering tolerance Combs for electrodes Drip tray Control & automation Remote control unit Pendant Missions programming 1 every three 2 every ev | Control panels on board | Nema 4x |
| Selection system 1 every three Type of hooks fail safe type Bales movements hydraulic centring system pyramids on cells Bale centering tolerance ± 2-3mm Combs for electrodes 2 Drip tray yes Control & automation Remote control unit 2 Pendant 1 Missions programming yes | Bale characteristics | |
| Type of hooks Bales movements centring system Bale centering tolerance Combs for electrodes Drip tray Control & automation Remote control unit Pendant Missions programming fail safe type hydraulic pyramids on cells 2 -3mm 2 -2-3mm 2 -2-3mm 2 -2-3mm 2 -2-3mm 2 -2 -3mm 2 -3 -3mm 2 -2 - | Lifting capacity | 20 electrodes |
| Bales movements hydraulic centring system pyramids on cells Bale centering tolerance ± 2-3mm Combs for electrodes 2 Drip tray yes Control & automation Remote control unit 2 Pendant 1 Missions programming yes | Selection system | 1 every three |
| centring system pyramids on cells Bale centering tolerance ± 2-3mm Combs for electrodes 2 Drip tray yes Control & automation Remote control unit 2 Pendant 1 Missions programming yes | Type of hooks | fail safe type |
| Bale centering tolerance ± 2-3mm Combs for electrodes 2 Drip tray yes Control & automation Remote control unit 2 Pendant 1 Missions programming yes | Bales movements | hydraulic |
| Combs for electrodes 2 Drip tray yes Control & automation Remote control unit 2 Pendant 1 Missions programming yes | centring system | pyramids on cells |
| Drip tray yes Control & automation Remote control unit 2 Pendant 1 Missions programming yes | Bale centering tolerance | ± 2-3mm |
| Control & automation Remote control unit 2 Pendant 1 Missions programming yes | Combs for electrodes | 2 |
| Remote control unit 2 Pendant 1 Missions programming yes | Drip tray | yes |
| Pendant 1 Missions programming yes | Control & automation | |
| Missions programming yes | Remote control unit | 2 |
| | Pendant | 1 |
| Operating mode manual | Missions programming | yes |
| - | Operating mode | manual |
| semiautomatic | | semiautomatic |



THC specifically designed for the application and for the environmental conditions. All metal parts with special coating, total thickness 300 μ m. Parts not coated or in contact with electrolytic solution in AISI 316L. Air conditioned with positive pressurized electrical cabinet (no contaminated air gets inside the cabinets). Electrical cabinets made in stainless steel. All electric motors are IP 65 and self-ventilated. Positioning control based on a double laser and encoder; positioning tolerance within \pm 2 \div 3 mm. The bale is stable due to 4 suspension points and guiding rods matched on female units located under the trolley. Bale complete of guiding portals and combs therefore when removing and inserting electrodes no short circuits



due to electrodes swinging. Self-locking type hooks and drip tray hydraulically operated. Bale fully insulated from the THC. Two different control systems: manual and semiautomatic. Operator pulpit for THC control and for loading missions queues to be carried out in semiautomatic mode under the supervision of the operator. Possibility to enhance the system to a full automatic transmission and for having a complete communication with plant DCS. The Automatic system of the THC machine is based on the use of certified «Failsafe» components. The «Failsafe» logic permits to



insert and manage all the safety logics inside the PLC software code without the necessity to install any other HW or SW logics. The use of Wi-Fi «failsafe» communication permits to simplify the communication between the automation system on board of the THC and all the other components and equipment placed at the ground level. Using this system the THC comply with a safety level SIL3.

