



Concelox Cu

Continuous Oxygen sensor for liquid Copper

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Introduction

Concelox-Cu is recommended for copper producers aiming to achieve:

- Consistent and optimal oxygen levels to prevent breaks in fine wire drawing, porosity, and internal cracks.
- Enhanced oxygen control, which improves refining, impurity removal, electrical conductivity of the produced wire, and the efficiency of wire annealing.
- Superior surface quality with stable oxygen levels on anodes, boosting current efficiency during electrolytic refining.
- Accurate phosphorus addition based on measured oxygen content.

Working Principles

Concelox features an oxygen cell with a solid electrolyte that generates an electromotive force (EMF) measured in millivolts (mV). This EMF, measured between the reference electrode and the bath electrode, provides a direct reading of oxygen activity in liquid copper.

The oxygen cell is housed in a high chromium steel tube, ensuring accurate measurements for up to 24 hours. To extend its lifespan, additional silicon carbide (SiC) tubes can be used. The cell is heat and corrosion-resistant, preventing corrosion when immersed in refined or anode copper.

Measuring Principles

The correlation between temperature (t), EMF and oxygen activity $a(O)$ is given by the following formula.

$$\text{Log } a_O = 7.64 - \frac{7943 - 10.08(E)}{t + 273}$$

Where E is measured in mV & t in OC

Due to the temperature sensitivity of ppm content, continuous temperature measurement is recommended during calculations.

No significant corrections are needed for impurities dissolved in refined copper, though typical impurities in rough anode coppers may reduce accuracy. The standard deviation is ± 3 mV, with a measurement range of 5 to 1500 ppm.

Practical Guidelines

The Concelox-Cu features an expandable probe that fits into a permanent head, which can be immersed in a liquid bath without the need for pre-heating. The immersion depth should be at least 10 cm, with special provisions required for shallow streams. It is important to ensure that the sensor does not come into contact with slag and is kept away from direct flames from gas burners. Additionally, the sensor is not recommended for use in baths containing phosphorus.

The sensor is connected to the Conti-Lab E instrument which uses software to measure, calculate, and display measurement values in real time.

- During a measurement, temperature values are shown on display 1 (top) and display 2 (bottom).
- After a measurement has been completed, the information displayed differs according to configurable settings – by default, oxygen content on display 1, pot temperature on display 2.

Measurement results can be specified and sent from the instrument using the standard serial or Ethernet connections, or other optional interfaces.

Ordering Information

Length: 850 mm:

CT50000850

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