Soederberg electrodes: Production and application through the ages

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Outline

- Historical Overview
- Present situation
- Outlook
- Company Profile
Historical Overview

Carl Wilhelm Soederberg (1876-1955)
First lab. trials with self-baking Electrodes 1910

1919
1st „self-baking“ Electrode (850mm) presented by Elkem

Early 90er Ferroatlantica developed ELSA electrode for Si-production

EAF running with baked/graph. Electrode

1st World War

Big rise in EAF performance
1,2m $\rightarrow$ 2m
12MVA $\rightarrow$ 100MVA

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Present Situation

Application:
• EAF - Melting of steel scrap
• SAF - Ferroalloys, CaC₂, Si, P

Operation:
• Heating charge by electric arc
• 3 phases alternating current
• Electr.: ∅ 1-2m , L = 10m and higher
• 3 different Electrodes
• Joule heating
Present situation

Fins

Graphite Core

Electrode paste

Casing

Contact clamps

Calc. Electrode

Soederberg electrode
(Ferroalloys production)

Composite electrode
(Silicon production)
Present situation

Key factors:

Electrical resistivity, Mechanical properties, Contact to the casing/core, Plasticity, Bridging
Present situation

Electrode paste: Dry material and Binder

Dry material:
- traditionally Anthracite
- Coke
- Graphite

Binder:
- Coal tar pitch (MP: 60-100 °C Mettler)
Outlook

• Highly productive plants ➔ Increasing size and load

• Regular shutdowns ➔ Thermal shock resistance

• Higher purity

• Changing qualities of raw materials

• Environmental regulations and health care ➔ low PAH
Aluminium Rheinfelden today: 3 companies with 220 employees producing Aluminium alloys, aluminium slugs and carbon products
Rheinfelden Carbon GmbH & Co KG

• **Products:** Soederbergpaste for submerged electric arc furnaces, collar paste, ramming paste

• **Production capacity:**
  • Paste plant: 75 000 mt/a
  • Anthracite calciner: 10 000 mt/a
Rheinfelden Carbon GmbH & Co KG
Rheinfelden Carbon GmbH & Co KG

Briketts

Cylinders
Thank you for your attention