



Engineering . Industry, transport of Energy, Connections

Mastering high currents

ARC.ITEC™

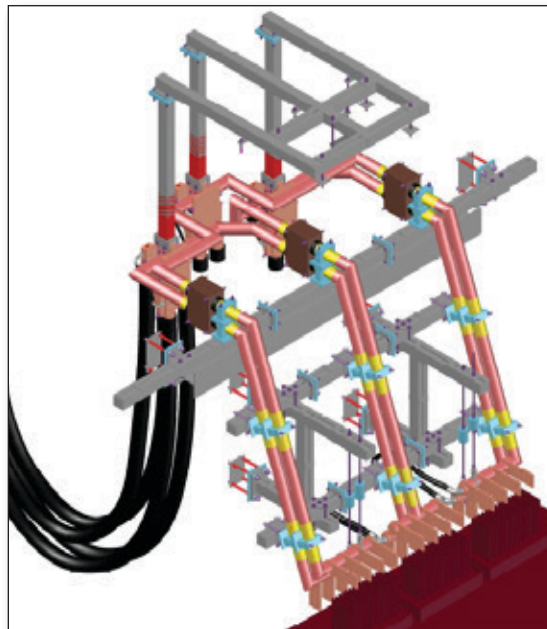
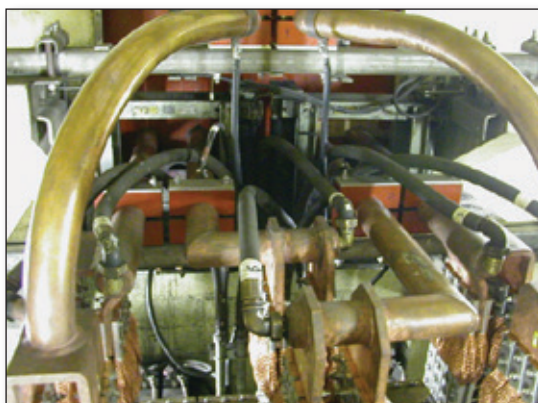
DATA SHEET

P46A

SECONDARY CIRCUITS FOR ELECTRIC ARC FURNACES

- AC or DC electric arc furnaces
- Ladle furnaces
- SAF
- Induction furnaces

- Markets:**
- Steel plants
 - Electrometallurgy
 - Graphitisation
 - Foundries



MAIN FEATURES

- In an arc furnace electrical supply system, the transformer secondary circuit is often considered as a minor part, which does not require any specific attention. It is a fact that it requires very little maintenance, and its influence on the furnace operating parameters is not supposed to vary significantly over time.
- It is however very important to keep in mind that the geometry of the system, and consequently its electrical balancing and the movement of the high current cables, will depend on the original design.
- In many cases, the furnace has been revamped several times, with new electrode arms, new transformer, new operating parameters... and the transformer secondary remains the same throughout the years.



- Solutions can be found to improve the reactance balancing, make a safer supporting and insulation system taking into account the presence of metallic dust and the vibrations of modern transformers.
- E.ITEC® has determined a range of standard components that allows to optimise the design of these secondary circuits, with reasonable prices and delivery times for complete circuits or parts.



SECONDARY CIRCUITS FOR ELECTRIC ARC FURNACES

DESIGN :

- Based on a standard range of water cooled copper tubes with a thickness of 10 to 15 mm, which is the best compromise between electrical and mechanical parameters. It takes the skin effect into account, and allows to either bend or weld the tubes, depending on the geometrical requirements.
- The design current density in the tubes is 5A/mm² +/- 10%. Air-cooled parts (contact plates) have a lower current density, between 1.25 and 3 A/mm², which depends on the distance to the water cooled parts.
- Bending is made without heating the tubes, by hammering from inside, which allows to reduce the ovality of the tubes, and keeps their mechanical properties. A common alternative is to weld the tubes with 90° angles, this process being perfectly mastered by E.ITEC®.
- Assembly is made by MIG welding (no TIG). Alternatively, silver brazing can be used for some parts.
- The water cooling circuit can be common to all tubes, or split into phases, depending on the actual layout.
- Most insulating parts are made of epoxy glass or polyester (depending on the area). There is always a double insulation between the conductors and the earth.
- The supporting structure is made of non-magnetic stainless steel. It can also include some parts made of laminated hardwood. As an option, this supporting structure can also be locally water cooled.

To optimize the yield of the energy supply, our designs are studied with the FLUX software for electric and thermal simulations. This electrical study will determine the layout of the circuit. Therefore, in most cases, replicating an existing layout will not be the solution recommended by E.ITEC®.

RANGE:

OPEN DELTA

Type	OD25	OD30	OD40	OD50	OD60	OD70	OD85
Electrode current	22 à 27 kA	27 à 33 kA	33 à 42 kA	42 à 53 kA	53 à 65 kA	65 à 78 kA	78 à 94 kA
Tube size (Ext Dia x Th)	100 x 10 mm	120 x 10 mm	120 x 13 mm	133 x 15 mm	160 x 15 mm	190 x 15 mm	225 x 15 mm
Copper cross section	2827 mm ²	3456 mm ²	4370 mm ²	5561 mm ²	6833 mm ²	8247 mm ²	9896 mm ²
Weight /m	25,2 kg/m	30,8 kg/m	38,9 kg/m	49,5 kg/m	60,8 kg/m	73,4 kg/m	88,1 kg/m

CLOSED DELTA

Type	CD28	CD35	CD45	CD55	CD70	CD80	CD100
Electrode current	25 à 31 kA	31 à 38 kA	38 à 48 kA	48 à 61 kA	61 à 75 kA	75 à 90 kA	90 à 108 kA
Tube size (Ext Dia x Th)	100 x 10 mm	120 x 10 mm	120 x 13 mm	133 x 15 mm	160 x 15 mm	190 x 15 mm	225 x 15 mm
Copper cross section	2827 mm ²	3456 mm ²	4370 mm ²	5561 mm ²	6833 mm ²	8247 mm ²	9896 mm ²
Weight /m	25,2 kg/m	30,8 kg/m	38,9 kg/m	49,5 kg/m	60,8 kg/m	73,4 kg/m	88,1 kg/m

SAF

Type	S60	S80	S100	S120
Electrode current	45 à 60 kA	60 à 80 kA	80 à 100 kA	100 à 120 kA
Number of tubes	6	8	8	8
Tube size (Ext Dia x Th)	50 x 10 mm	50 x 10 mm	60 x 10 mm	70 x 10 mm
Copper cross section	7542 mm ²	10056 mm ²	12658 mm ²	15080 mm ²
Weight /m	67.1 kg/m	89.5 kg/m	111.8 kg/m	134.2 kg/m



Specific case of Submerged Arc Furnaces (SAF):

In a SAF, the connection is made on the electrodes and the circuits are made with a number of small copper tubes. Hereabove is an exemple of what E.ITEC® can do:

Also available: furnace bustubes and electrode arms