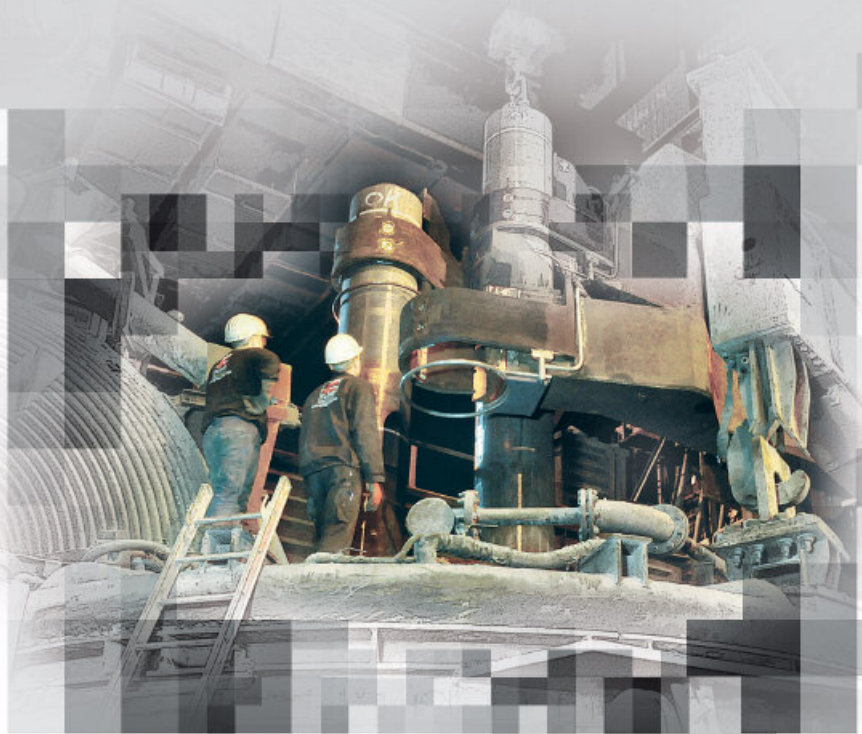
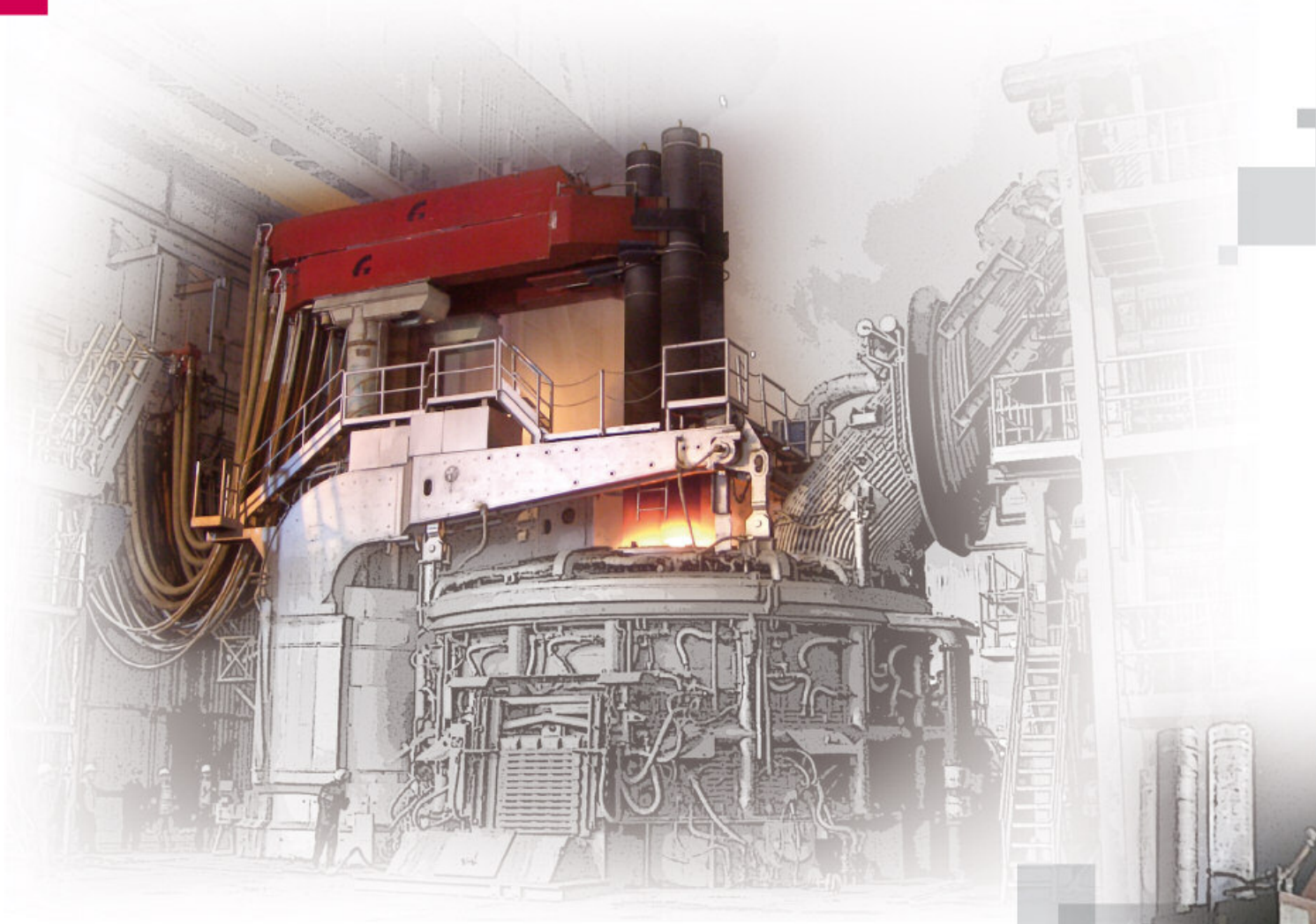




EAFF / LF...





FROM THE DRAFT TO THE CONSTRUCTION OF SPECIALISED DURABLE AND POWERFUL HIGH-CURRENT SYSTEMS

THE PERFORMANCE OF ELECTRIC ARC FURNACES HAS IMPROVED IN LEAPS AND BOUNDS IN RECENT YEARS

FLOHE supplies components for furnace construction that uncompromisingly meet these requirements:

- Current-conducting electrode arms
- Water-cooled high-current cables and conductors
- Low-loss columns and roller boxes

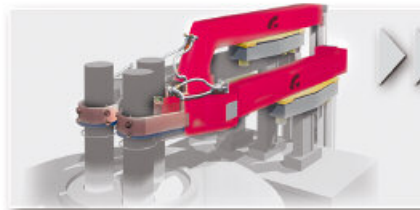
These components are characterised by durability, high availability, optimised current transmission and low maintenance.

HERE WE DRAW ON THE EXTENSIVE EXPERIENCE OF OUR DESIGN AND DEVELOPMENT TEAM WHO HAVE SUCCESSFULLY COMPLETED MORE THAN 200 NEW INSTALLATIONS AND/OR CONVERSIONS WORLDWIDE

CONTENTS

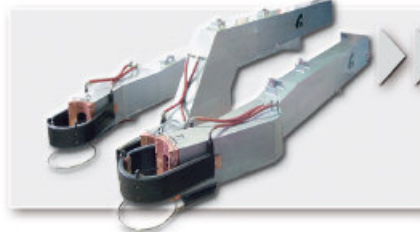
■ BESIDES THE CONSTRUCTION OF NEW INSTALLATIONS, WE ALSO PROVIDE ECONOMIC SOLUTIONS TO REDUCE ENERGY CONSUMPTION, OR TO INCREASE THE PERFORMANCE OF EXISTING INSTALLATIONS.

■ BY APPLYING THE LATEST AND MOST ADVANCED TECHNOLOGIES IN PRODUCTION AND CONSTRUCTION, WE ENSURE THAT YOUR SYSTEMS ARE SUPPLIED WITH ENERGY OPTIMALLY AND COST-EFFICIENTLY.



Overview

Furnace construction 4 - 5



Electrode arms

From copper/steel 6 - 7

From aluminium 8 - 9

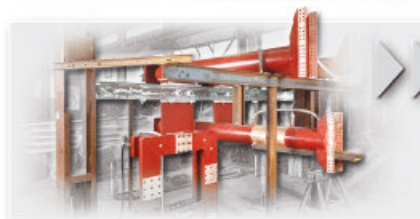


Low-loss columns 10 - 11

Insulation 10



High-current cable 12 - 13



Delta closures 14 - 15



Spare parts 16 - 17



Service 18 - 19

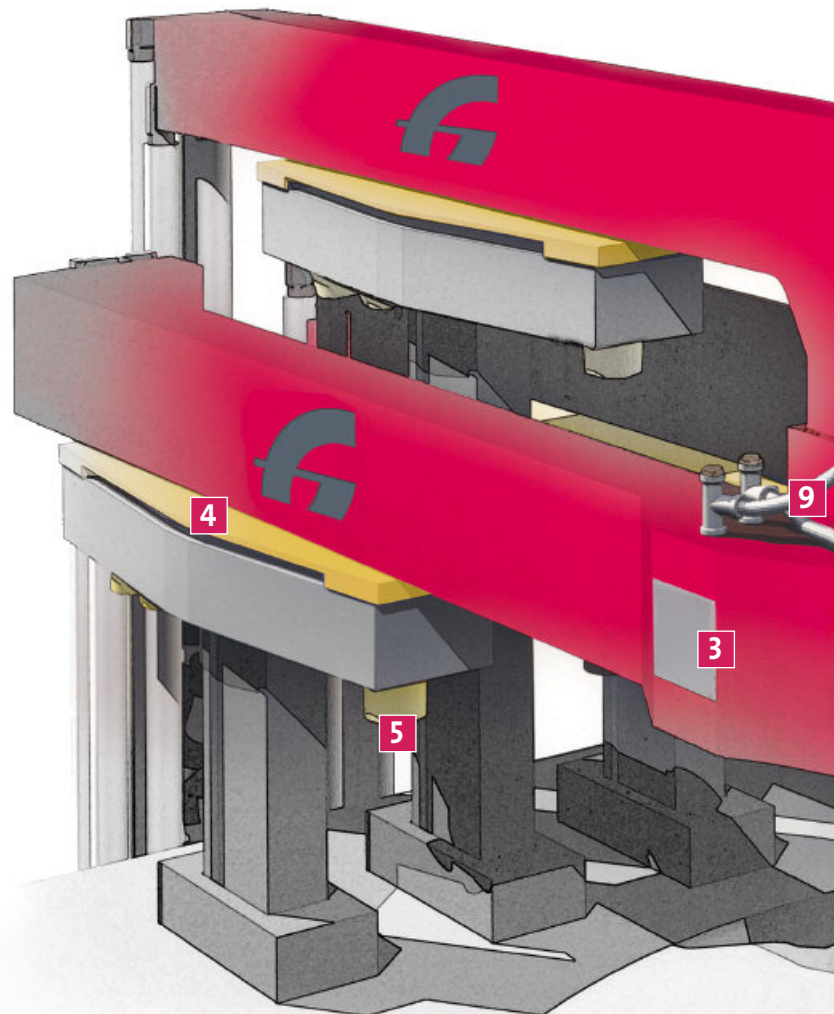
EXPERTISE IN ENGINEERING + PRODUCTION...

A BRIEF HISTORY OF FLOHE

INNOVATIONS IN FURNACE CONSTRUCTION

- 1955 DIFFUSION WELDING
(FLEXIBLE CONNECTION)
- 1962 CABLE COMPRESSION
- 1972 HIGH-CURRENT LINES
- 1984 COPPER/STEEL ELECTRODE ARMS
- 1985 CABLE SWIVELLING DEVICE
- 1991 ALUMINIUM ELECTRODE ARMS
- 1993 DC CHOKES
- 2002 LOW-LOSS COLUMNS
- 2005 CABLE QUICK COUPLING
- 2006 ELECTRONIC CLAMPING FORCE
MEASUREMENT
- 2008 ELECTRODE ARM AC Ø 762
- 2011 COPPER CRUCIBLES

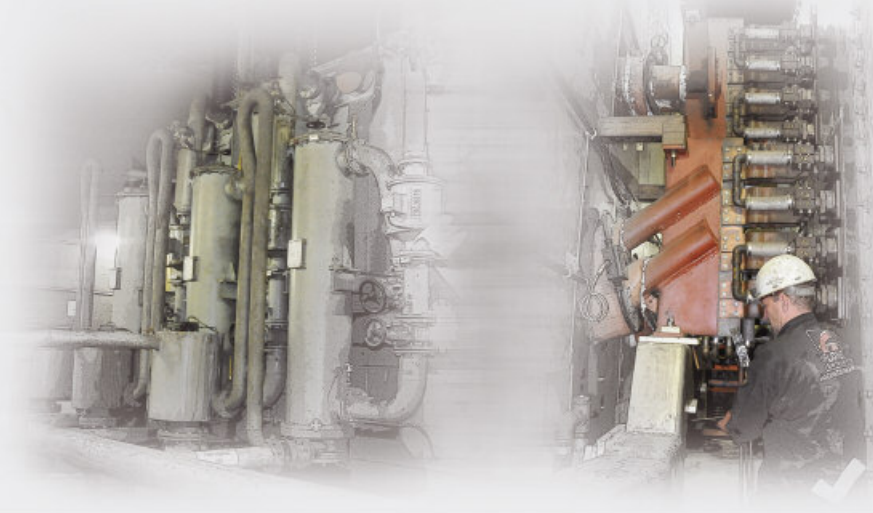
WE SUPPLY
100 COUNTRIES
WORLDWIDE



...FROM INDIVIDUAL COMPONENTS
THROUGH TO COMPLEX HIGH-CURRENT SYSTEMS

■ FLOHE HAS BEEN SUPPLYING HIGH-CURRENT LINES FROM THE OUTPUT TRANSFORMER TO THE CABLE FOR MORE THAN FOUR DECADES

■ FLOHE SUPPLIES THE ENTIRE RANGE HIGH-CURRENT CABLES OF ALL SIZES – FROM THE WIRE TO THE FINISHED CABLE



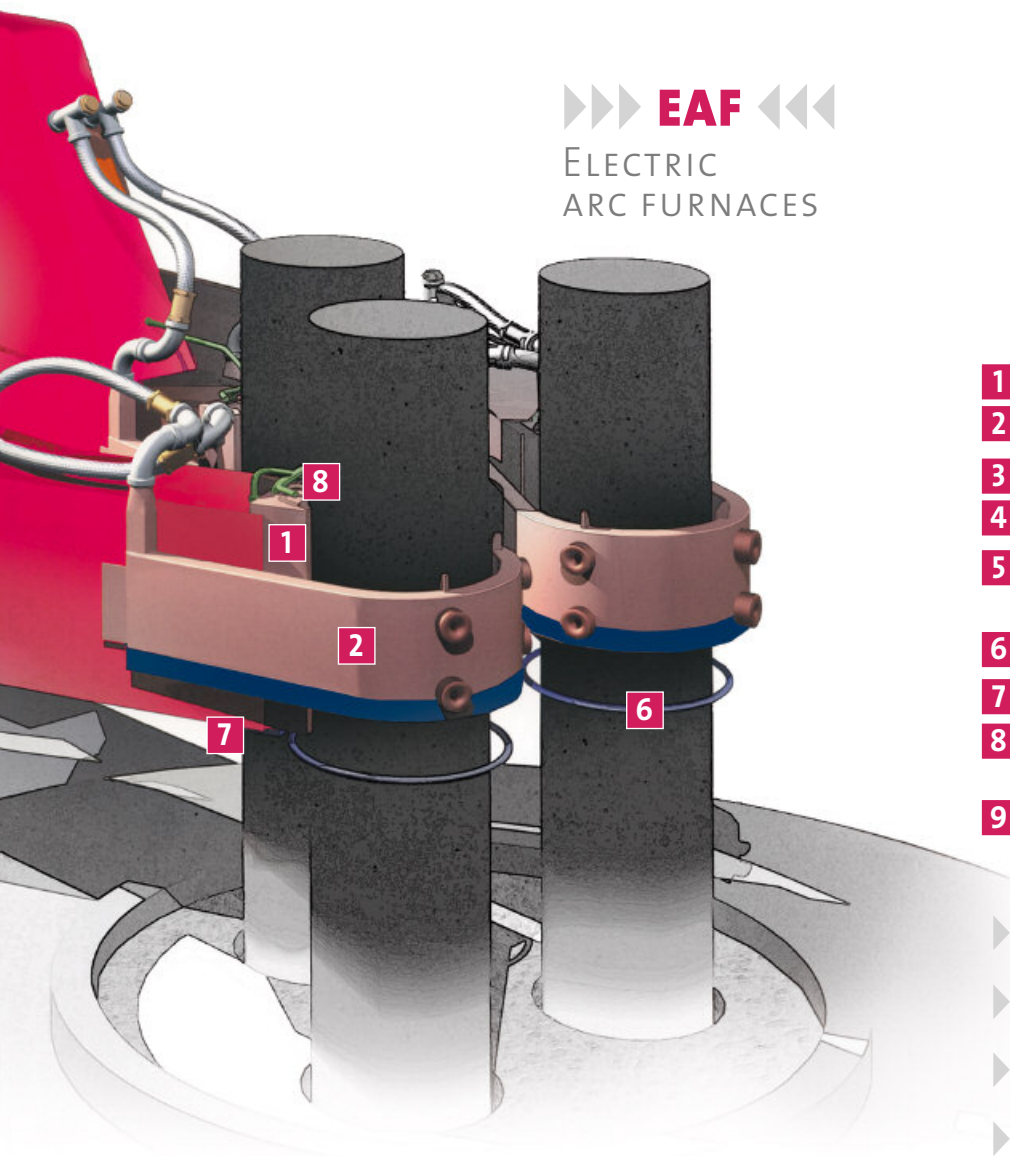
FURNACE CONSTRUCTION COMPONENTS

▶▶ EAF ◀◀

ELECTRIC
ARC FURNACES

▶▶ LF ◀◀

LADLE FURNACES FOR
SECONDARY METALLURGY



DETAILS OF ELECTRODE ARMS ...

- 1 CONTACT SHOE
- 2 ELECTRODE HOLDER
- 3 CLAMPING DEVICE
- 4 MAIN INSULATION
- 5 EXPANSION BOLTS WITH QUICK FASTENING
- 6 SPRAY RING
- 7 HEAT SHIELD
- 8 BLOW-OFF UNIT FOR CONTACT SURFACES
- 9 COOLING WATER HOSES

ADVANTAGES...

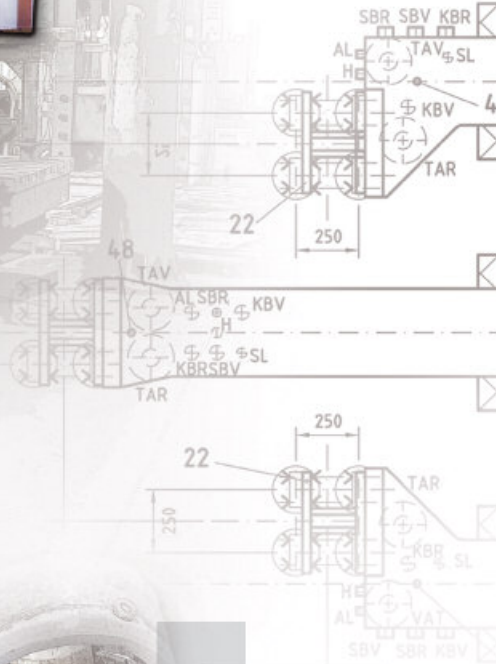
- ▶ Interchangeable spare part components – copper/steel to aluminium
- ▶ Electrode arm designed for 2 electrode sizes
- ▶ Independent temperature monitoring of individual components possible
- ▶ Simple column fastening system

■ FLOHE IS THE WORLD'S ONLY MANUFACTURER OF ALL ELECTRODE ARM SYSTEMS – CONVENTIONAL & CURRENT-CONDUCTING ELECTRODE ARMS MADE OF COPPER/STEEL AND ALUMINIUM





ENGINEERING, STRUCTURAL DESIGN,
PRODUCTION AND COMMISSIONING
FROM A SINGLE SOURCE



CURRENT-CONDUCTING
COPPER/STEEL ELECTRODE ARM
Ø 618 MM · KUMBA, ZA



ELECTRONIC
CLAMPING FORCE
MEASURING DEVICE

CURRENT-CONDUCTING ELECTRODE ARMS

▶▶ FROM COPPER/STEEL ◀◀

FOR ELECTRODE SIZES OF \varnothing 100-800 MM

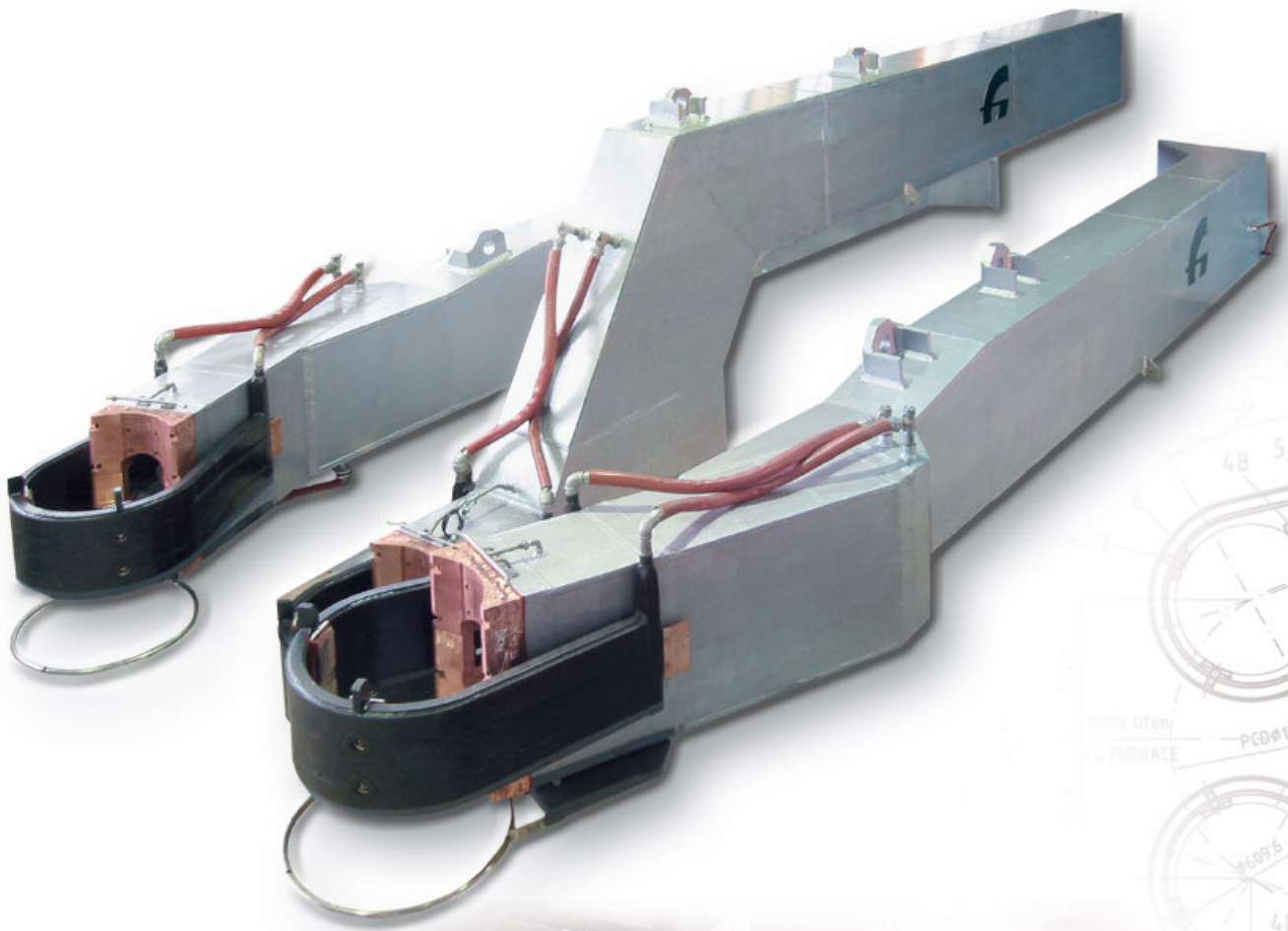
ADVANTAGES...

- LOW OPERATING COSTS
- SHORT DOWNTIMES
- EASY HANDLING
- PERFECT SYMMETRY
- MAXIMUM EFFICIENCY



▶ \varnothing 711.2 MM · FOR 86 kA · IN OPERATION SINCE 1996
FACTORY: OUTOKUMPU NIROSTA · BOCHUM

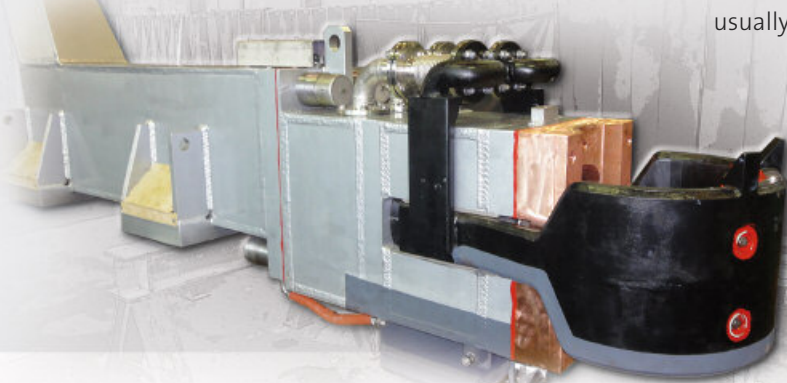




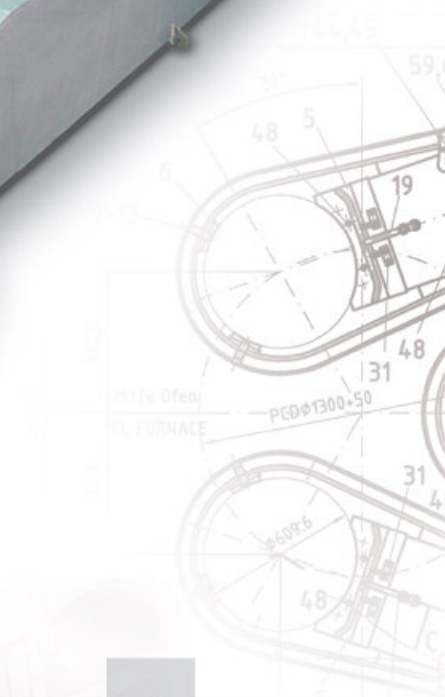
FOR UHP FURNACES AND LADLE FURNACES

■ Due to the material used and their design, current-conducting FLOHE aluminium electrode arms have ensured low electrical operating costs, low graphite consumption, higher travel speeds, easy handling, perfect symmetry and maximum efficiency since 1991.

■ The weight advantage make aluminium electrode arms ideal for modifications to existing furnaces, since changes to peripheral components are usually not required.



▶ INTERNAL
NON-DESTRUCTIVE
TECHNOLOGY



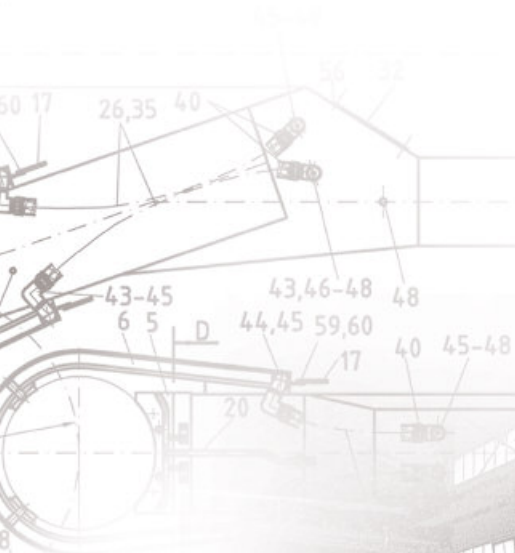
CURRENT-CONDUCTING ELECTRODE ARMS

▶▶ FROM ALUMINIUM ◀◀

FOR ELECTRODE SIZES OF \varnothing 100-800 MM

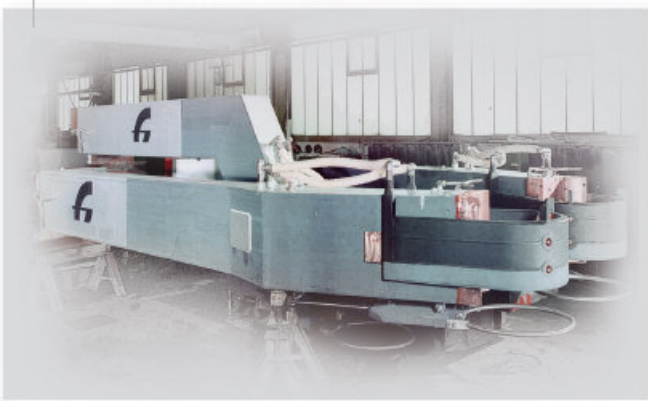
ADVANTAGES...

- 30% WEIGHT SAVING
- LOW ELECTRICAL RESISTANCE
- BETTER CONTROL SYSTEM RESPONSE
- EASIER MAINTENANCE



▶ \varnothing 609.6 MM · FOR 60 KA · TRIANGULATED DESIGN
FACTORY: NKMK · RUSSIA

▶ \varnothing 558.8 MM · FOR 47 KA · TRIANGULATED DESIGN
FACTORY: ONE STEEL · AUSTRALIA



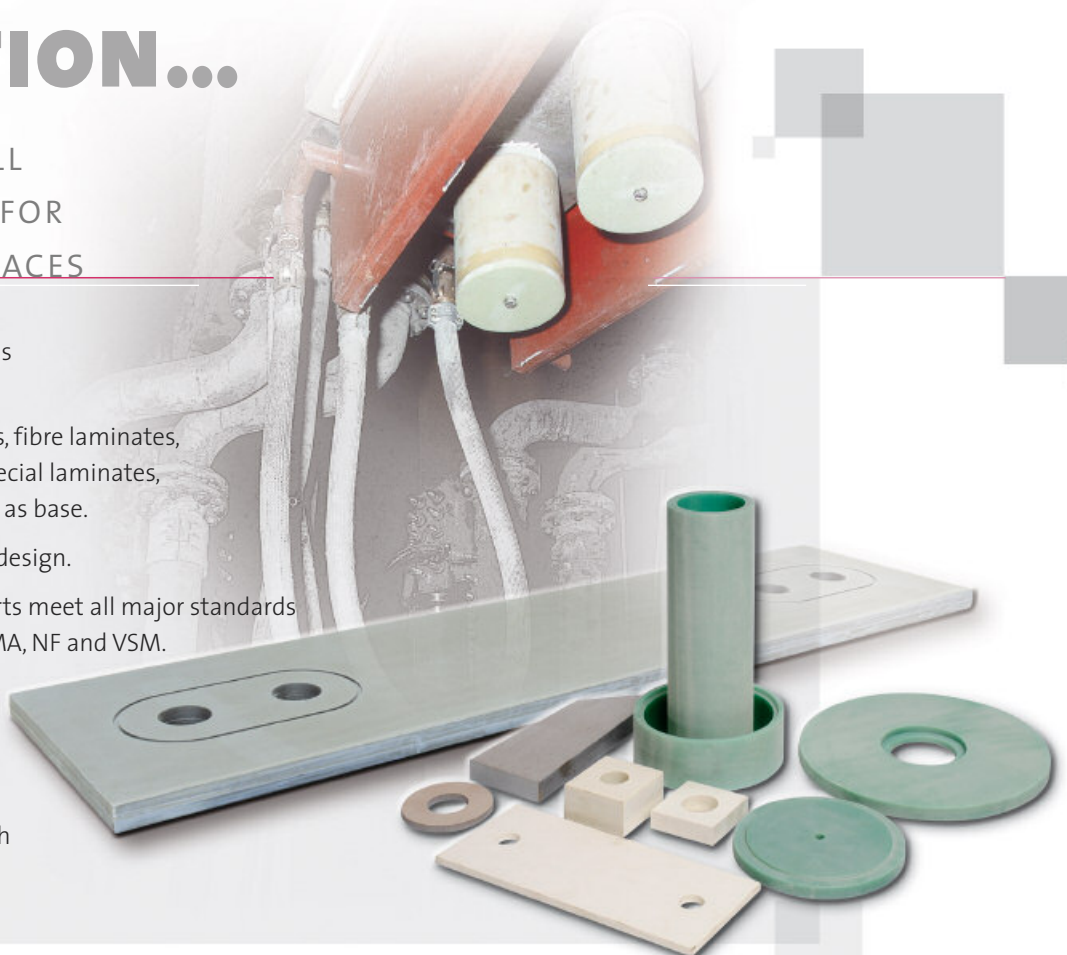
LOW-LOSS COLUMNS...



INSULATION...

FLOHE SUPPLIES ALL
INSULATING PARTS FOR
ELECTRIC ARC FURNACES

- Our product range comprises all sizes and materials.
- We use glass fibre laminates, fibre laminates, resin-bonded glass mats, special laminates, paper laminates or plywood as base.
- We will create your custom design.
- Of course, our insulating parts meet all major standards such as DIN, EN, IEC, BS, NEMA, NF and VSM.
- Our standard insulation materials are designed for a temperature of 180 °C. We achieve temperature resistance up to 1200 °C with special materials.



Low-Loss COLUMNS

TO COMPLETE THE RANGE, FLOHE PRODUCES SO-CALLED LOW-LOSS COLUMNS.

- In furnaces with current-conducting electrode arms, column heads are heated due to the geometric arrangement. The heat is dissipated through the corresponding water cooling.
- By introducing a new geometric arrangement and special material, it is possible to reduce the loss by at least 75%.
- Modification of the column or the column heads usually pays for itself within 6 months.



LOSS REDUCTION
BY AT LEAST
75%



ROLLER BOX

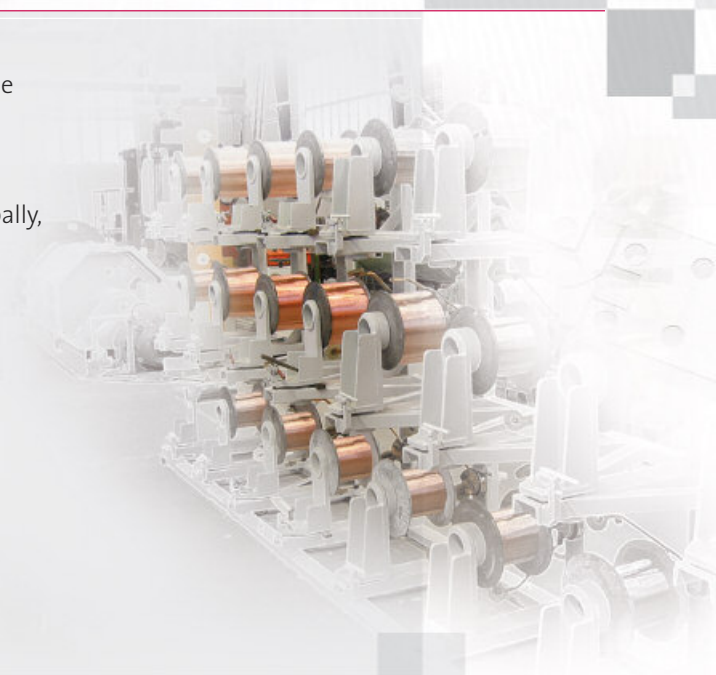
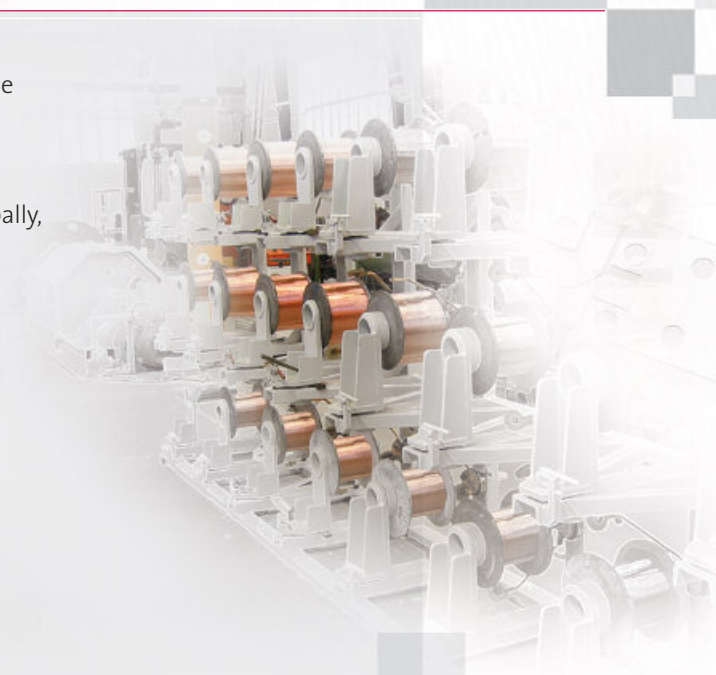


Long service life
Optimum geometry
Top quality

FROM THE WIRE TO THE FINISHED CABLE —
FLOHE SUPPLIES THE ENTIRE RANGE

- Due to the strong increase in the electric furnace performance, the air-cooled cable originally used have almost completely been replaced by water-cooled cables.
- Today, almost only ultra-high-power furnaces (UHP) are built globally, in which water-cooled multicore cables are used.
- FLOHE has developed a multicore cable that meets the special requirements of modern high-power furnaces.

FOR DETAILED INFORMATION, PLEASE SEE OUR
'HIGH-CURRENT CABLES' BROCHURE.



HIGH-CURRENT CABLES

IN THE LAST 5 DECADES, FLOHE HAS SUPPLIED WELL OVER 1,000 ARC AND LADLE FURNACES WITH HIGH-CURRENT CABLES OF ALL SIZES BOTH LOCALLY AND ABROAD

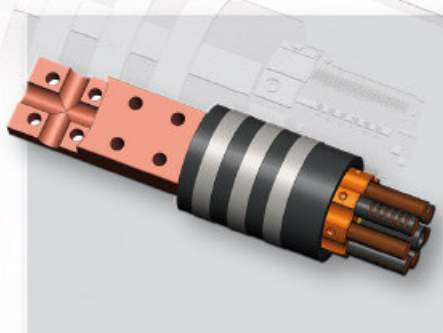
OUR MAIN FOCUS WAS ON:

- Optimum current transmission
- Low electric losses
- Long service life
- Optimum cooling water flow
- Easy handling
- Low maintenance
- Quick installation and dismantling



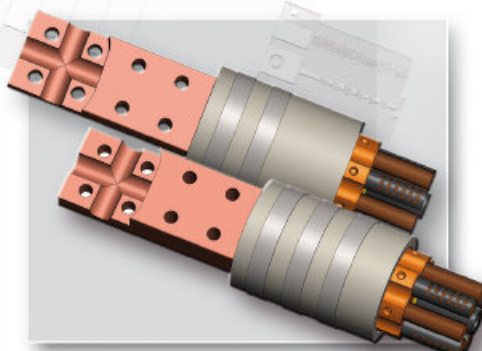
TYPE FHW

▶▶ THE CLASSIC TYPE ◀◀



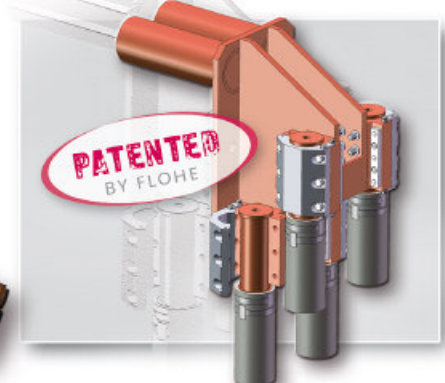
TYPE FHWI

▶▶ THE INTERNATIONAL TYPE ◀◀

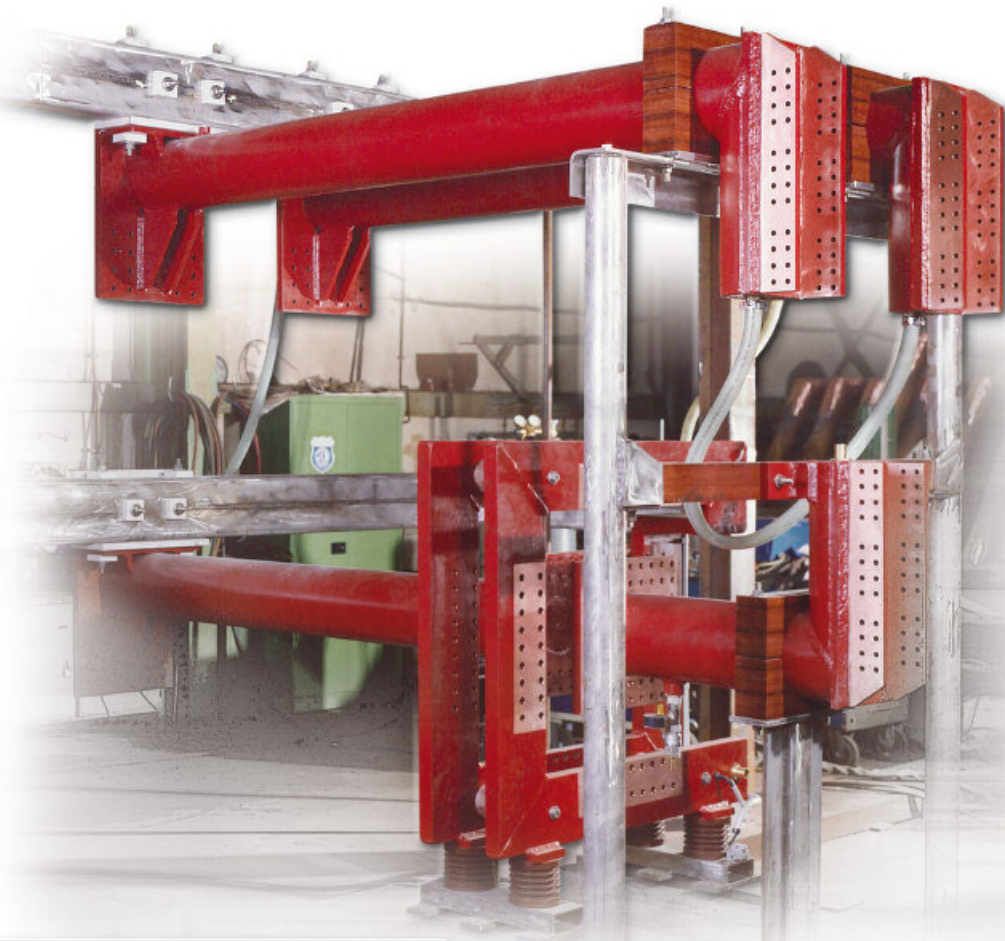


TYPE FHWNT

▶▶ THE FAST TYPE ◀◀

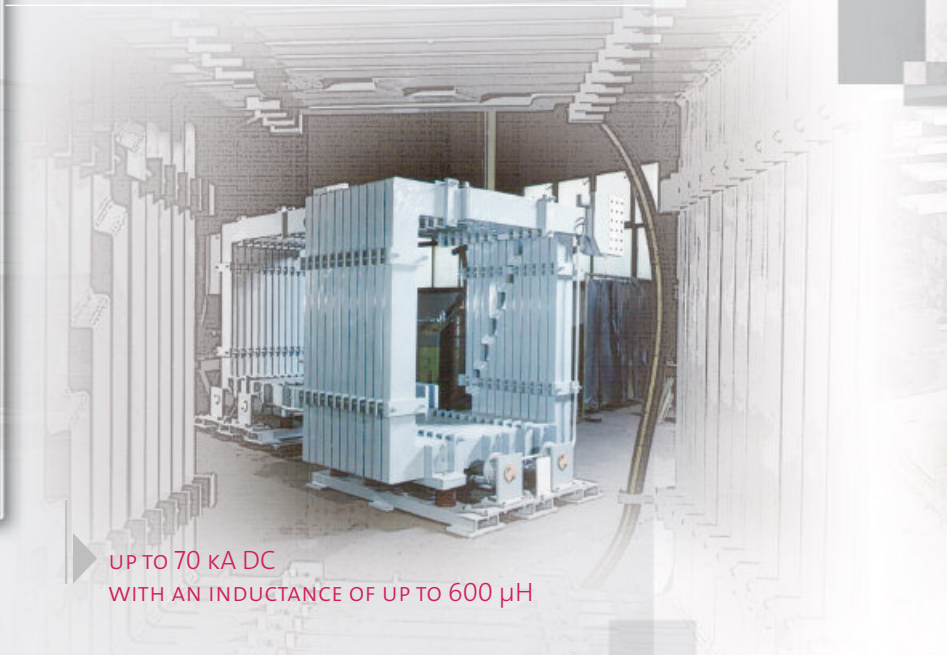


HIGH-CURRENT LINE DELTA CLOSURE



FURNACE FLOOR
NAMAKWA SANDS \varnothing 7.0 M

HIGH-CURRENT CHOKES

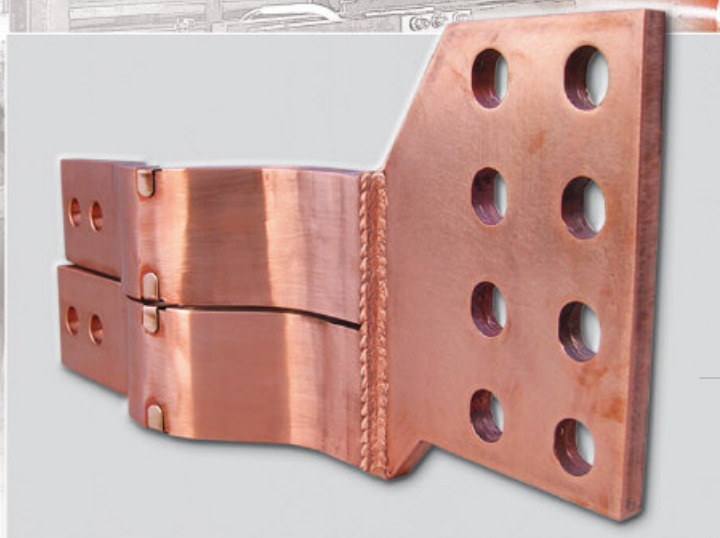


UP TO 70 kA DC
WITH AN INDUCTANCE OF UP TO 600 μ H

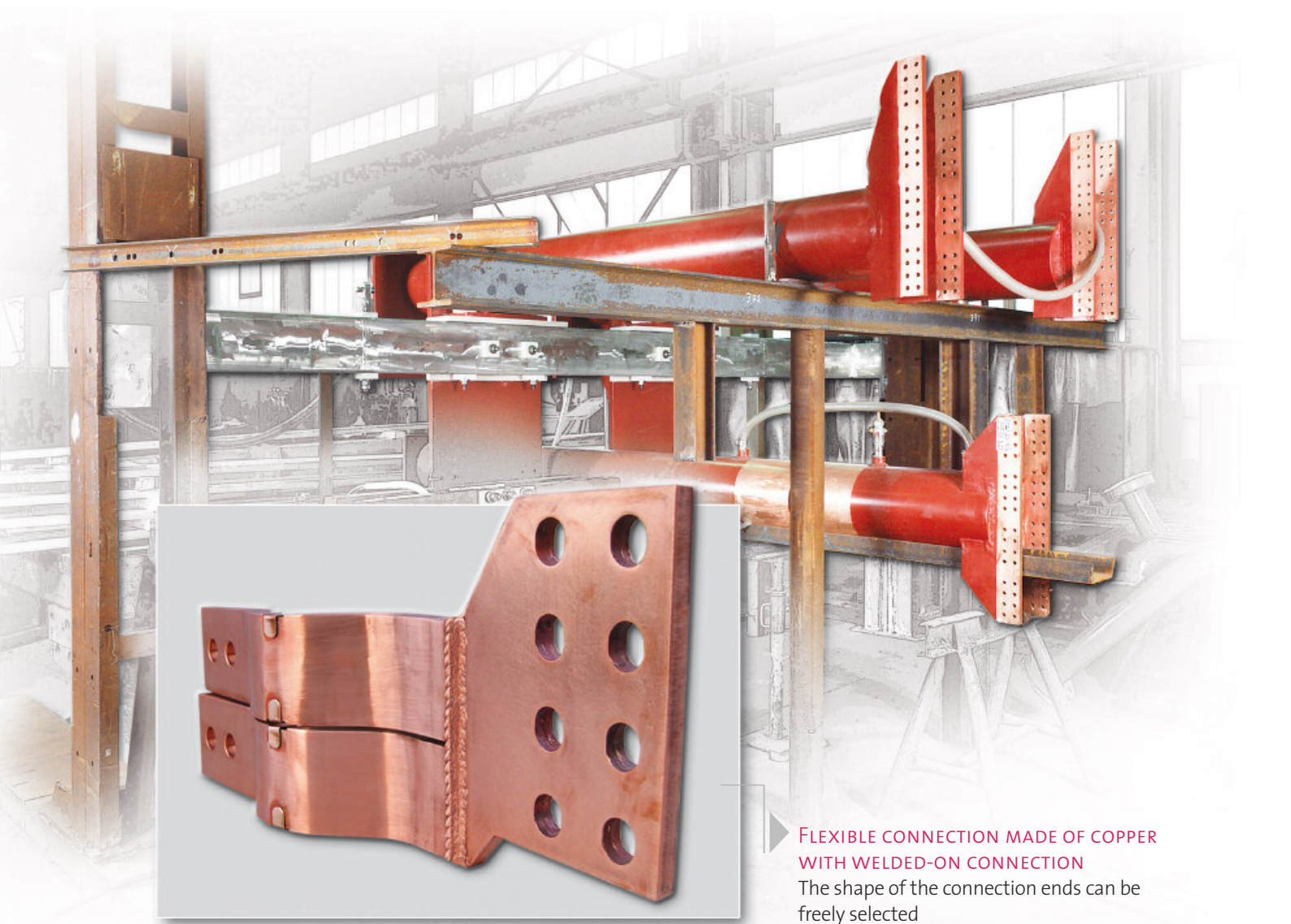
DELTA CLOSURE

FLOHE HAS BEEN SUPPLYING HIGH-CURRENT LINES FROM THE OUTPUT TRANSFORMER TO THE CABLE FOR MORE THAN FOUR DECADES.

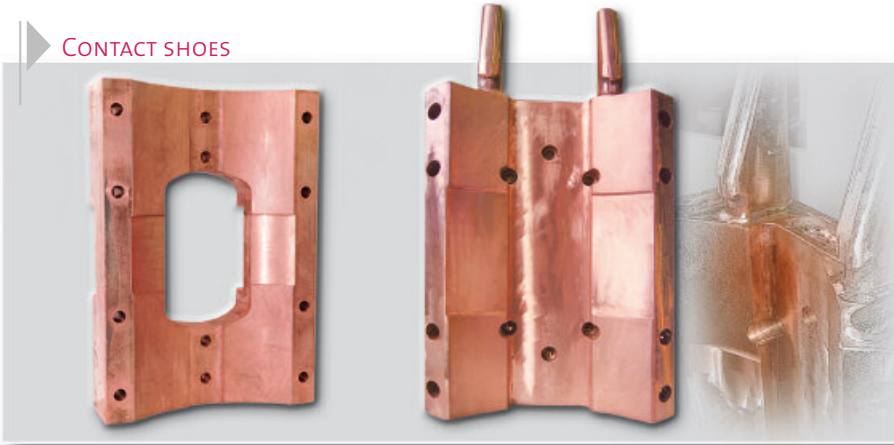
- These are designed for UHP and ladle furnaces and based on the latest technology.
- Our high-current lines can be designed for a current of 100 kA and a voltage up to 1500 V.



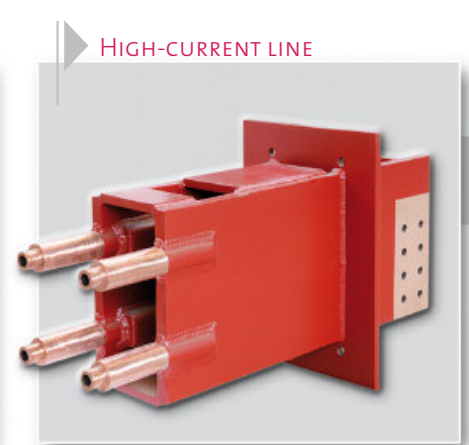
▶ **FLEXIBLE CONNECTION MADE OF COPPER WITH WELDED-ON CONNECTION**
The shape of the connection ends can be freely selected



CONTACT SHOES



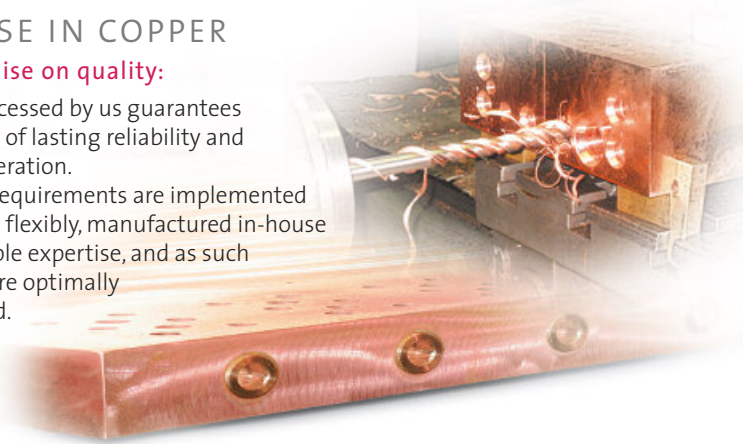
HIGH-CURRENT LINE



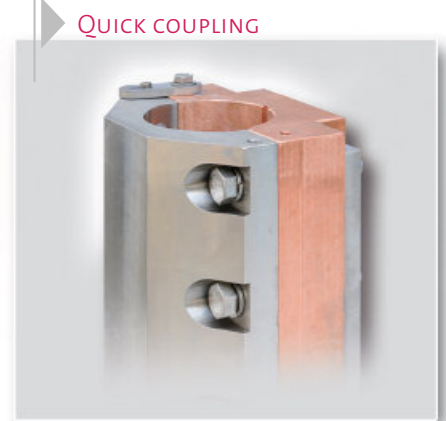
EXPERTISE IN COPPER

No compromise on quality:

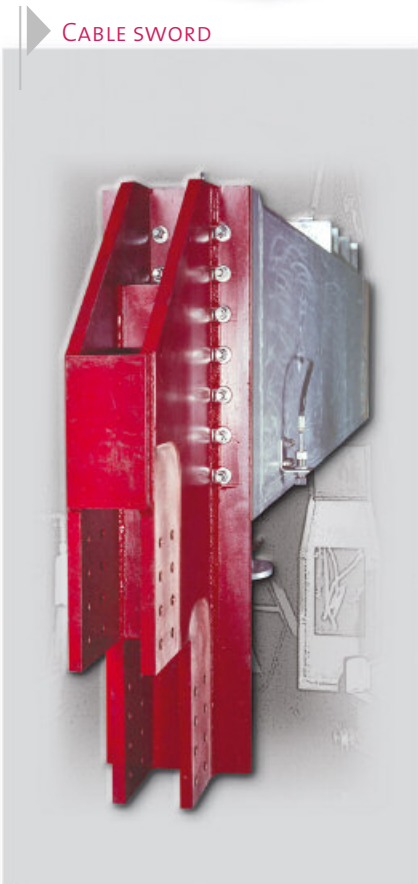
- Copper processed by us guarantees a high level of lasting reliability and smooth operation.
- Customer requirements are implemented quickly and flexibly, manufactured in-house with valuable expertise, and as such all stages are optimally coordinated.



QUICK COUPLING



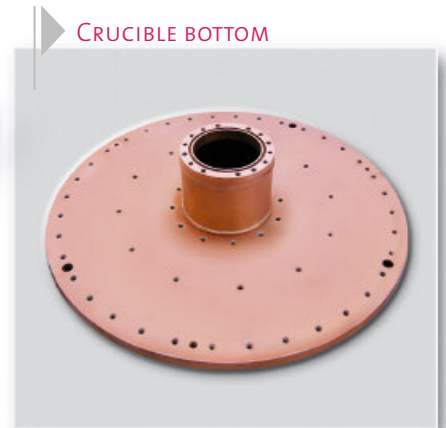
CABLE SWORD



TRANSFORMER TERMINAL



CRUCIBLE BOTTOM



▶ SPRAY SHIELD



SPARE PARTS

FLOHE has been committed to impeccable quality and guaranteed provision of spare parts for decades.

▶ PISTON ROD



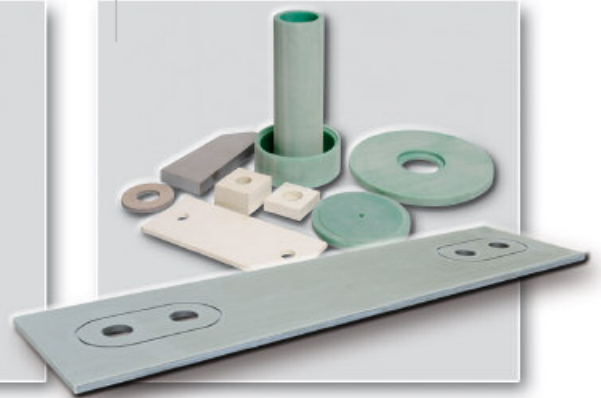
▶ CLAMPING DEVICE



▶ DISC SPRING STACK



▶ INSULATING PARTS & MAIN INSULATING PLATE



▶ ELECTRODE HOLDER



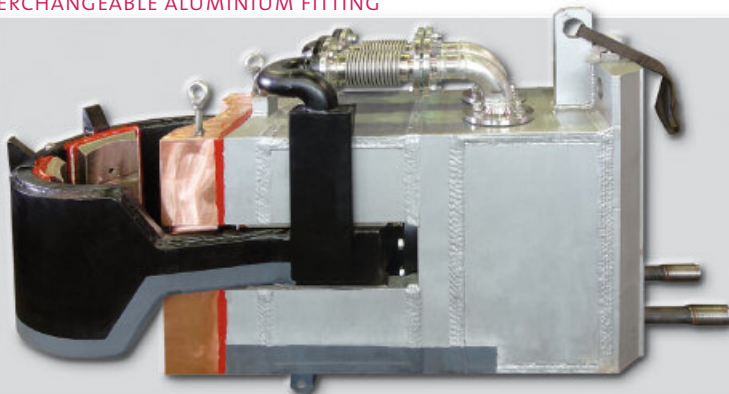
▶ PRESSURE SHOE



▶ QUICK-ACTION NUT



▶ INTERCHANGEABLE ALUMINIUM FITTING





IN THE FIELD OF ELECTRIC FURNACES...

- All incidental work on the electrode arms in the area of: Maintenance and repairs
 - ▶▶ of conventional and current-conducting electrode arms
- Installation and alignment of electrode arms
- All incidental work on the high-current line in the area of maintenance and repairs
 - ▶▶ Inspection and replacement of components
- Manufacture and supply of spare parts according to drawing or sample
- Insulation measurement
- Replacement of insulation between arm and column
- Cable exchange
 - ▶▶ and on-site repairs at hose exchange
- Column exchange
- Regulating cylinder exchange
- Exchange of rolls / roller blocks
- Setting of guide columns
- Inspection and replacement of cooling water hoses
- All on-site repair welds on steel, stainless steel, aluminium or copper components



SERVICE

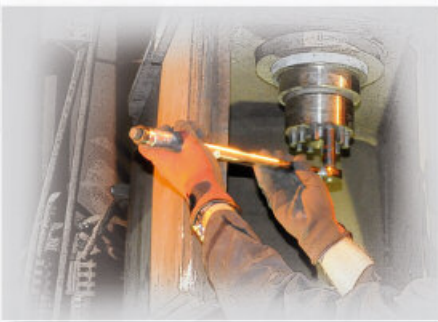
WITH A TEAM OF EXPERTS WE PROVIDE YOU WITH THE FOLLOWING SERVICES:

DESIGN...

- Feasibility studies
- Dimensioning of furnace transformers, chokes and lines
- Furnace design
- Preparing specifications up to high-voltage level
- Selecting the operating points

OPERATION...

- Commissioning
- Electric measurements on furnaces, transformers, etc.
- Electric, mechanical and hydraulic troubleshooting
- Control settings on furnaces from various manufacturers
- Improvement of processes, optimisation of operating points
- Fault analyses: Transformer oil, graphite consumption, etc.
- Training: Electrical engineering for arc furnaces



PRODUCT OVERVIEW ...

FOR MORE THAN 60 YEARS:

**EXPERTISE IN
ENGINEERING + PRODUCTION**

...FROM INDIVIDUAL COMPONENTS THROUGH
TO COMPLEX HIGH-CURRENT SYSTEMS



▶ HIGH-CURRENT CABLES



▶ ELECTROSLAG REMELTING
PLANT



▶ SWITCHING EQUIPMENT



▶ FLEXIBLE CONNECTIONS



▶ ELECTROLYSIS: BUSBARS



www.FLOHE.com

WE WILL GLADLY
ADVISE YOU...

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