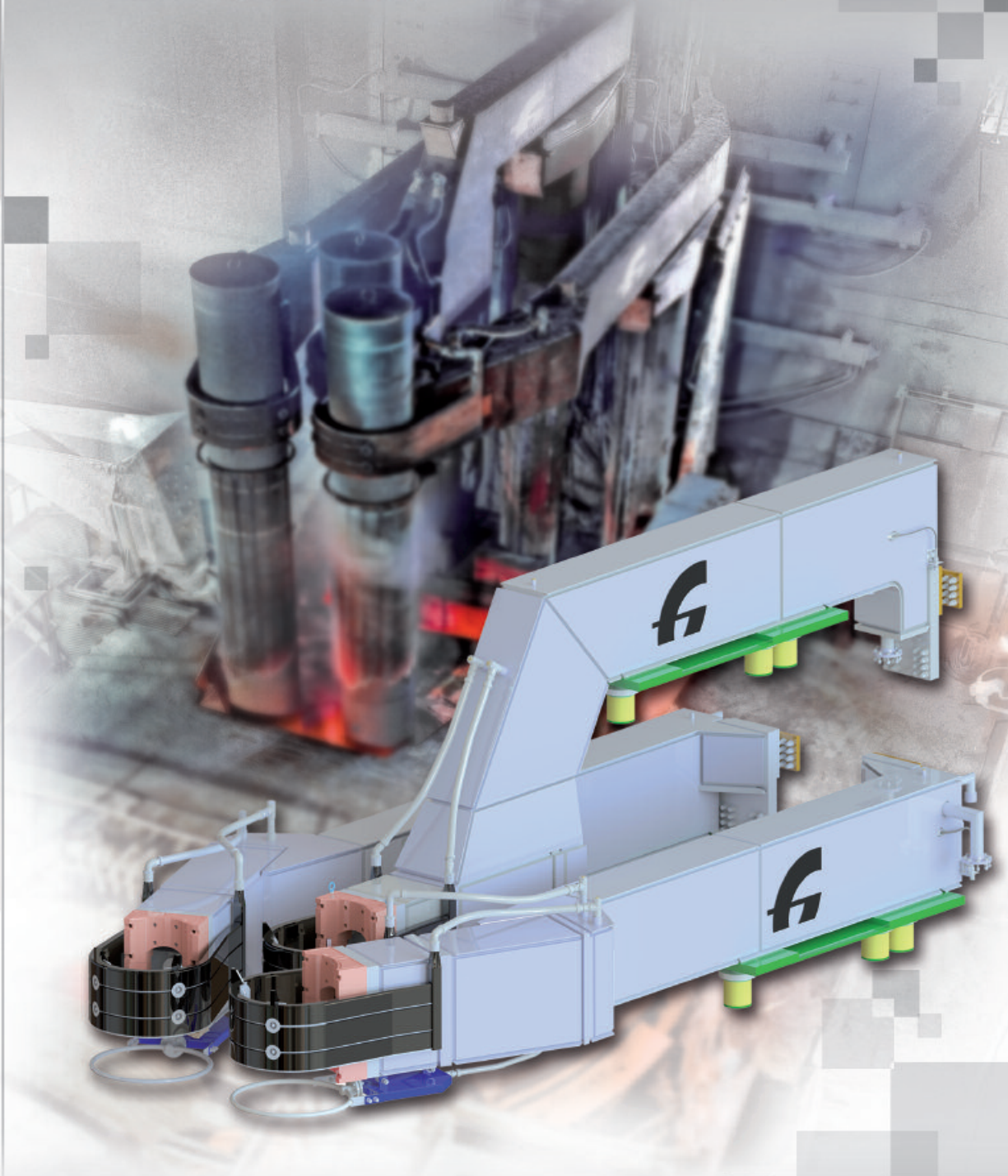
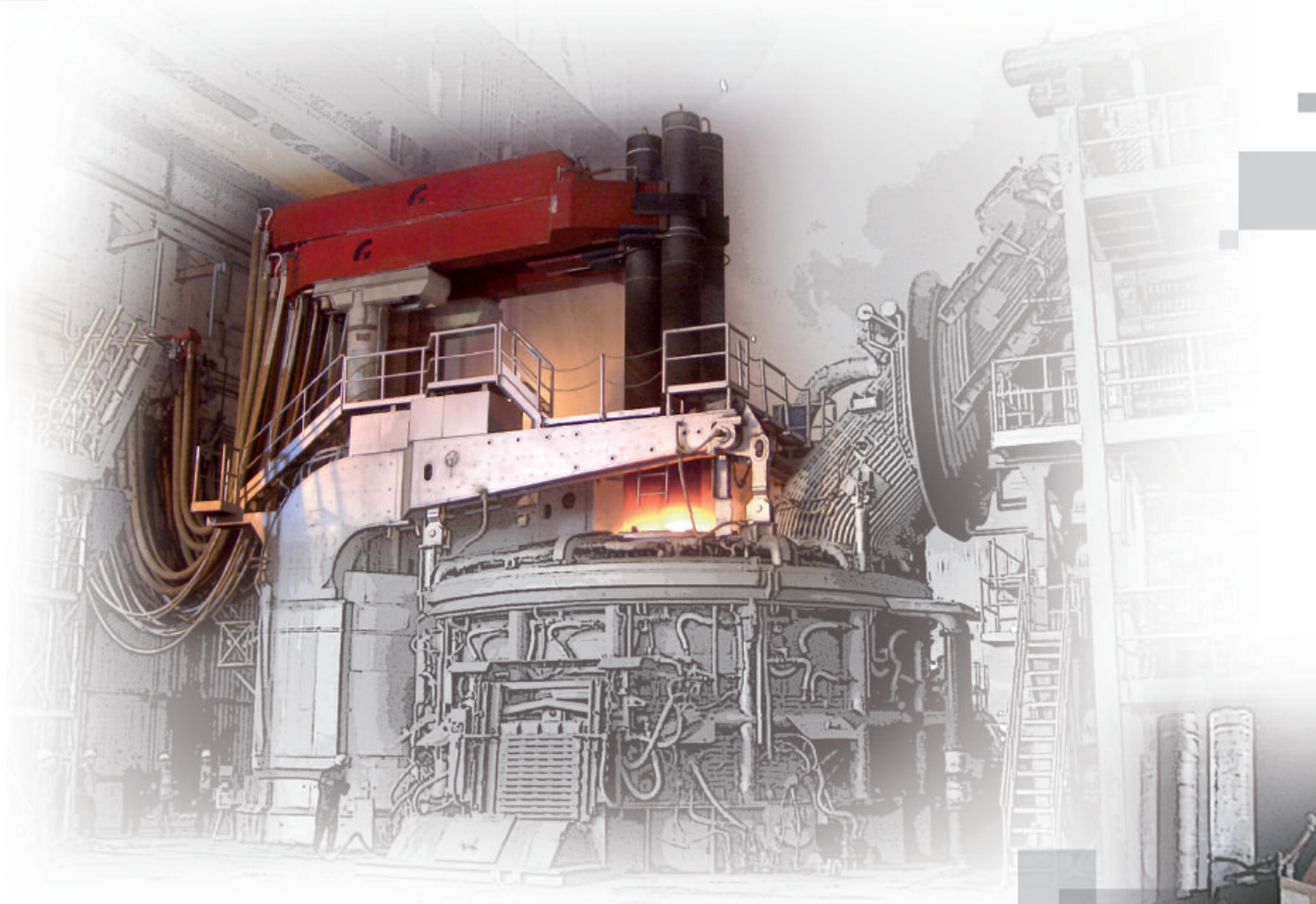




EAF / LF...





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.

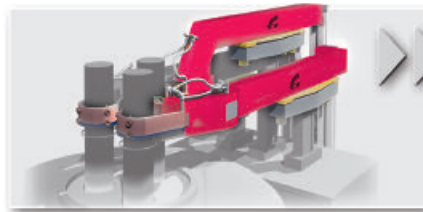
With the FLOHE design, the special focus was put on a low maintenance effort.

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

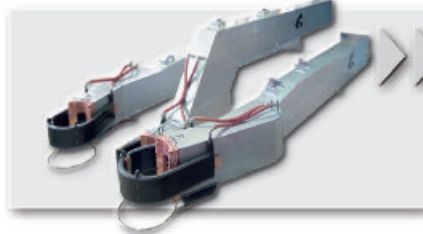
■ BESIDES THE CONSTRUCTION OF NEW INSTALLATIONS, WE ALSO PROVIDE ECONOMIC SOLUTIONS TO REDUCE ENERGY CONSUMPTION, OR TO INCREASE THE PERFORMANCE OF EXISTING INSTALLATIONS.

■ 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

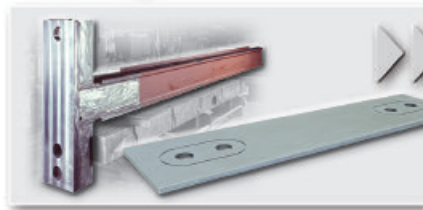
Furnace construction 4 - 5



Electrode arms

From copper/steel 6 - 7

From aluminium 8 - 9

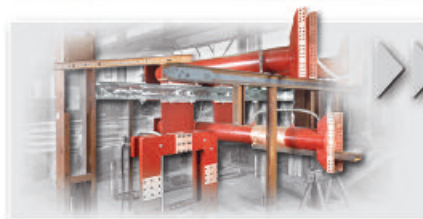


Low-loss columns 10 - 11

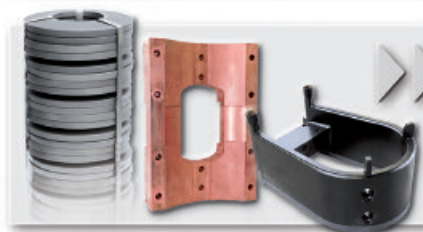
Insulation 10



High-current cable 12 - 13



Delta closures 14 - 15



Spare parts 16 - 17



Service 18 - 19

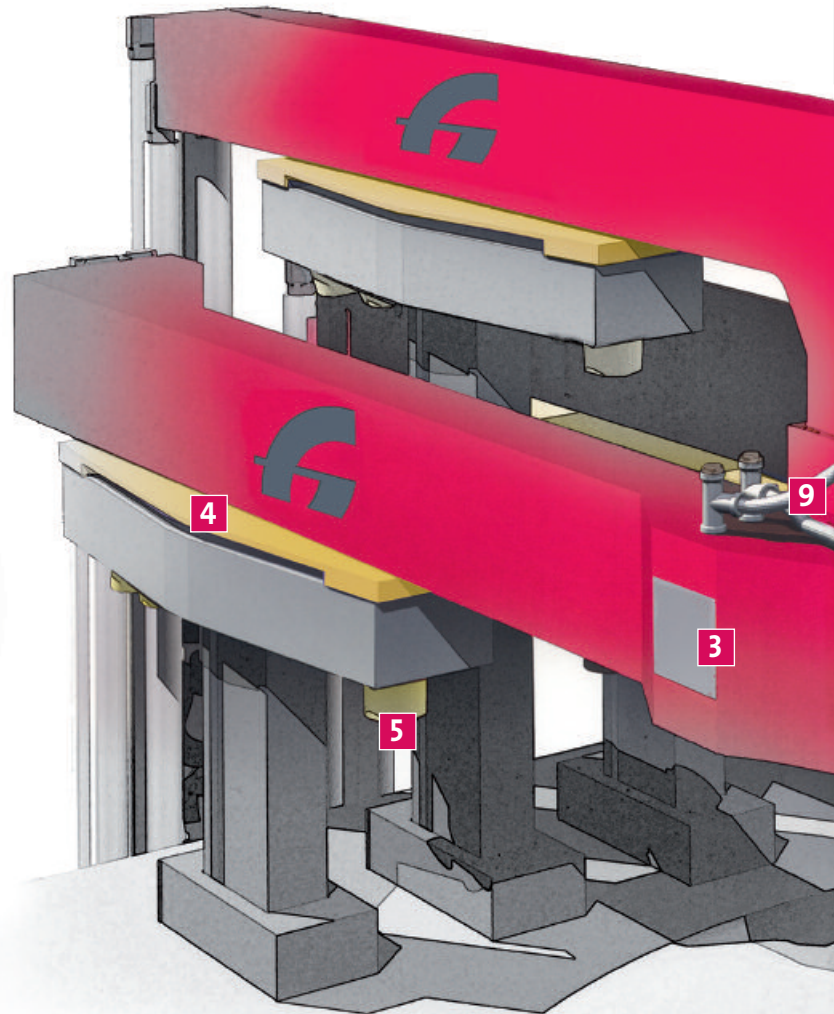


A BRIEF HISTORY OF FLOHE

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 |
| 2017 | ROTATION DEVICE LUBRICATION |
| 2019 | TRAGARM LIGHT |

WE SUPPLY
100 COUNTRIES
 WORLDWIDE

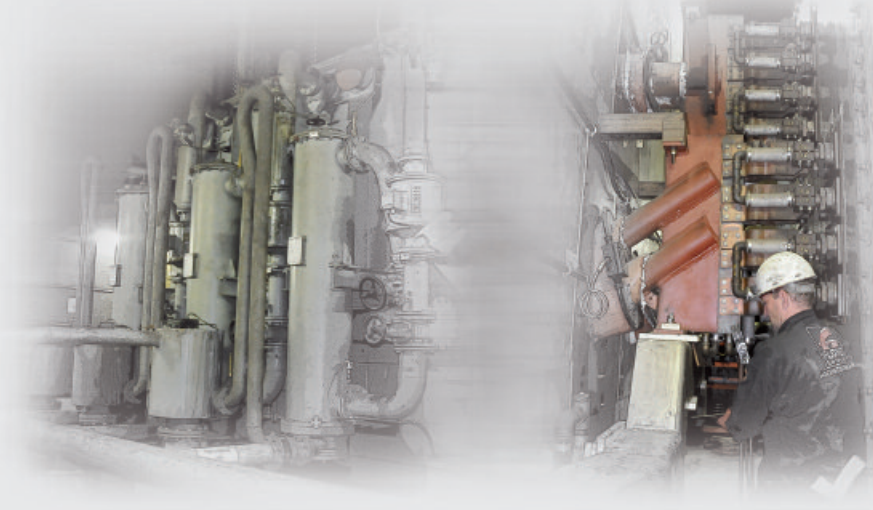


...FROM INDIVIDUAL COMPONENTS

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...

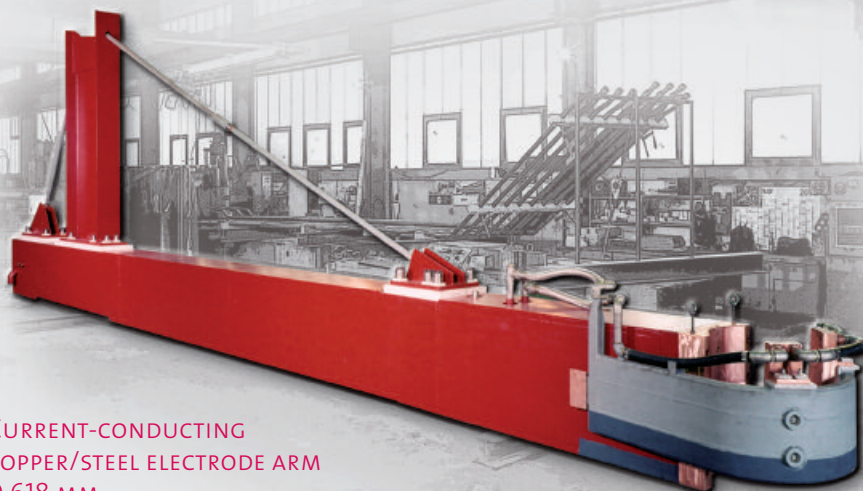
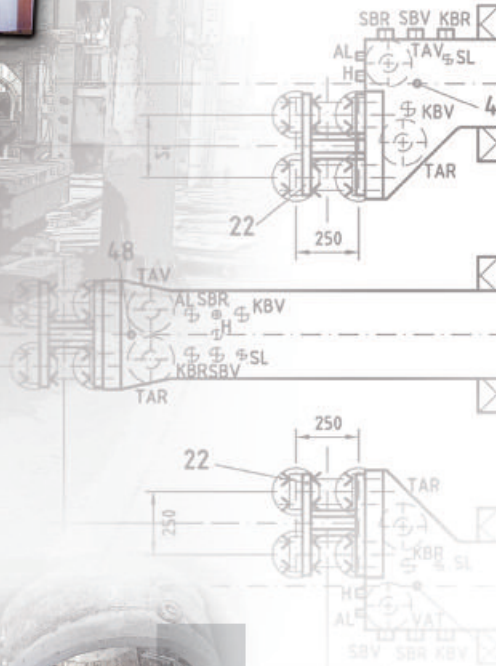
- ▶ Interchangeable spare part components – copper/steel to aluminium
- ▶ Electrode arm designed for 2 electrode sizes
- ▶ Independent temperature monitoring of individual components possible
- ▶ Simple column fastening system

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

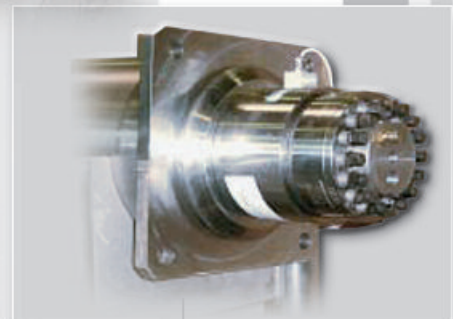




ENGINEERING, STRUCTURAL DESIGN,
PRODUCTION AND COMMISSIONING
FROM A SINGLE SOURCE



CURRENT-CONDUCTING
COPPER/STEEL ELECTRODE ARM
Ø 618 MM



ELECTRONIC
CLAMPING FORCE
MEASURING DEVICE

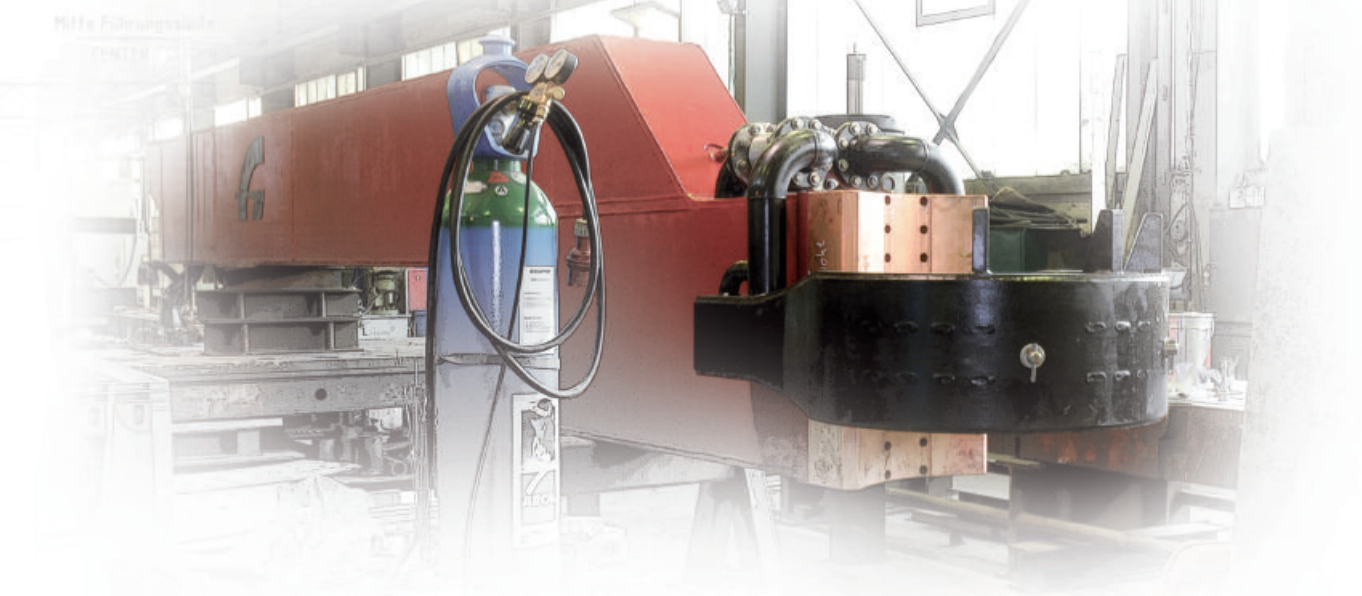
CURRENT-CONDUCTING ELECTRODE ARMS

▶▶ FROM COPPER/STEEL ◀◀

FOR ELECTRODE SIZES OF \varnothing 100-800 MM

ADVANTAGES...

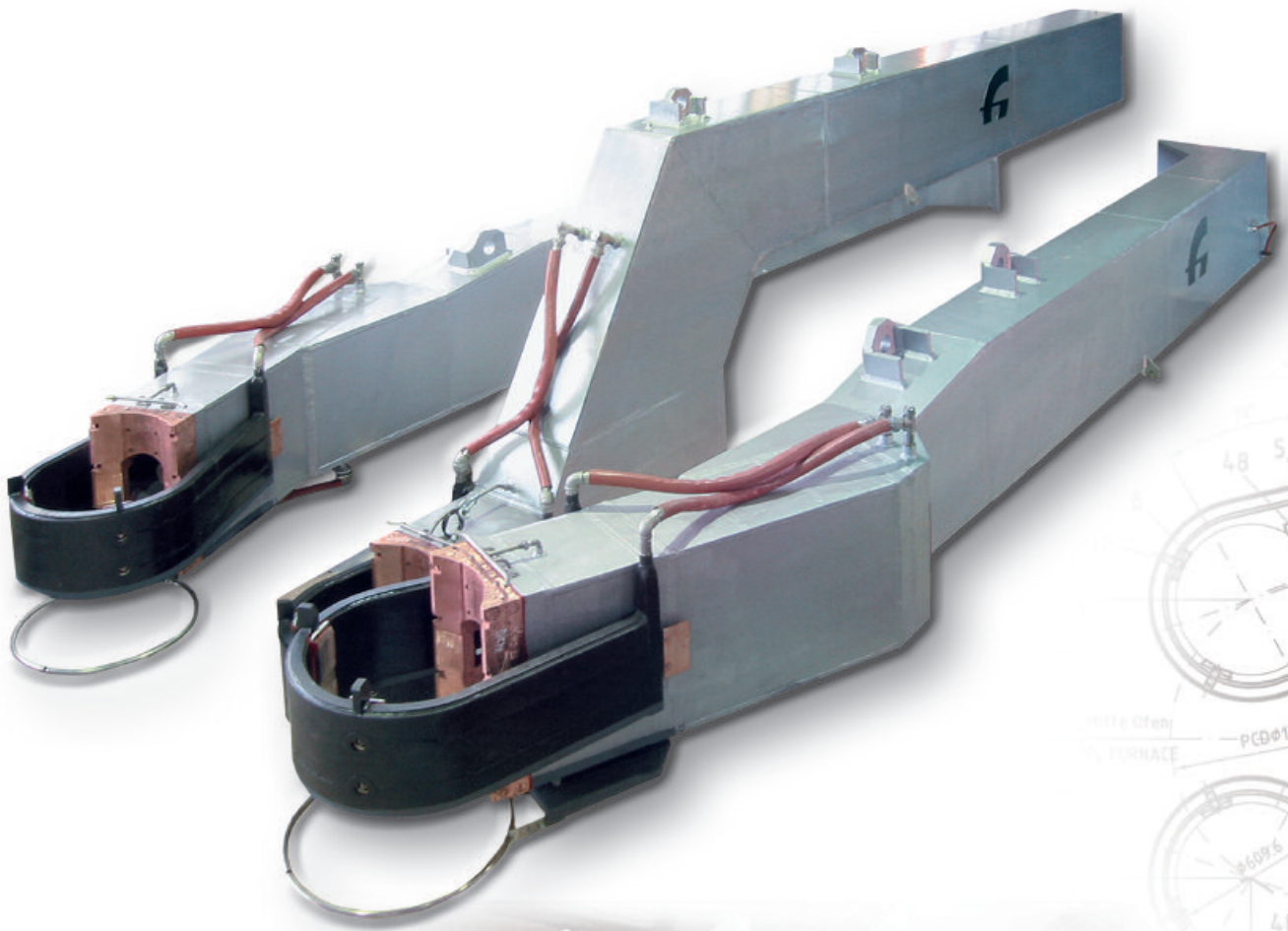
- LOW OPERATING COSTS
- SHORT DOWNTIMES
- EASY HANDLING
- PERFECT SYMMETRY
- MAXIMUM EFFICIENCY



▶ \varnothing 711.2 MM · FOR 86 kA

▶ \varnothing 762.2 MM · FOR 95 kA

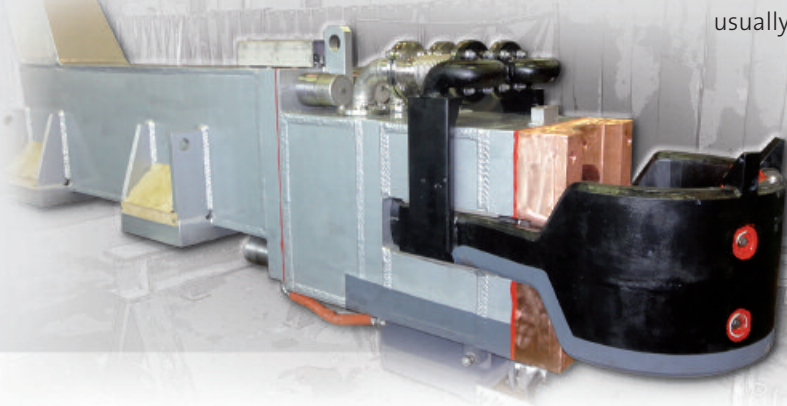




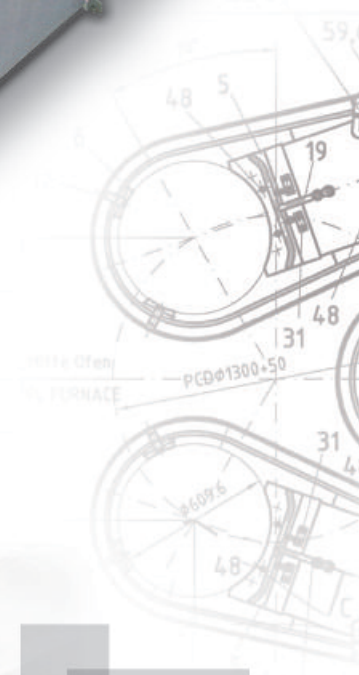
FOR UHP FURNACES AND LADLE FURNACES

■ 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



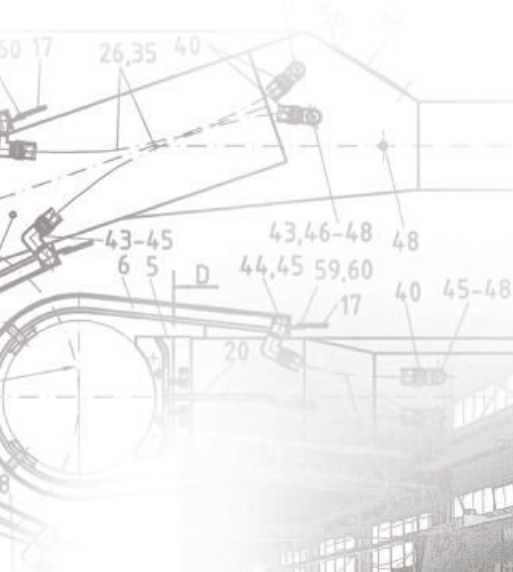
CURRENT-CONDUCTING ELECTRODE ARMS

▶▶ FROM ALUMINIUM ◀◀

FOR ELECTRODE SIZES OF \varnothing 100-800 MM

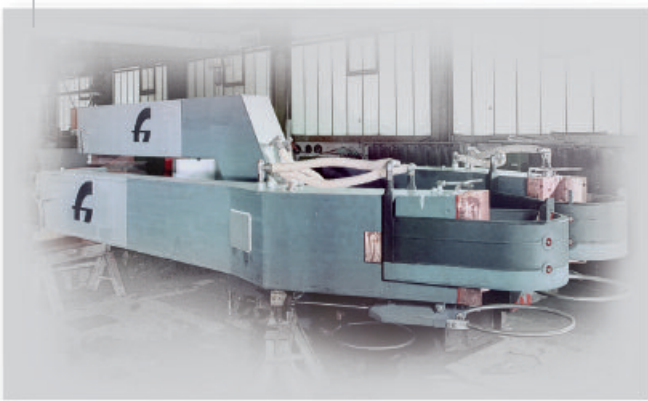
ADVANTAGES...

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



▶ \varnothing 609.6 MM · FOR 60 KA · TRIANGULATED DESIGN

▶ \varnothing 558.8 MM · FOR 47 KA · TRIANGULATED DESIGN



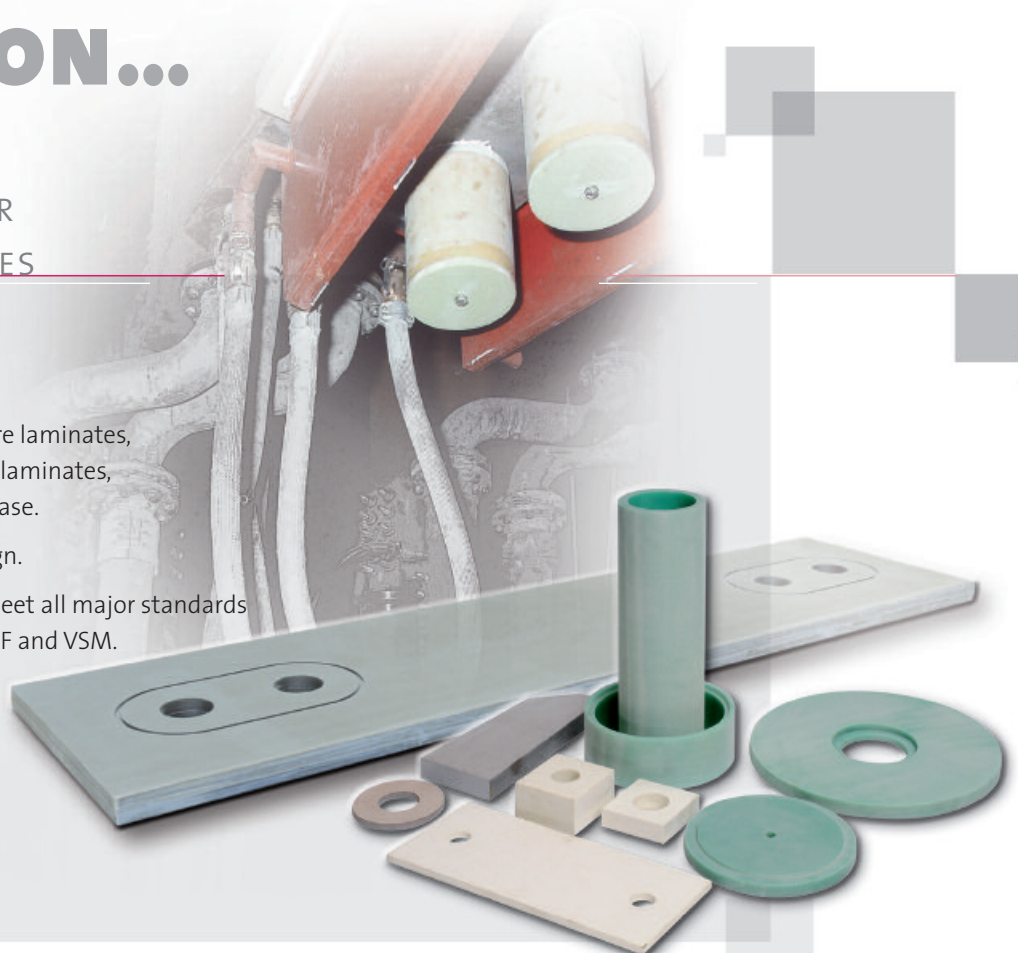
LOW-LOSS COLUMNS...



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

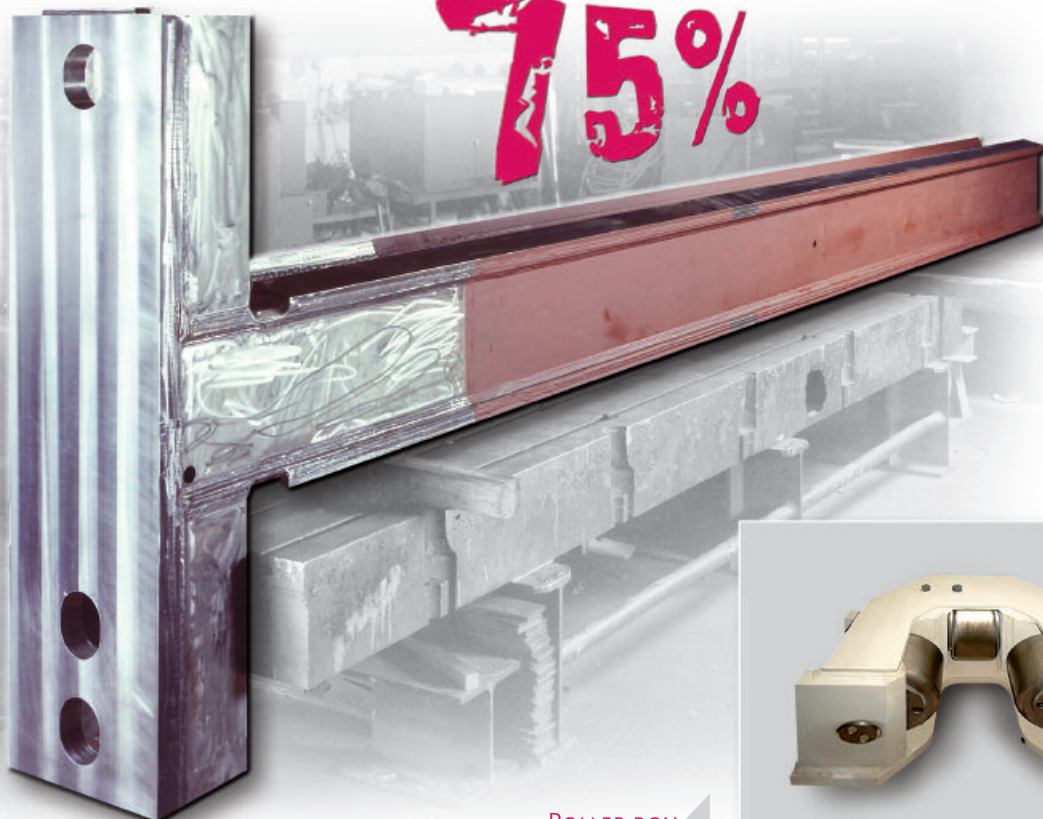
TO COMPLETE THE RANGE, FLOHE PRODUCES SO-CALLED LOW-LOSS COLUMNS.

- 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

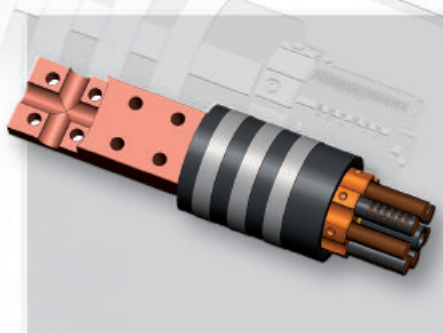
OUR MAIN FOCUS WAS ON:

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



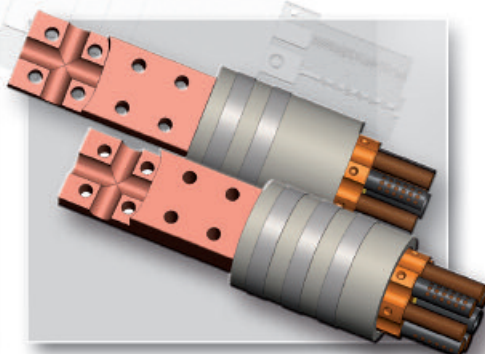
TYPE FHW

▶▶ THE CLASSIC TYPE ◀◀



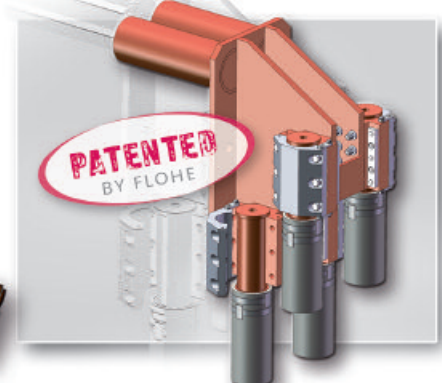
TYPE FHWI

▶▶ THE INTERNATIONAL TYPE ◀◀

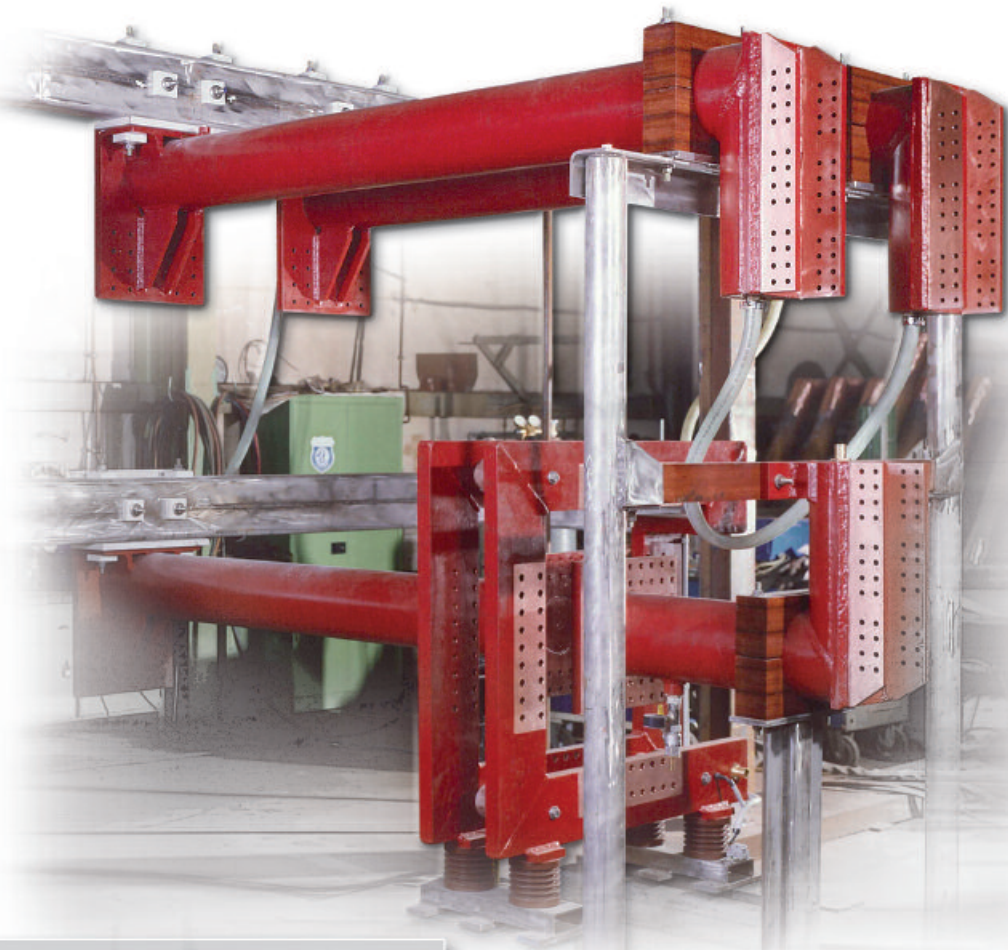


TYPE FHWNT

▶▶ THE FAST TYPE ◀◀

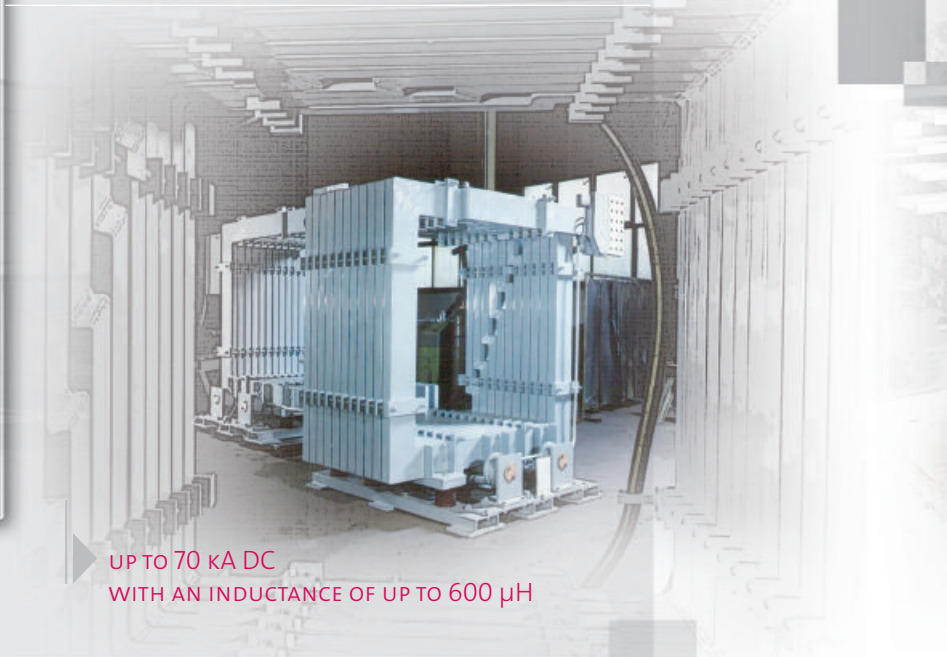


HIGH-CURRENT LINE DELTA CLOSURE



▶ BOTTOM ELECTRODE \varnothing 7.0 m

HIGH-CURRENT CHOKES

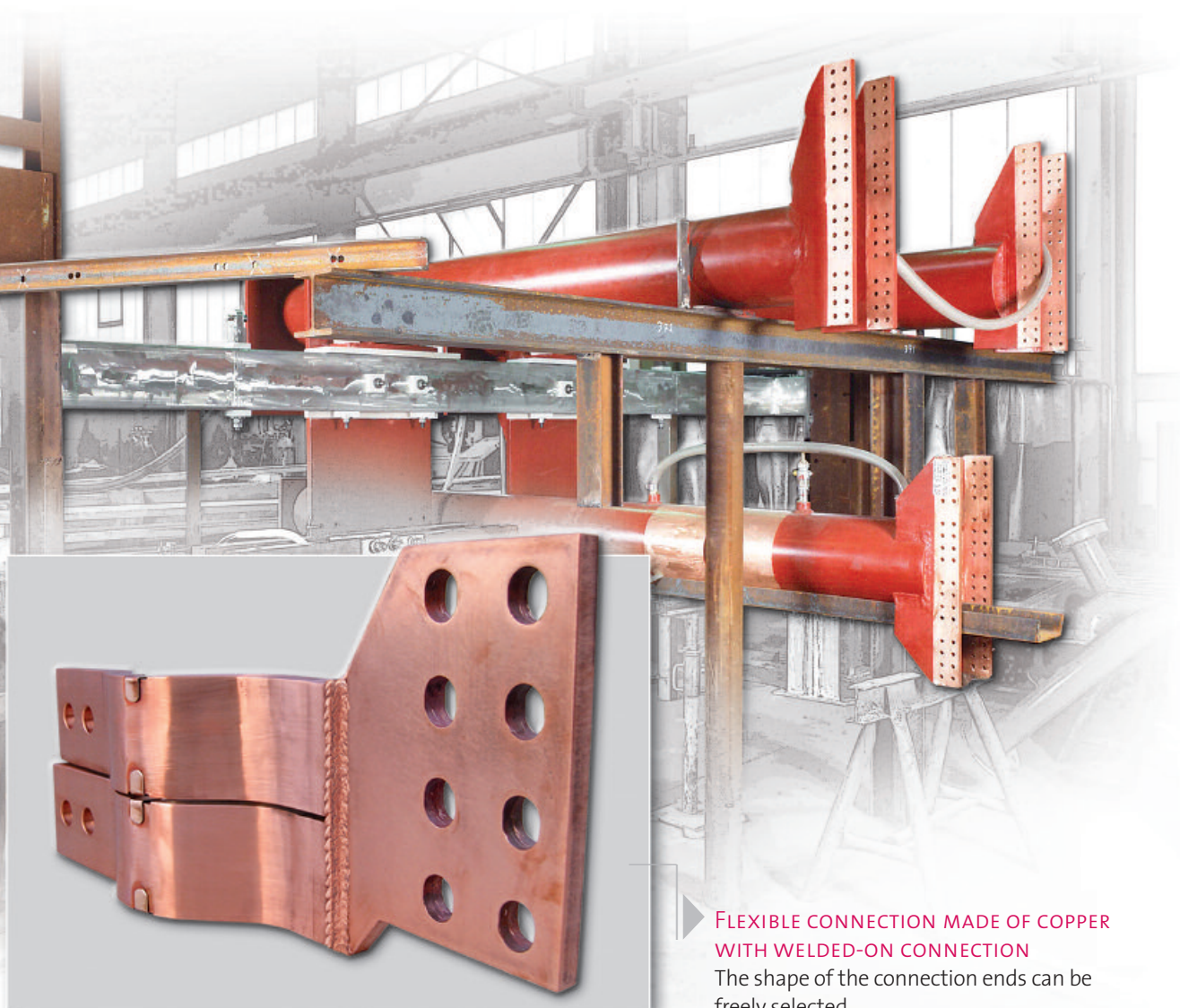


▶ UP TO 70 kA DC
WITH AN INDUCTANCE OF UP TO 600 μ H

DELTA CLOSURE

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

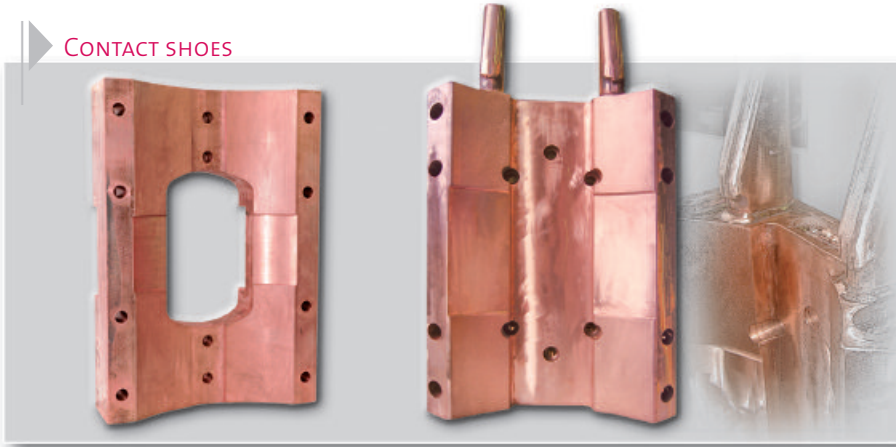
- These are designed for UHP and ladle furnaces and based on the latest technology.
- Our high-current lines can be designed for a current of 100 kA and a voltage up to 1500 V.



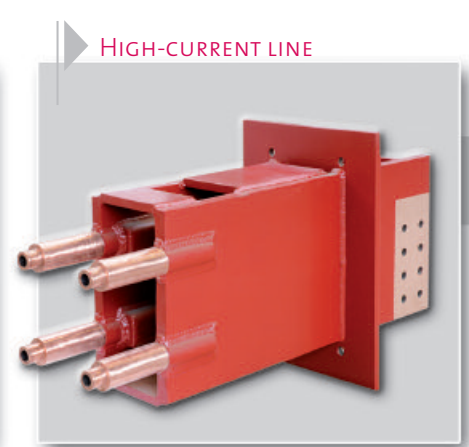
▶ **FLEXIBLE CONNECTION MADE OF COPPER WITH WELDED-ON CONNECTION**

The shape of the connection ends can be freely selected

CONTACT SHOES



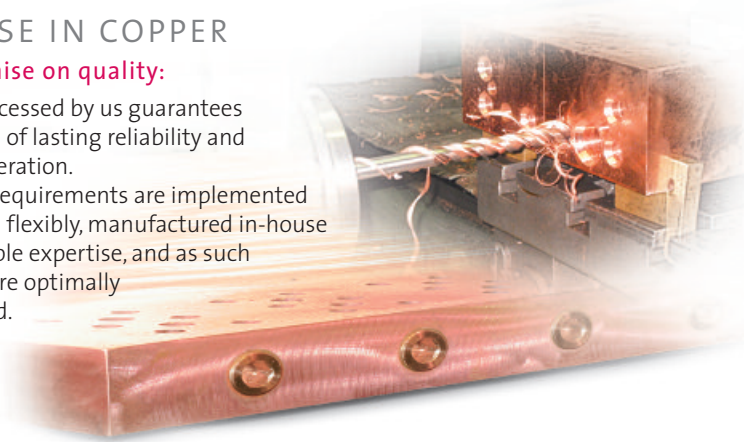
HIGH-CURRENT LINE



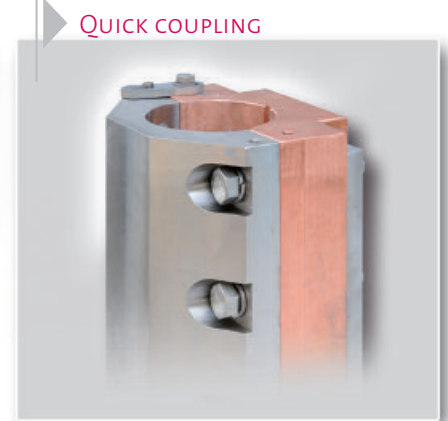
EXPERTISE IN COPPER

No compromise on quality:

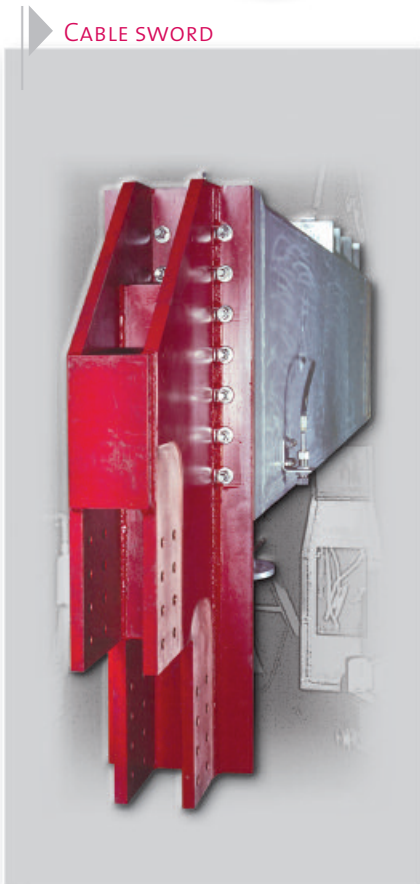
- Copper processed by us guarantees a high level of lasting reliability and smooth operation.
- Customer requirements are implemented quickly and flexibly, manufactured in-house with valuable expertise, and as such all stages are optimally coordinated.



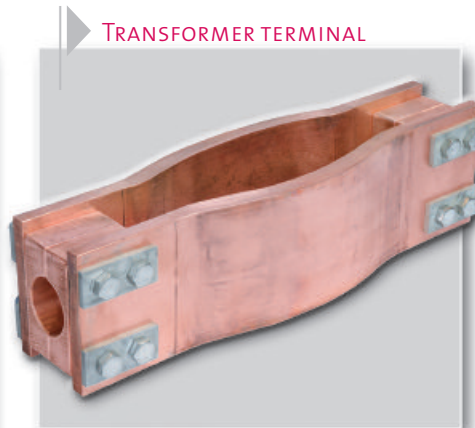
QUICK COUPLING



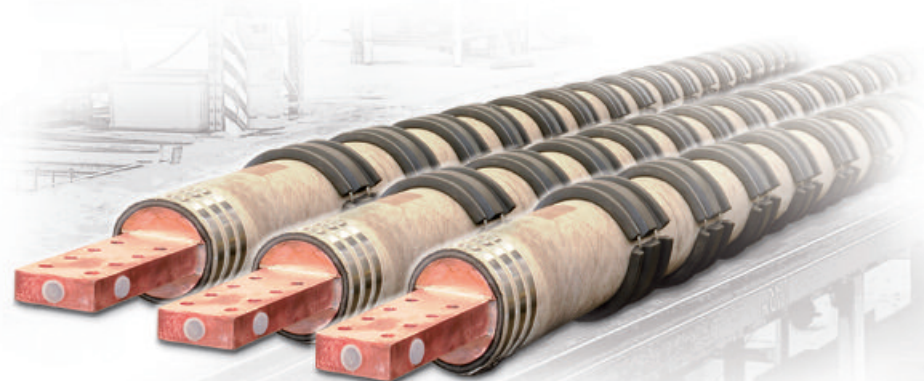
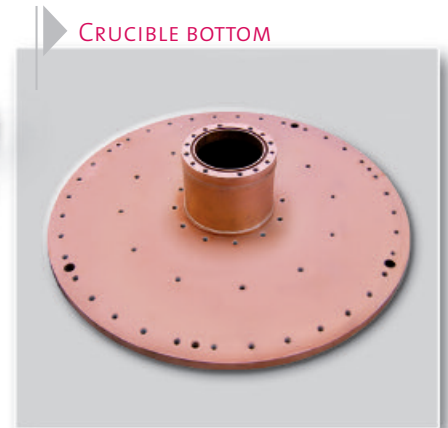
CABLE SWORD



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



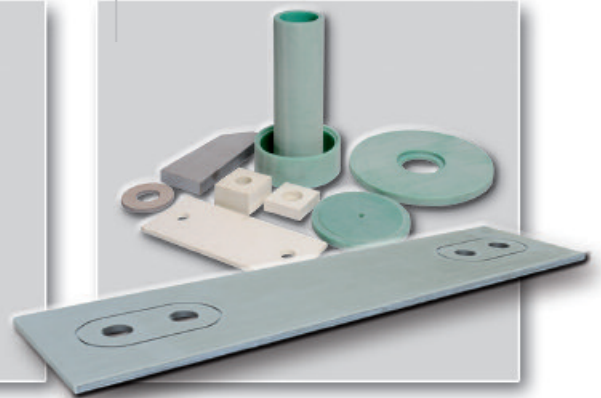
▶ CLAMPING DEVICE



▶ DISC SPRING STACK



▶ INSULATING PARTS & MAIN INSULATING PLATE



▶ ELECTRODE HOLDER



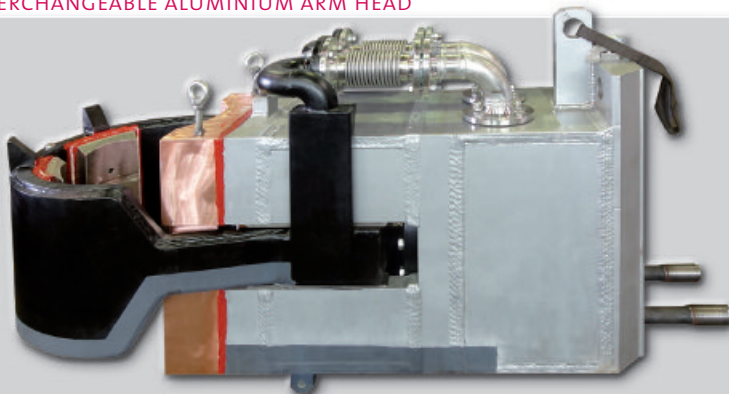
▶ PRESSURE SHOE



▶ QUICK-ACTION NUT



▶ INTERCHANGEABLE ALUMINIUM ARM HEAD





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



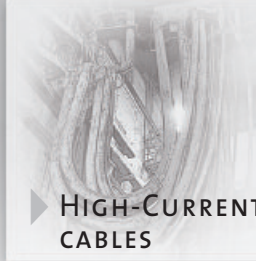
FLOHE

PRODUCT OVERVIEW

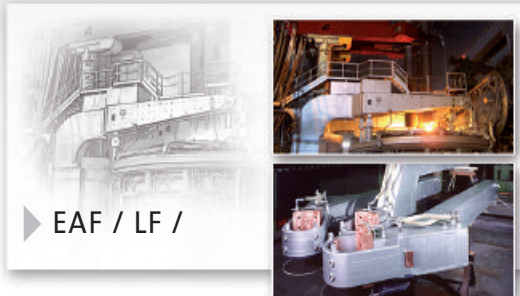
FOR MORE THAN 110 YEARS:

EXPERTISE IN ENGINEERING + PRODUCTION

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



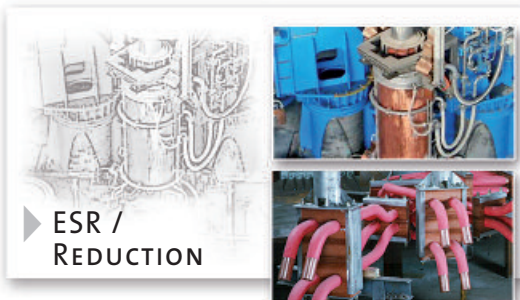
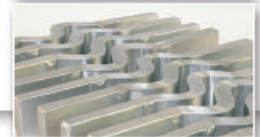
▶ HIGH-CURRENT
CABLES



▶ EAF / LF /



▶ FLEXIBLE
CONNECTIONS



▶ ESR /
REDUCTION



▶ ELEKTROLYSIS:
BUSBARS



WE WILL GLADLY
ADVISE YOU...



FLOHE GmbH & Co. KG

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44579 CASTROP RAUXEL

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