



HIGH CURRENT ENGINEERING...



COMPETENCE IN ENGINEERING AND MANUFACTURING

from individual components to complex high current systems

For more than 70 years, brand FLOHE represents German quality products and a huge range of services in the field of high current technology. From basic to detail engineering combined with assembly, repair and revamping – in all sectors related to high current systems. The FLOHE team of specialists is ready to provide assistance to customers, wherever they are in the world.

Using trend-setting and multi-patented engineering, the latest CAD applications and high-grade material specifications, FLOHE creates built-to-order, customised solutions which incorporate both individual components to high current systems. The FLOHE team is ready to serve the customer – fast, reliable and competent.

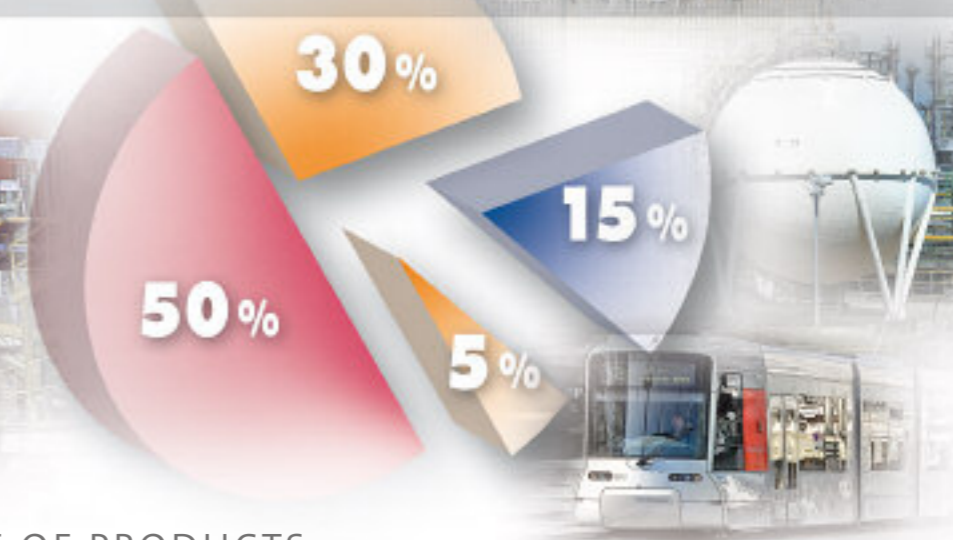
COMPANY PROFILE

OUR MAIN SECTORS...

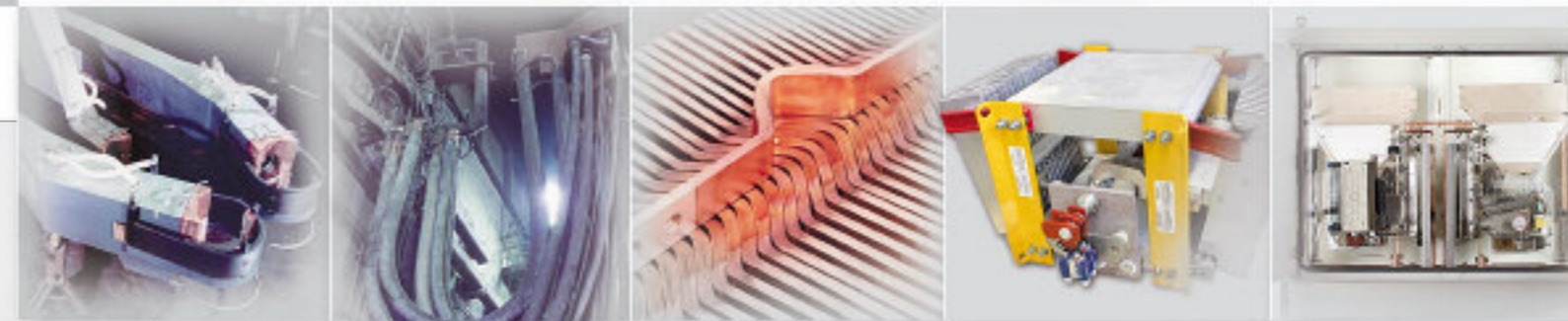
The proof of FLOHE's ability, reliability and safety is found across the world in a whole range of industrial sectors.

- STEEL
- ELECTRO-TECHNOLOGY
- CHEMICAL INDUSTRY
- TRACTION

- Electric steel plants, induction furnaces, strip galvanisation
- Power supply industry, transformer manufacturers, medium-voltage switchgear, low voltage technology, generator manufacturers
- Chlorine, copper and zinc electrolysis, Reduction furnaces for non-ferrous metals
- Metros, underground trains, trams, buses



FLOHE'S RANGE OF PRODUCTS...



- HIGH CURRENT SYSTEMS ENGINEERING**
- Electrode arms
 - High current systems
 - Water-cooled high current cables
 - Copper products (e.g. contact pad)
 - DC bottom electrodes
 - Complete installation

- EXPANSION CONNECTORS & BUSBAR SYSTEMS**
- Flexible connections made from copper and aluminium
 - Busbar systems
 - Complete installation

- SWITCHGEAR**
- Medium-voltage switchgear
 - High current switchgear
 - Direct current loadbreakers with switchboards



FOR ALL ELECTRICALLY POWERED FURNACES OF ALL SIZES



CURRENT CONDUCTING
ARMS MANUFACTURED
...FROM COPPER / STEEL

...FROM ALUMINIUM

CONVENTIONAL ARMS

ELECTRODE ARMS...

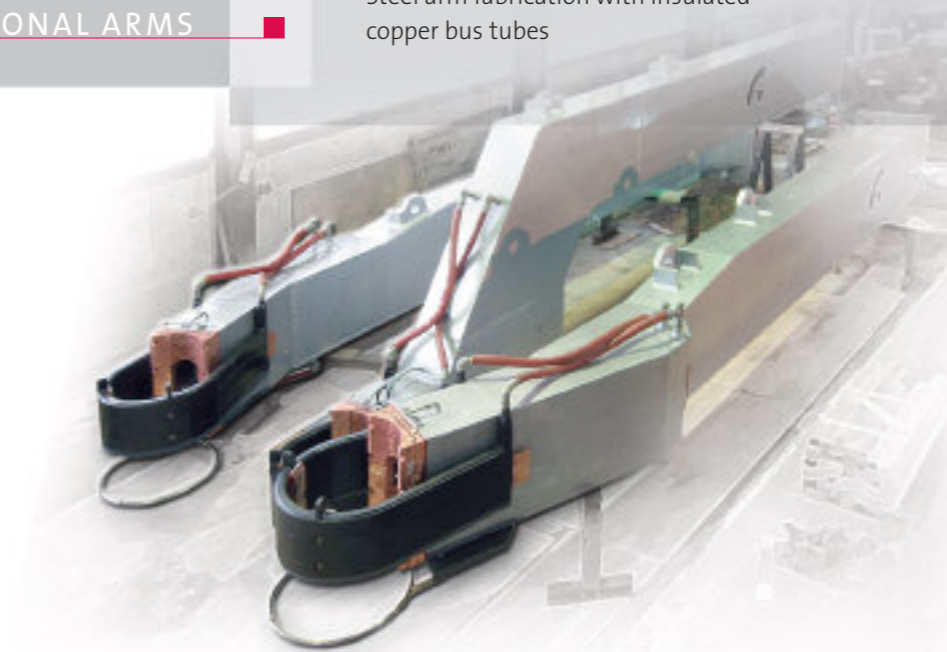
A one stop shop for engineering, design,
manufacturing and commissioning

...for AC-EAF, DC-EAF and LF

For Ø 100-800 mm sized electrodes · low operating costs · minimal shutdown
times · easy handling · optimum symmetry · highest efficiency level

For Ø 100-800 mm sized electrodes · weight saving of 30% ·
low electrical resistance · better control dynamics · simpler maintenance

Steel arm fabrication with insulated
copper bus tubes



- Contact shoe
- Clamping device
- Clamping clip
- Cable sword
- Spray box
- Adapter assembly
- Electronic clamping force measuring device

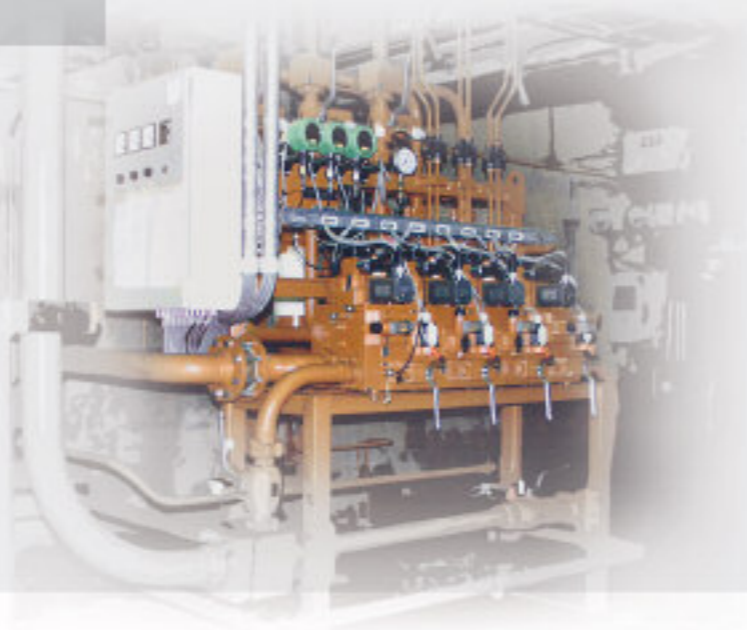
EAF / LF

from the conception to the expert
manufacturing of long lasting and
powerful high current systems.

Electric arc furnace performance has come a long way
in recent years.

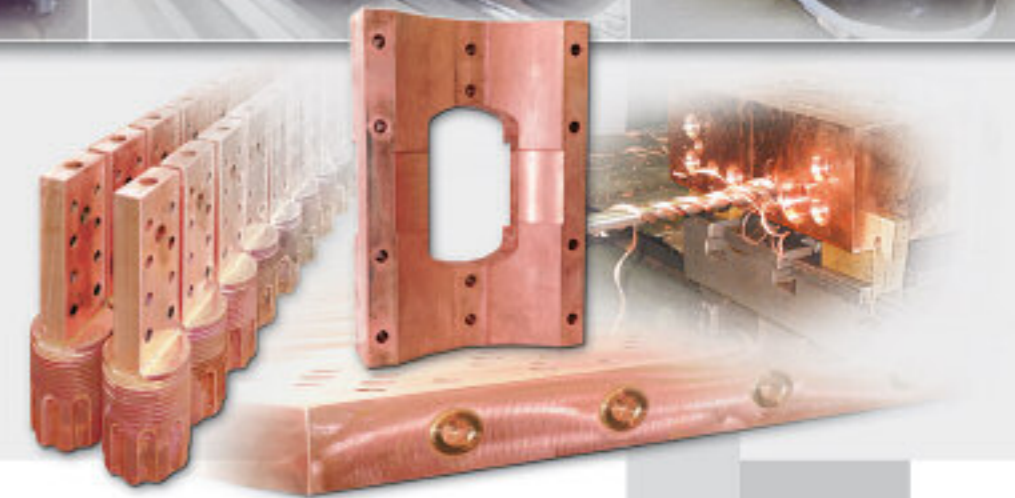
In connection with this, FLOHE offers furnace components
which fulfil these requirements without any compromises.
Current conducting arms, water-cooled cables, delta closures,
low-loss columns and roller boxes. These components are
characterised by longevity, a high degree of availability,
optimised current transfer and low maintenance.

Simultaneously, we are able to fall back on years of
experience which has been gained by our resources and
development team who have successfully completed over
200 new installations and revampings across the world.



Expertise in copper

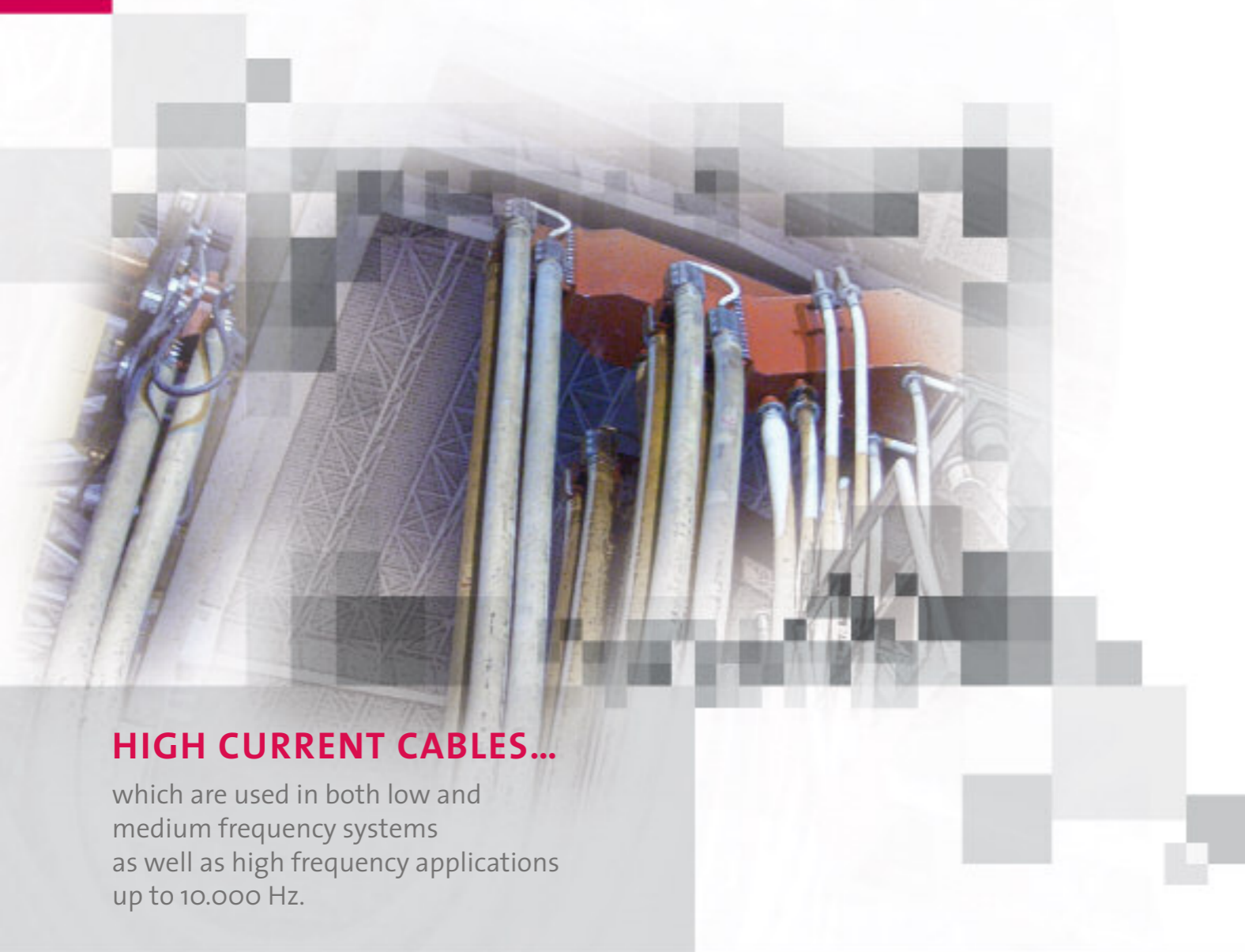
When it comes to quality, we make no
compromises: Copper processed by us
guarantees a high level of lasting reliability
and trouble-free operations. Customer
needs are implemented quickly and flexibly
with valued expertise. Manufacturing takes
place in-house, and as such all stages are
optimally coordinated.



EAF + LF

You will find detailed information
in our THEMATIC BROCHURE
▶ EAF + LF

FOR ALL ELECTRICALLY POWERED FURNACES OF ALL SIZES



HIGH CURRENT CABLES...

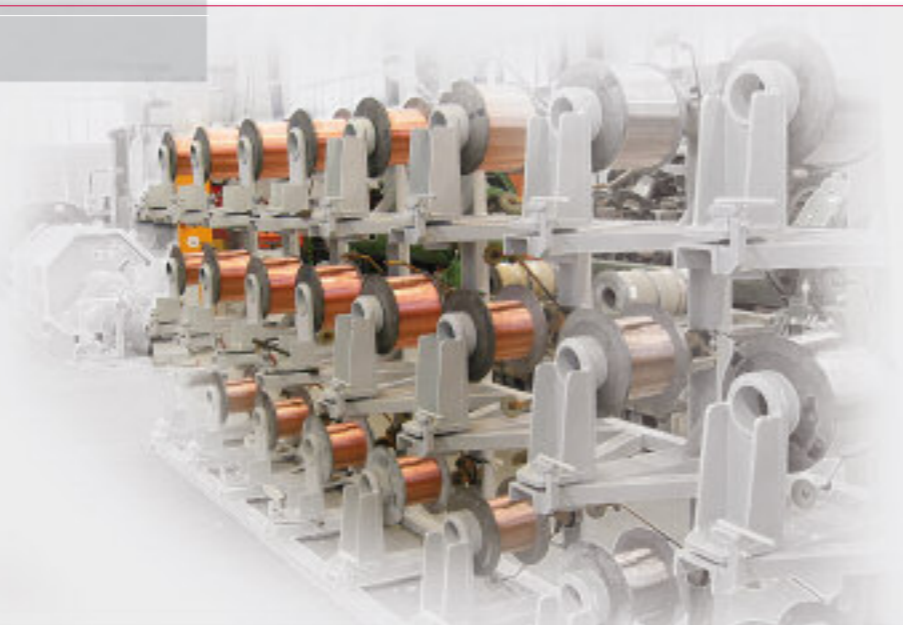
which are used in both low and medium frequency systems as well as high frequency applications up to 10.000 Hz.

Water-cooled cables for electric arc and induction furnaces...

- optimum transfer of current
- reduced losses
- long lifetime
- optimum flow of cooling water
- long service life of the outer hose
- pressed cable heads

Auxiliary hoses

- Non-conducting auxiliary hoses for current conducting components



HIGH CURRENT CABLES



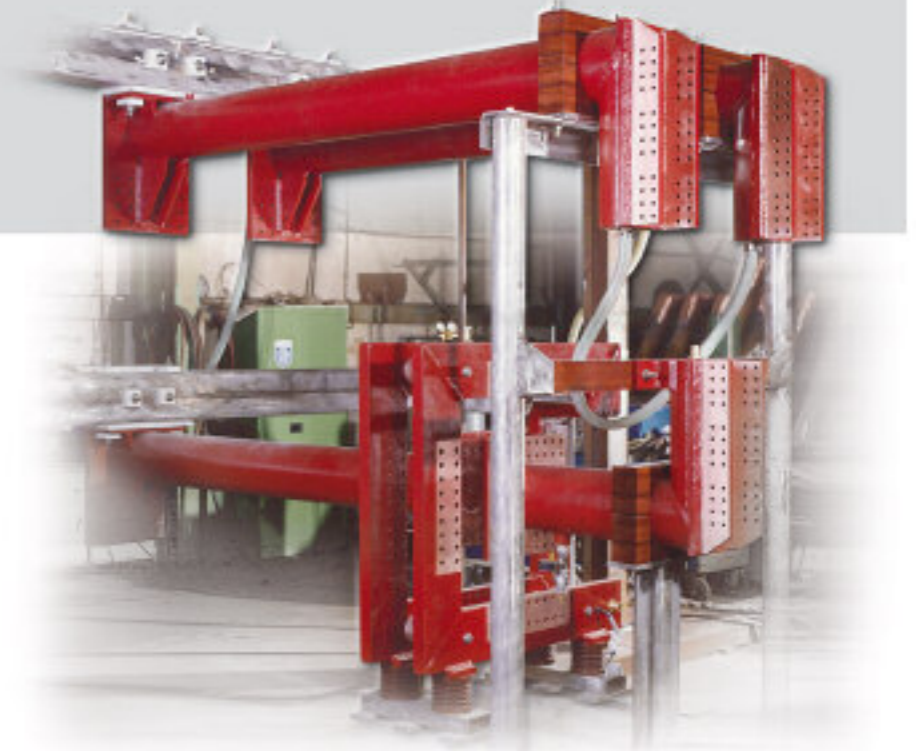
HIGH-CURRENT LINE DELTA CLOSURE

DELTA CLOSURE

FLOHE has been supplying high-current lines from the output transformer to the cable for more than five 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.



FLOHE high current lines...

are available in copper and aluminium. They are characterised by a robust design, a high level of efficiency and a long service life.



- Type FHW / FHWI high current cable
- Type FHWNT boltless cable
- FAA single-core cable
- Type FMH hollow conductor cable
- Swivelling device
- Type FKV tube screwed connection
- Customised solution
- Cable repair
- Cable resistance measurement FDC



Quick couplings...

By means of an adapter, quick couplings are connected with the contact surfaces of the current conducting arms and delta closure which are already available at the high current conductors. This way, assembly times are reduced considerably.



You will find detailed information
in our **THEMATIC BROCHURE**

► EAF + LF ► High current cables

FLOHE HIGH CURRENT COMPONENTS FOR REDUCTION FURNACES



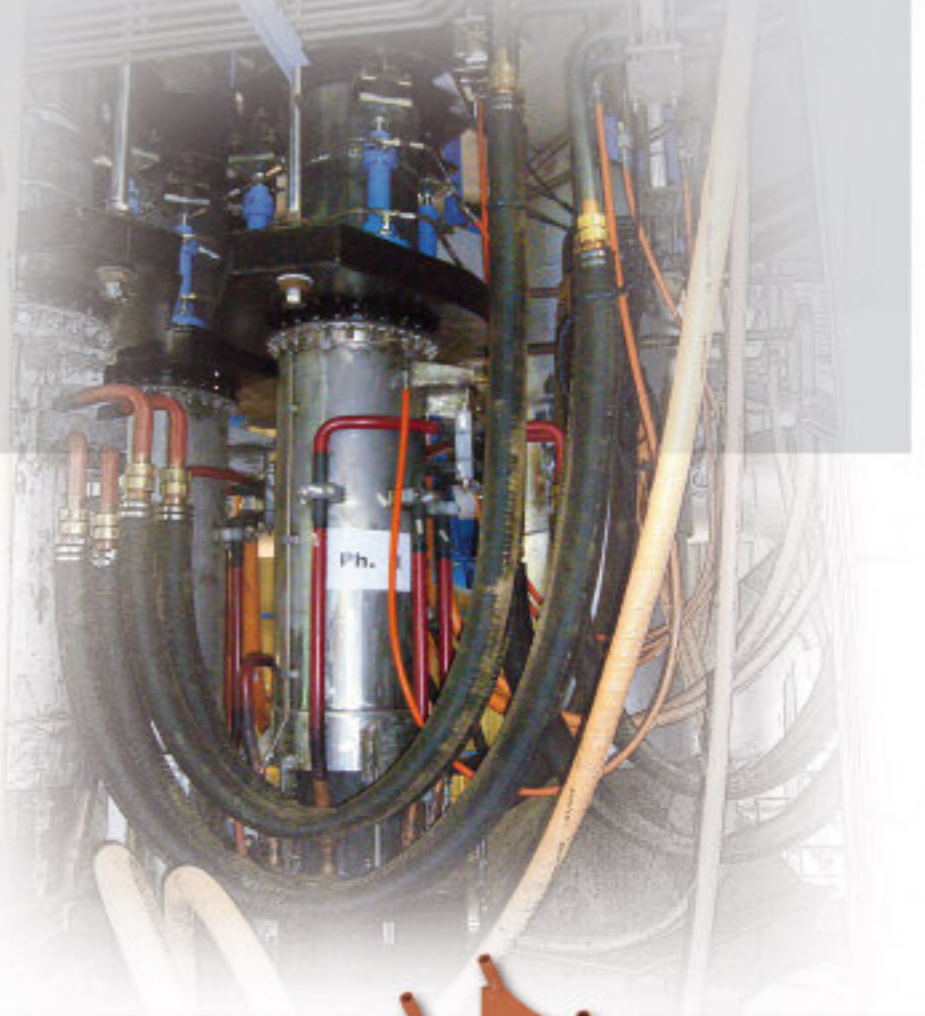
REDUCTION

FLOHE is your competent partner for high-current components used in reduction furnaces.

EXPERIENCE
FROM DELIVERIES
TO OVER
30 COUNTRIES

In addition
to the production
of copper products...

our range of services includes
engineering, as well as delivery
and assembly on site.



FLOHE

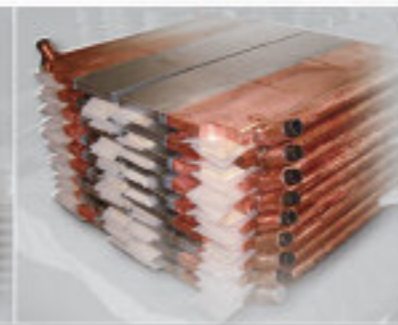
constructs, supplies and assembles
important components for reduction furnaces
which produce the following products:

Ferroalloys (e.g. FeCr, FeMn, FeNi, FeSi, Ni, SiMn, Ti)

- High current line from the transformer to the string of electrodes
- Cable on the US-output transformer
- Cable on the high current line to the string of electrodes
- High current tubes on the string
- Cable or tubes to the lower holder ring
- Lower holder ring complete with contact pads and hydraulic clamping cylinder
- Suspensions which are necessary



- High current lines made of copper tubes \varnothing 50 – 70 mm with insulation and individual suspensions.



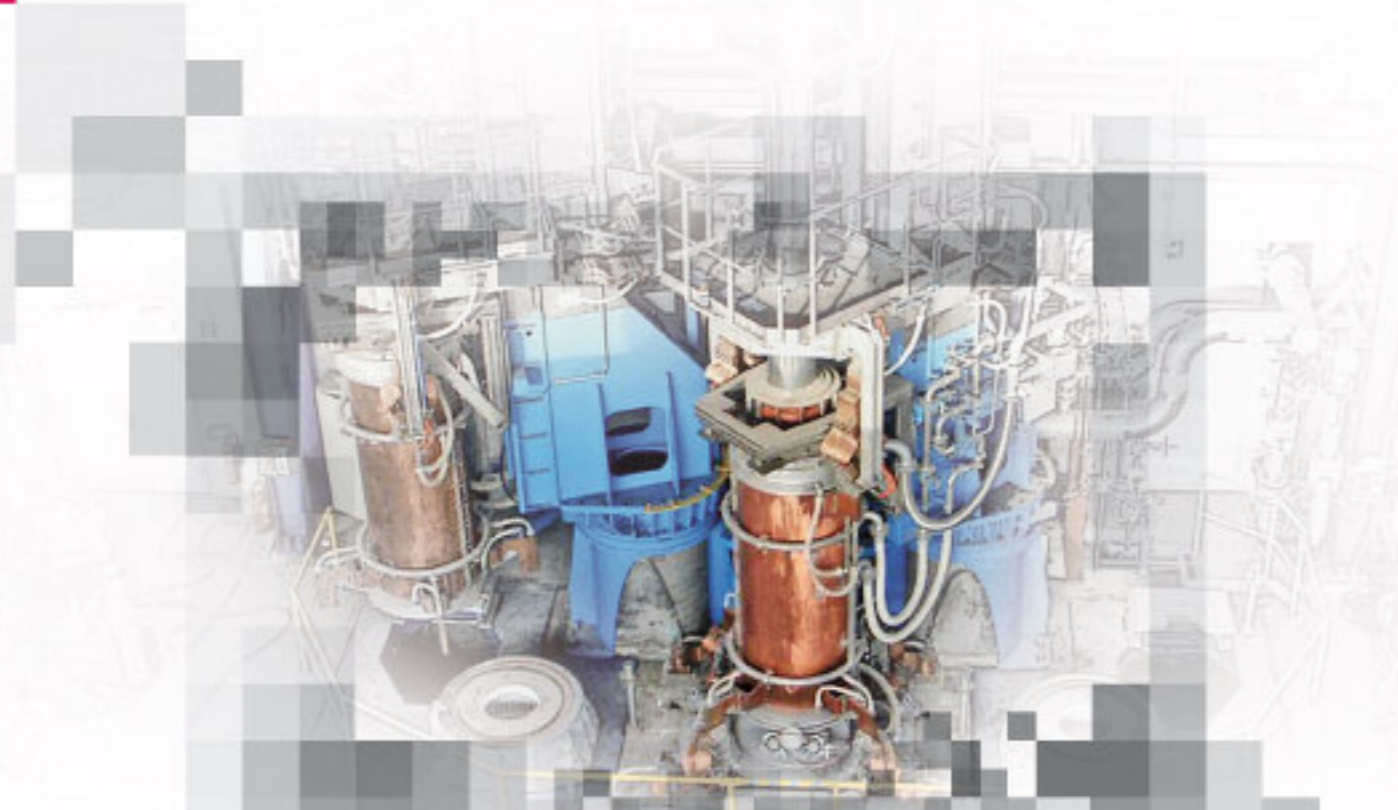
- Water-cooled wall coolers in a welded design (MIG or EB) with a protective layer made of hard chrome.



- Contact pads, forged or cast, in different variants. Preference is given to forged solutions.



COPPER CRUCIBLE FOR SECONDARY METALLURGY



ENGINEERING & PRODUCTION

of high-quality crucibles and copper moulds

Our crucibles are reliable and cost-efficient for all kinds of vacuum arc furnaces, electro-slag remelting (ESR) and pressure electroslag remelting (PESR) plants thanks to their high durability.



The copper alloys used have been developed for all applications which place high to maximum demands on heat conductivity. In addition, a medium to high strength is obtained in order to ensure high service lives.

TESTING PROCEDURES SUCH AS...

- Ultrasound
- X-rays
- Pressure test

ensure a high quality standard during all stages of production.

ESR

- STANDING CRUCIBLES ■
- SLIDING CRUCIBLES ■
- CRUCIBLE BASES ■
- ELECTRODE RODS ■

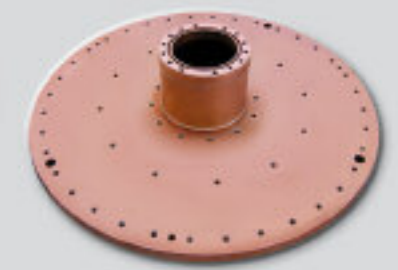
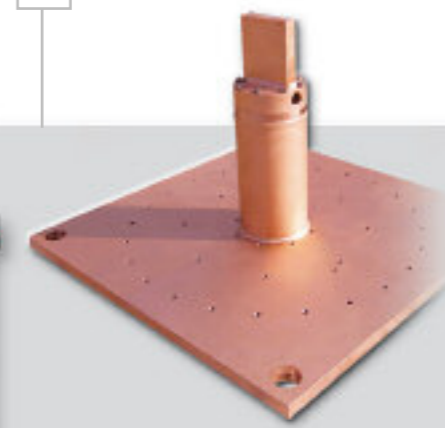
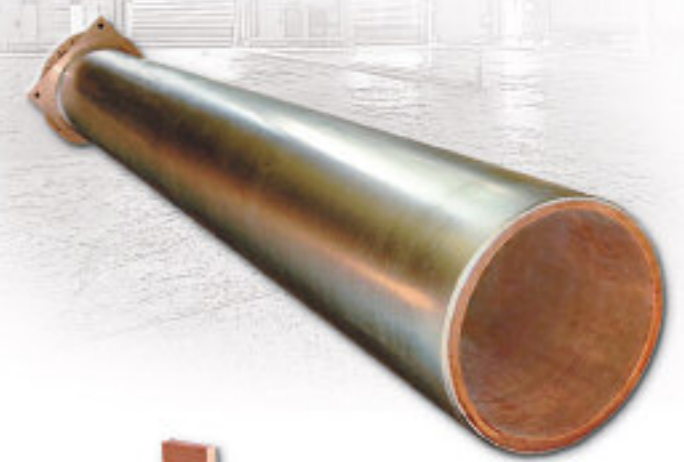
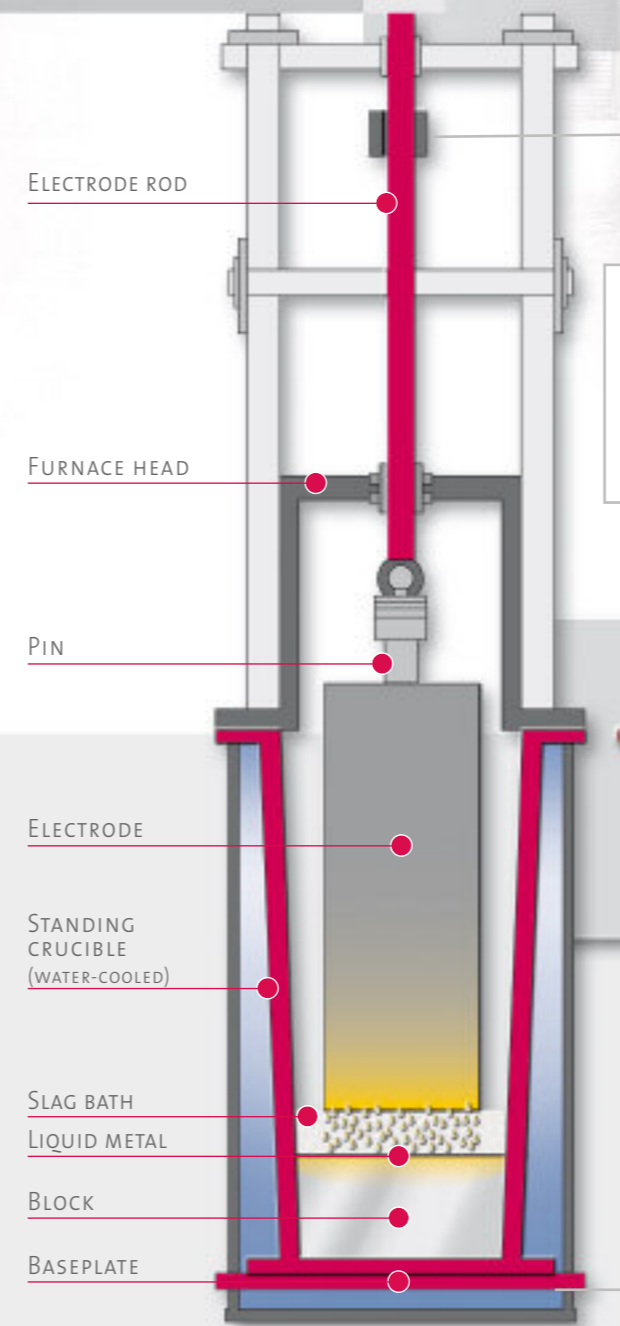
ESR

Electroslag Remelting Processes

are used to meet the constantly rising quality requirements on the degree of purity, toughness and polishability of the blocks to be melted.

FLOHE manufactures...

longitudinally welded pipes, baseplates, plus all current-carrying components such as cables, copper current-supply lines and flexible connections.



Our service:
Maintenance + Repair

The maintenance process ...

- Cleaning service
- Build-up welding
- Repair
- Straightening of deformed crucibles
- Pressure test



You will find detailed information in our THEMATIC BROCHURE
► Crucibles for the remelting process



ELECTROLYSIS

In different applications of non-ferrous metallurgy, we supply high current systems.

These include copper, zinc, magnesium and silver electrolysis as well as aluminum smelter. We supply the requested equipment for the power transmission from exit rectifier to the cell.

Furthermore we supply for any kind of chlorine electrolysis (High density cell, membran, bipolar, diafragma) the necessary high current material for a long and safe operation.

We rely on 110 years of experience!

ALUMINIUM SMELTER ■

CHLORINE ELECTROLYSIS ■

NON-FERROUS
ELECTROLYSIS ■

GRAPHITIZATION
PLANT ■

NUCLEAR RESEARCH ■



ONE PLACE ONE SUPPLIER

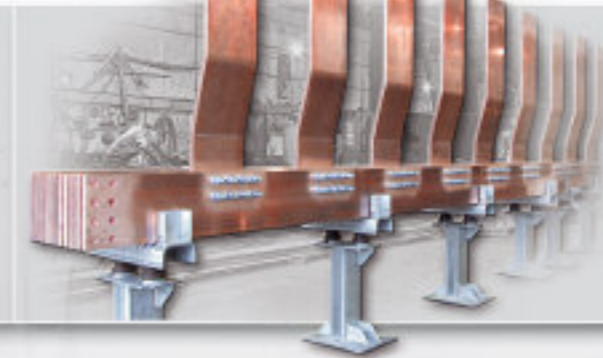
We offer a complete package for the high current application of Non-ferrous metallurgy.

Worldwide experience
up to **360 kA**

- Project management
- Basic engineering
- Detail engineering
- Own manufacturing of bus bar system including flexibles, insulation and supports
- Own manufacturing of switches for cell and rectifier room
- Construction on site
- Maintenance



- Water cooled, welded, flexible aluminum connection



- Main bus bar with connection to cell, made of copper



- Standard bolting connection for copper bus bars

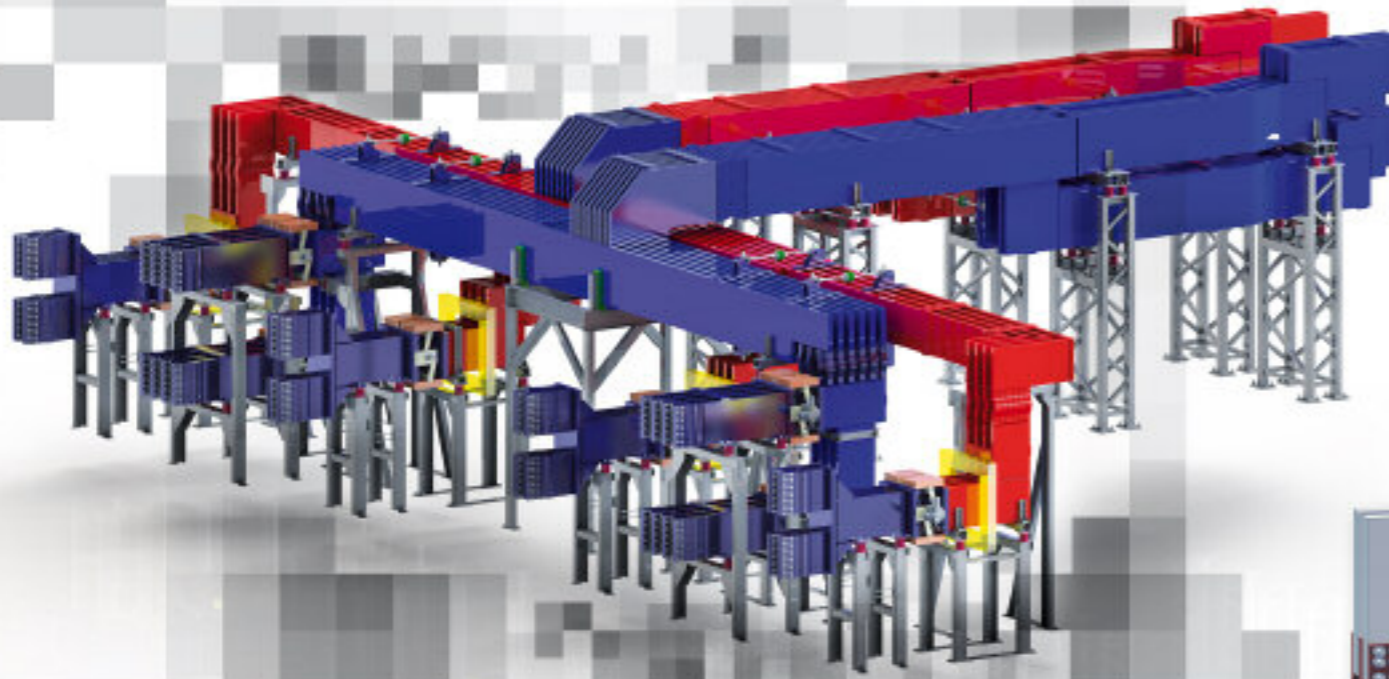


BUSBAR SYSTEMS

Over 70 years of innovative expertise in the fields of engineering and manufacturing as well as the installation of customised busbars – naturally in accordance with ISO 14001 + OHSAS 18001

The systems are either carried out in accordance with customer drawings or completed as a turnkey project and are specially designed for the connection from the power generator to the loads.

ELECTRIC CURRENTS
UP TO 360 kA



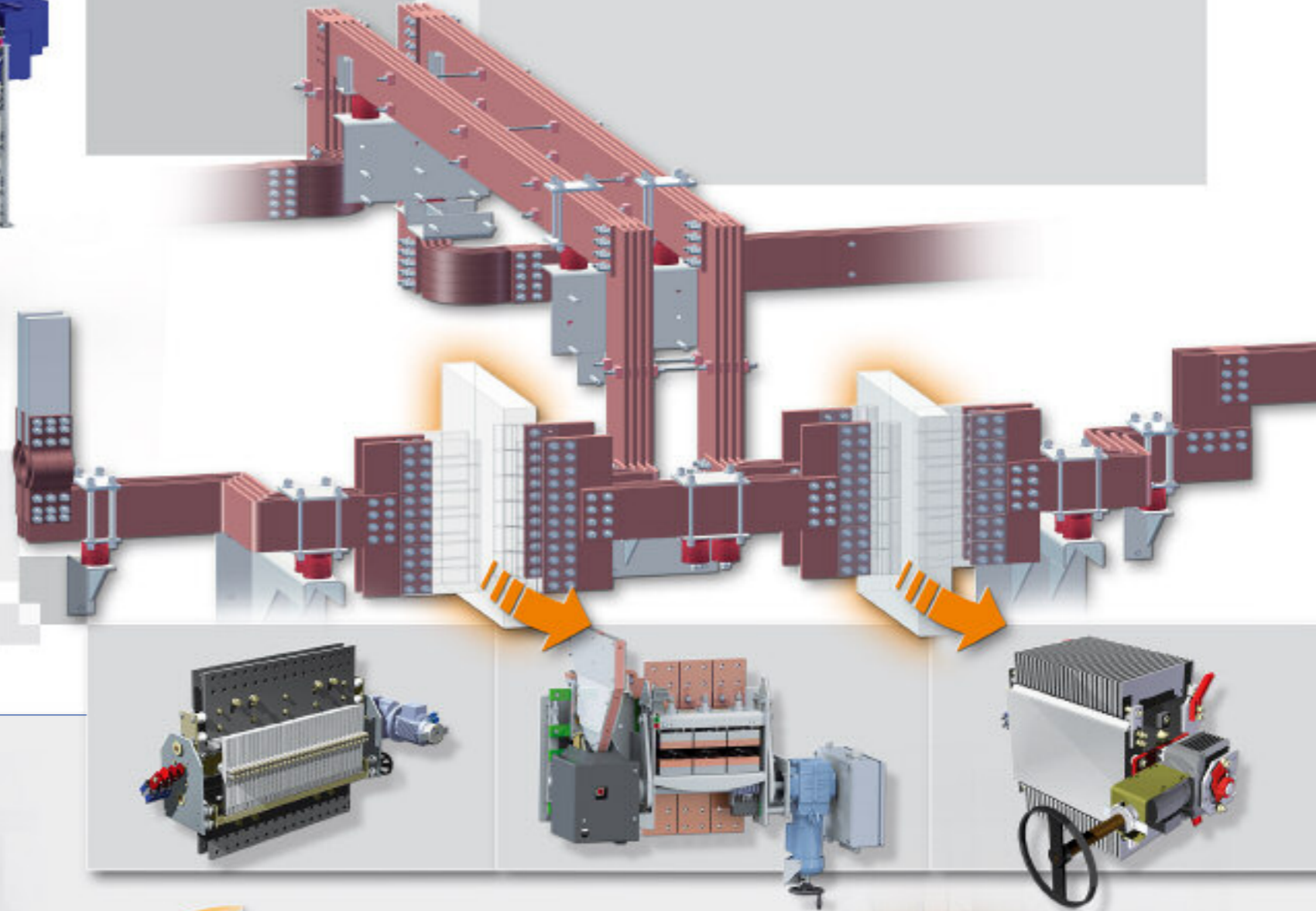
IN THE MANUFACTURING

of our highly developed busbar systems made of aluminum or copper, FLOHE has many years of experience in the following areas:

- MIG and TIG welding
- Press-welding
- Working with explosion bounded plates
- Aluminium welding
- Hard soldering
- Processing of surfaces
- Coating of surfaces

At all stages in the engineering phase...

there is a person who is both responsible for the project and on hand to offer the customer advice and guidance. Professional installation by our supervisor rounds the project off and steers the customer onto the path of successful operation.



EVERYTHING FROM A SINGLE SOURCE...

ENGINEERING · PRODUCTION · DELIVERY · ASSEMBLY · MAINTENANCE

for high current systems with insulated brackets, flexible connections and high current switches.

BUSBAR SYSTEMS



You will find detailed information in our **THEMATIC BROCHURE**
► **Flexible connectors & busbar systems**



FLEXIBLE CONNECTIONS...

manufactured from copper or aluminium

These are links between switches, transformers, high current components and their solid busbar. The heat expansion of high current busbars is compensated through their elasticity. At the same time, these units prevent connections from being damaged by vibrations.

We design and produce with an experienced team and the latest in manufacturing equipment.

FLEXIBLE CONNECTORS

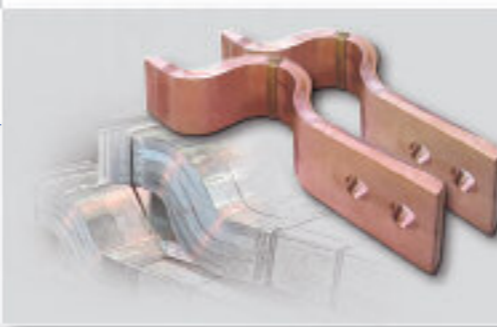
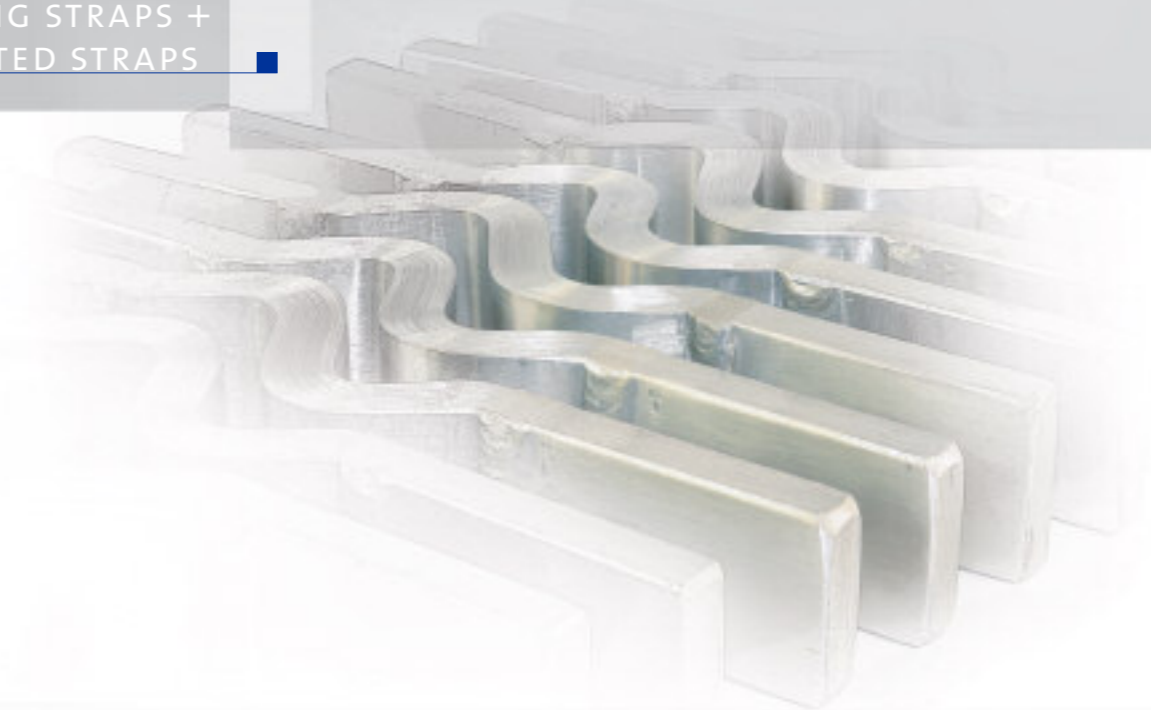
FLEXIBLE CURRENT CONNECTORS, EXPANSION EARTHING STRAPS + LAMINATED STRAPS

PRESS-WELDING...

Using the technology of press-welding, copper foils of different thicknesses are welded together.

An electrical current (up to 65000 Ampere at approx. 15 Volt) passes through pressed on electrodes and the component. The copper foils to be welded are heated until just short of the melting point and then fused together by pressing, wherein the lattice planes of the of the materials come together as a result of the deformation (up to atomic effect displacements) and as such, generate the material bonding. Press-welding has a great importance as, apart from high productivity, qualitatively-good weld connections are generated.

Press-welded expansion connectors from FLOHE exhibit exceptional conductivity on account of a fully molecular composition. The contact surfaces can be drilled, milled and bent.



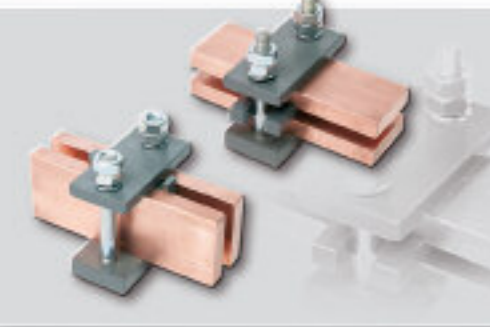
Expansion connectors made from copper and aluminium

- pressure welded embodiment
- pressure riveted embodiment
- with flat copper welded on



Highly flexible expansion connectors made from flexible copper expansion connectors

- with pressed-on copper sleeves

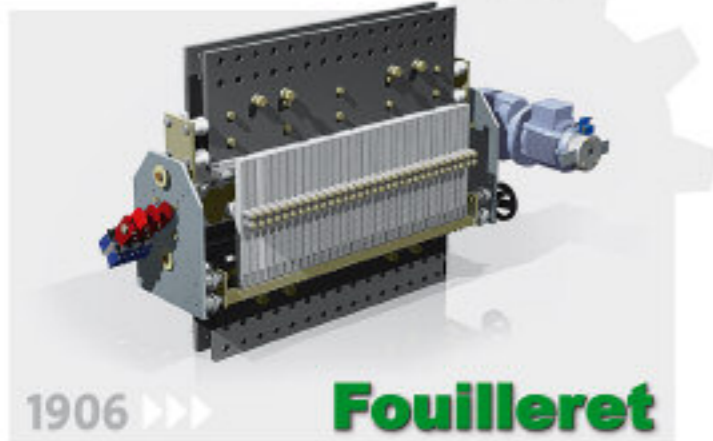


Busbar support for standing or laying busbars

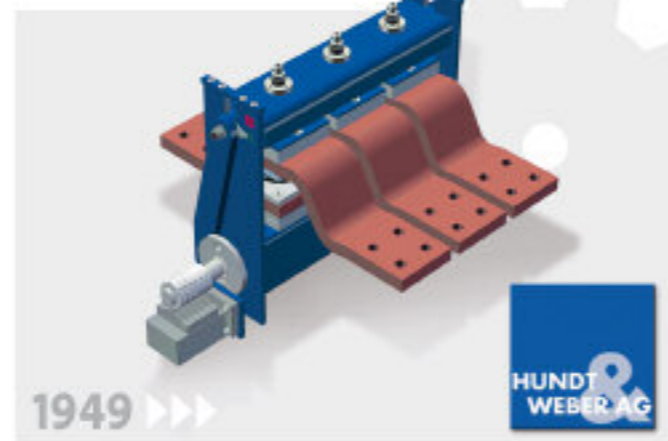
- For laying copper busbars, the holders receive a special protective covering.



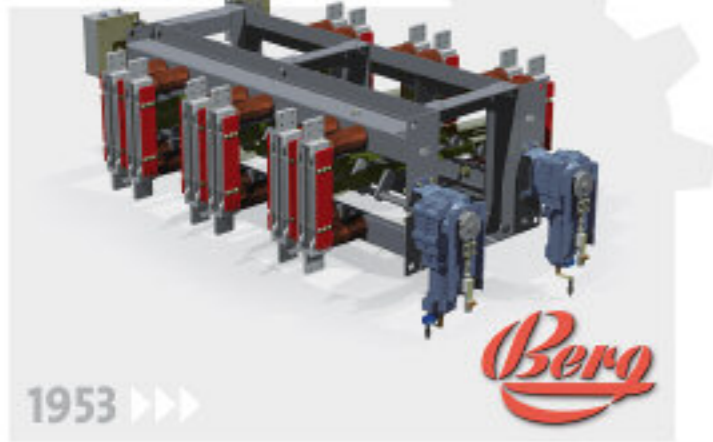
With tradition...



1906 >>> **Fouilleret**



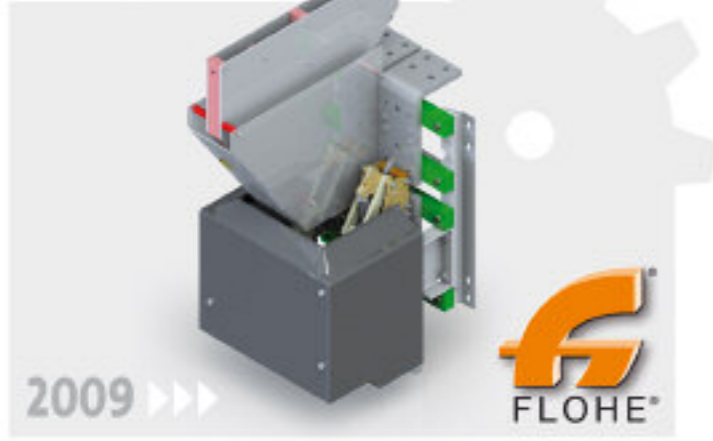
1949 >>> **HUNDT & WEBER AG**



1953 >>> **Berg**



1959 >>> **SOULE**



2009 >>> **FLOHE®**



2011 >>> **Wirtz Starkstromtechnik GmbH**



- HIGH CURRENT ■
- MEDIUM VOLTAGE ■
- TRACTION ■



COMPETENCE CENTER SWITCHES

FLOHE builds on the experience and the know-how of switchgear of the companies Fouilleret, Ferraz, Soule, Berg and Hundt & Weber and continues to develop these products with an experienced team.

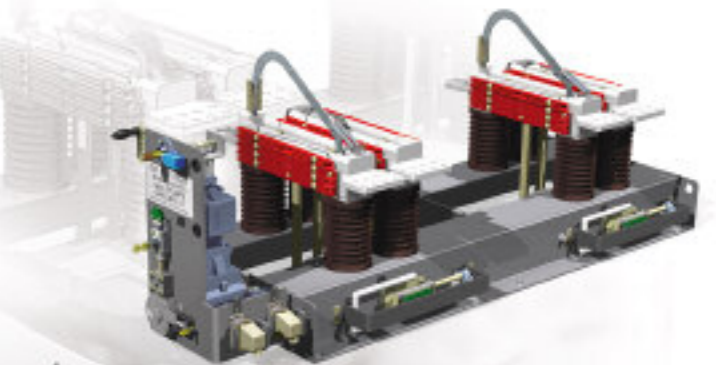
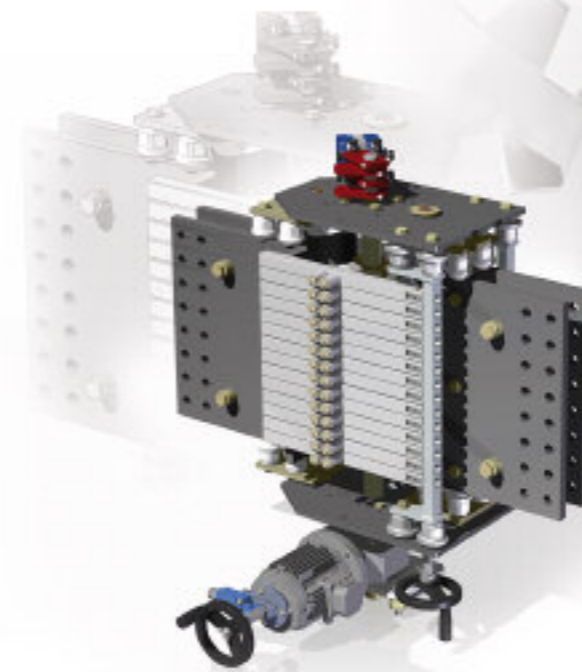
Our scope of supply includes engineering, manufacturing of components and systems, as well as on site service.

FLOHE offers a complete package in electrolysis (busbars, switchgear, flexible connections, installation and maintenance on site), medium voltage (disconnectors, grounding switches, flexible connections) and traction applications (loadbreak switches, enclosures, systems).

... into the future



BERG GmbH
GERMANY



MEDIUM VOLTAGE & TRACTION

HIGH POWER SWITCHED



FOUILLERET SAS
FRANCE

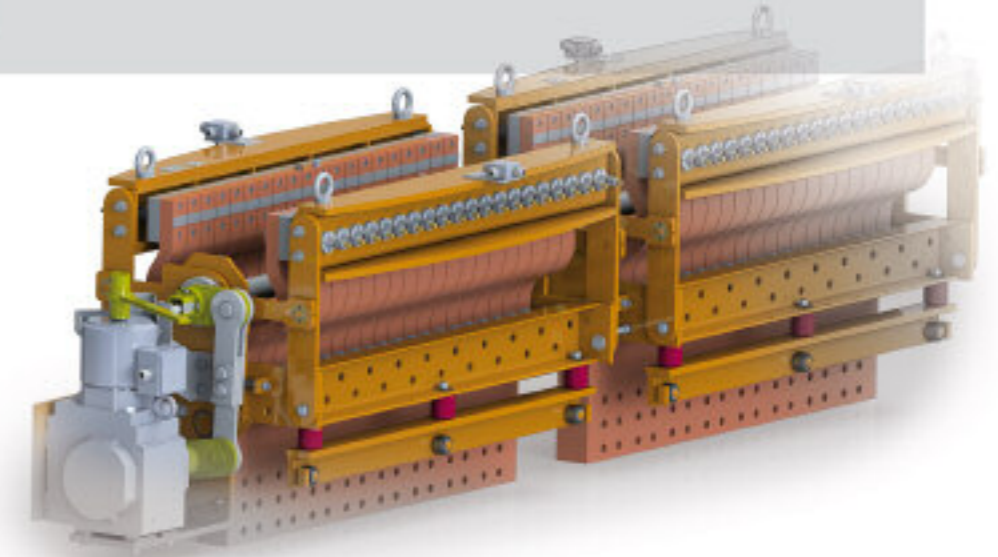
SINCE MORE THAN 110 YEARS



HIGH CURRENT ISOLATOR
HIGH CURRENT LOADBREAKER

- TYPE NORD/R
- TYPE PBD
- TYPE FRG/FRGL
- TYPE FORB
- TYPE ZKS

We are offering suitable solutions to meet any customer requests. Our product range includes standard disconnectors up to 2000V and 360kA, as well as load break switches and shorting switches for all current applications.



FLOHE high current switchgear...

is available in copper and aluminium embodiments. Current ratings of up to 360 kA are available for high-current disconnectors and 36 kA for load disconnectors.

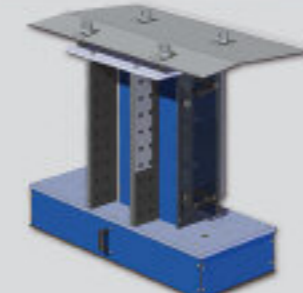
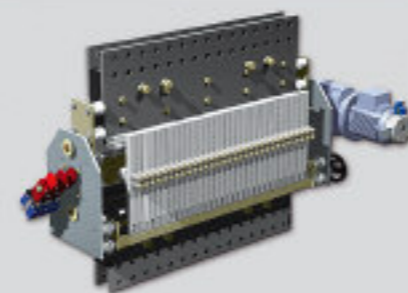
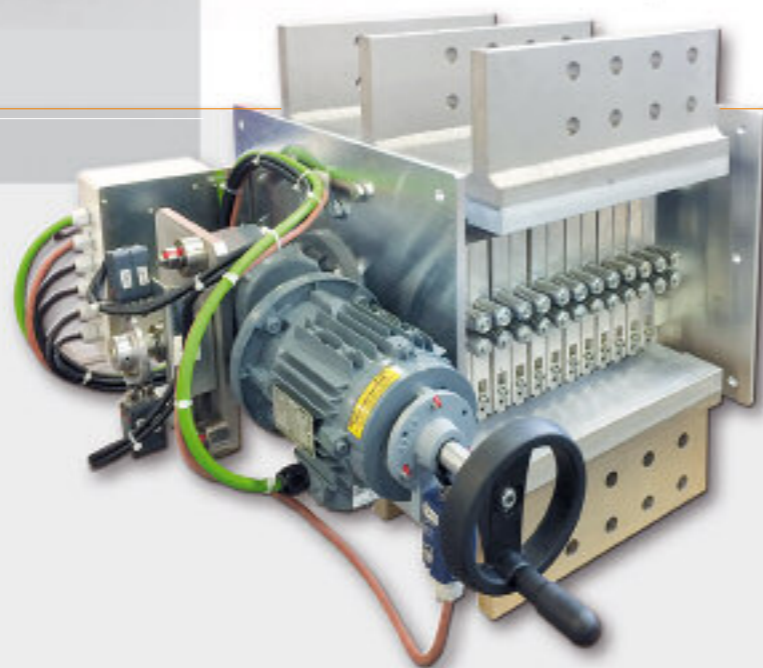
TAILOR MADE SOLUTIONS

to customer specifications.

We are able to fulfil specific, challenging customer requests.

We are working with a team of French and German engineers.

We are marked by our technical competence and by the engagement, experience and capabilities of our employees as well.



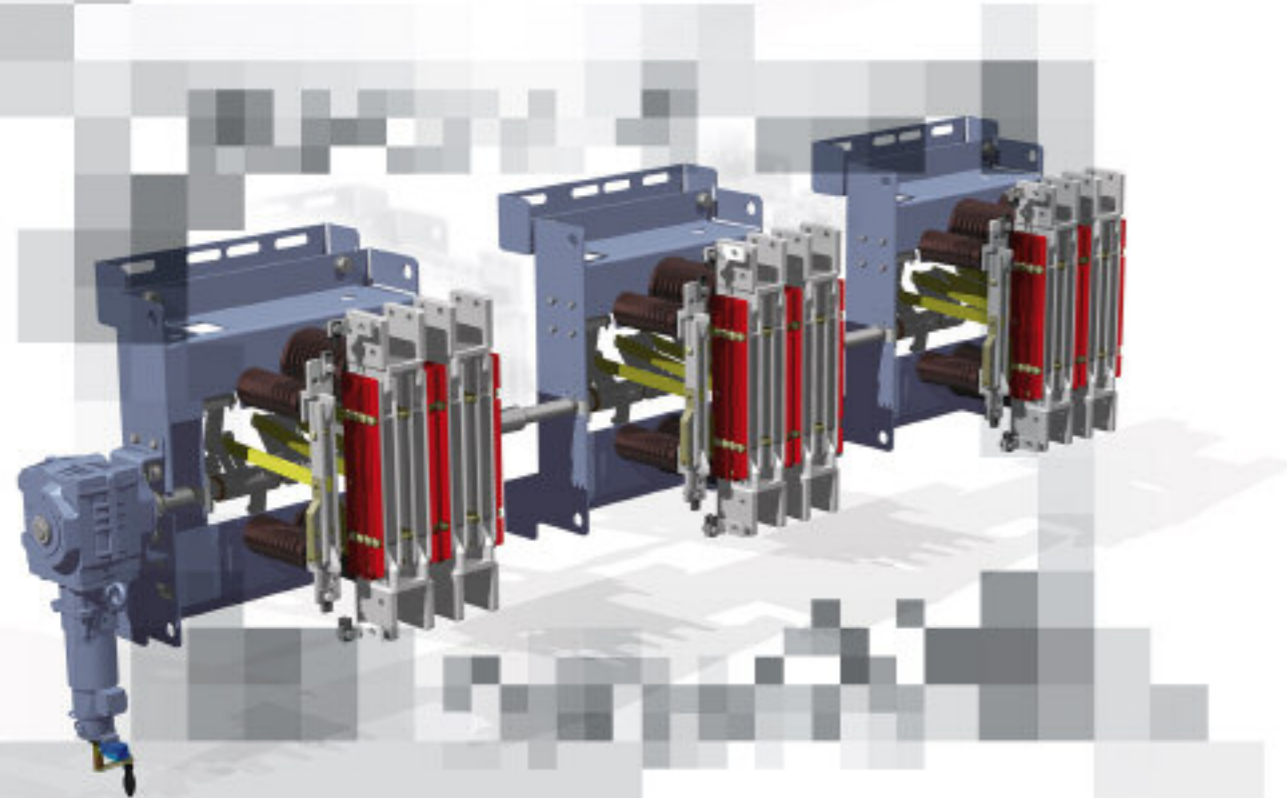
All our products are available in needed versions.

- Manual / motor pneumatic
- Remote drive / emergency drive
- Panic switch function
- Auxiliary switch for internal and external control
- Locking systems: mechanical or electrical
- Terminal box: local / or remote control box
- Temperature monitoring

HIGH CURRENT SWITCHGEAR

You will find detailed information in our THEMATIC BROCHURE
▶ High current switchgear





SINCE 1906

FLOHE stands for quality European products in the field of low and medium voltage equipment.

In the field of medium voltage equipment, we deal with all kinds of disconnectors. Our range covers equipment from 1.5 kV to 40.5 kV. We achieve maximum amperages of up to 12000 A.

In addition, standard grounding connections and grounding connections which cannot be powered up are part of the range of products. Here, we achieve rated impulse currents of up to 210 kA.

Our equipment is based on a modularsystem.

DESPITE THIS, WE IMPLEMENT APPLICATION-SPECIFIC AND CUSTOMER SPECIFIC SOLUTIONS IN EACH OF OUR ORDERS.



ELECTRIC CURRENTS
UP TO 12000 kA

1.5 kV
UP TO 40.5 kV

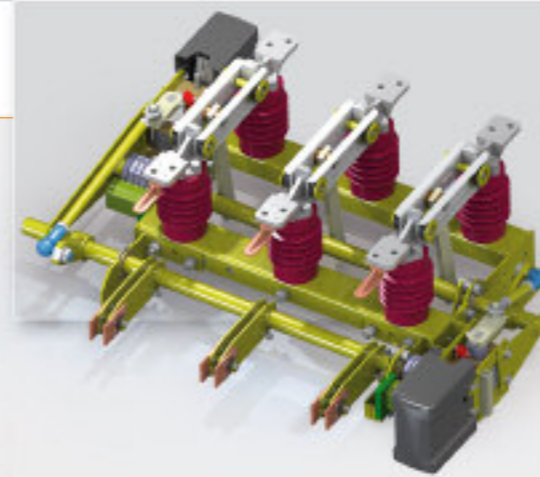
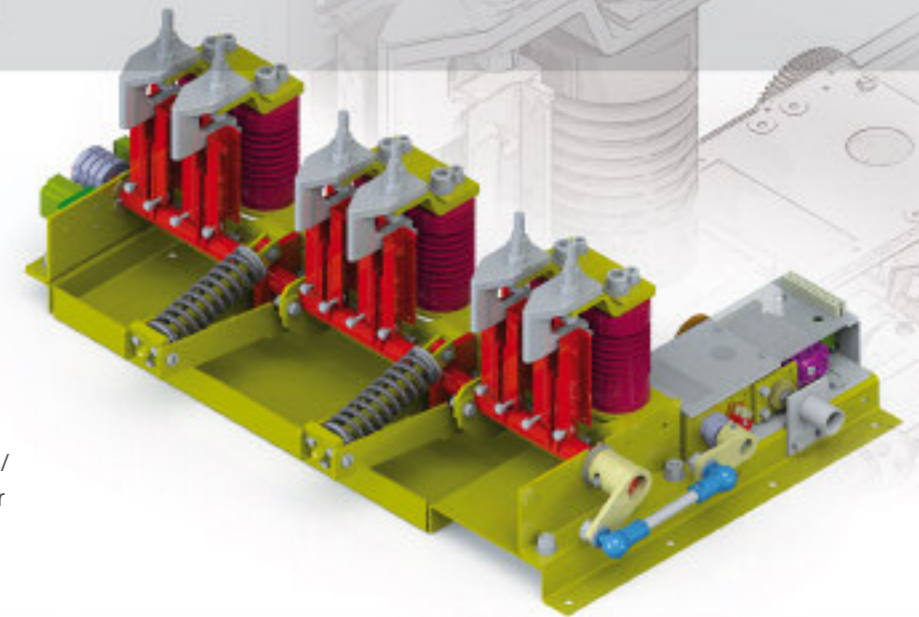
Very high reliability and operational reliability is necessary.

This reliability can also be achieved under severe climatic and technical conditions.

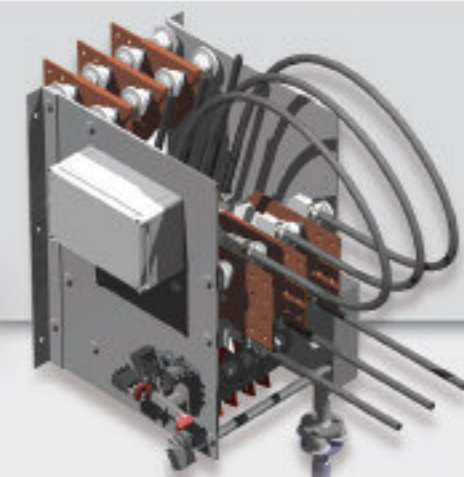
Very often, a combination of different devices is a good idea, e.g. disconnector/ grounding connection or a commutator with a grounding connection.

**ISOLATOR
ISOLATOR/GROUNDING
CONNECTION COMBINATION
CHANGEOVER SWITCHES
GROUNDING CONNECTION & GROUNDING
CONNECTION WHICH CANNOT BE POWERED UP**

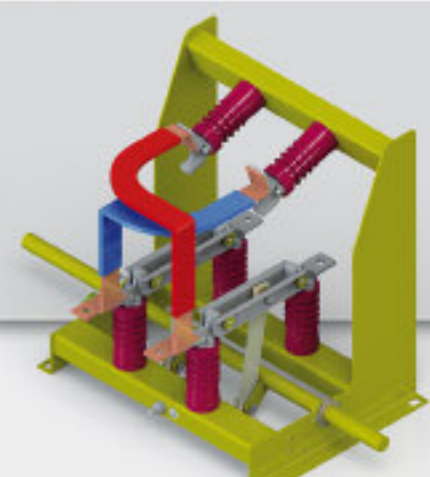
... are needed when working on electrical equipment so that the operating personal can be protected.



Isolator/Grounding connector combination GTD with motor drives



Compact, water cooled disconnector FA for AC and DC applications



Commutator



SWITCHGEAR CUBICLE

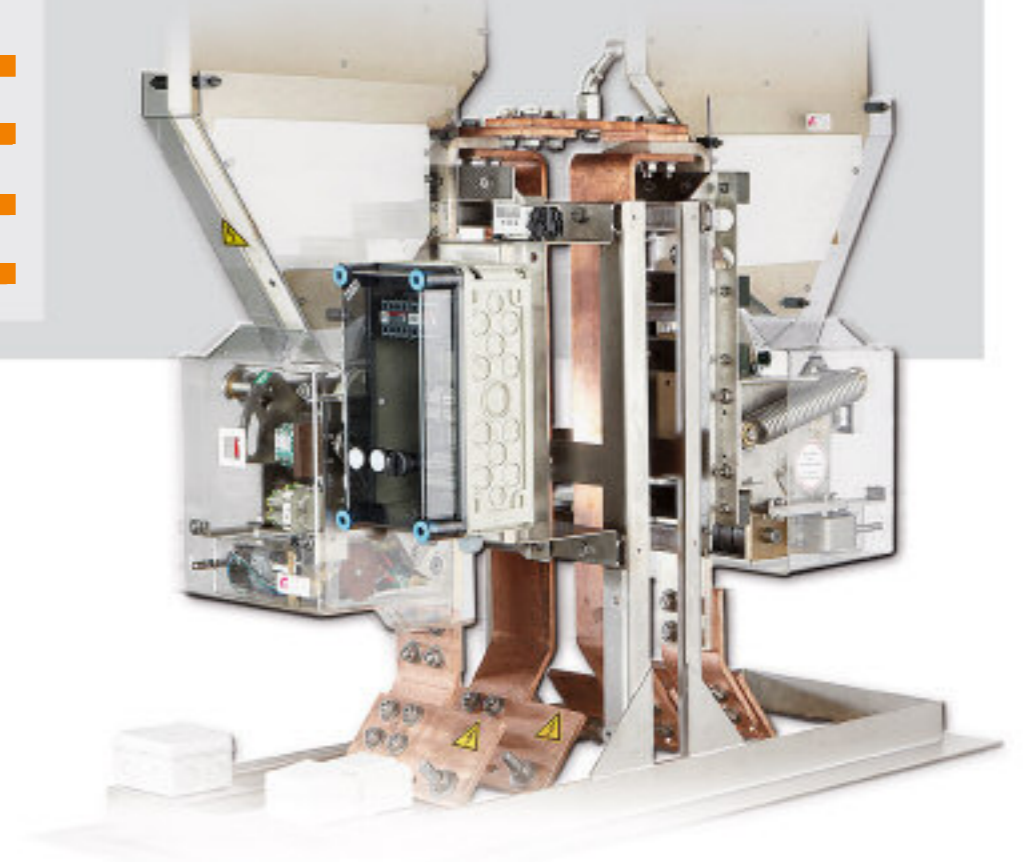
FLOHE designed and manufactured complete outdoor cubicles up to IP66.

ISOLATOR-EARTHING SWITCH COMBINATION

EARTHING SWITCH

ISOLATOR

DC LOADBREAKER

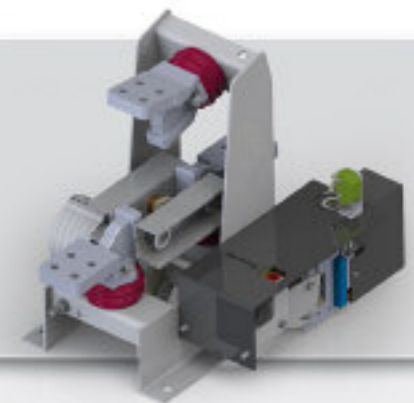
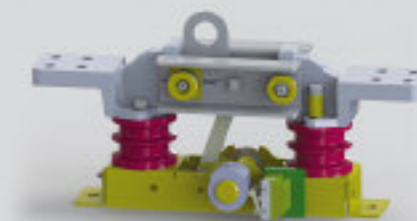
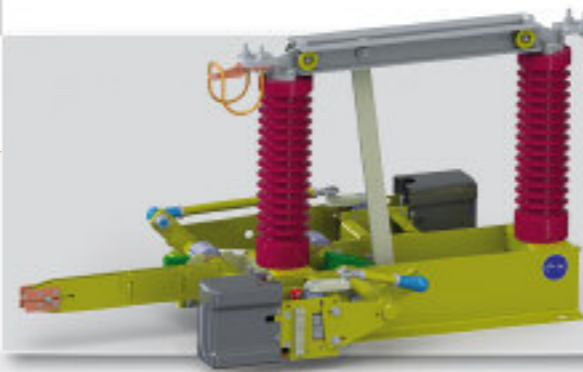


IN THE RAILWAY INDUSTRY...

DC loadbreakers are required for safe disconnection and earthing according to standard: EN 50123-3 – VDE 0115.

DC loadbreakers are in accordance for making capacity and breaking capacity in both directions.

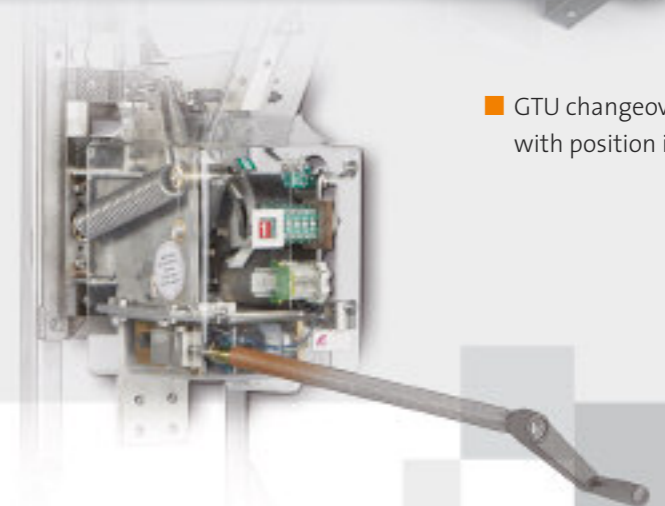
Insulating distance between conductor and earth: overvoltage category 4 EN 50124-1.



Cubicle specification upon request...

with DC Loadbreaker, DC disconnector, fuses, control equipment etc.

GTU changeover switch with position indicator





SERVICE...

A team of professionals offers you the following services:

Assembly

- Assembly and disassembly work
- Provision of assembly conductors
- Welding of copper, aluminum and copper/steel
- Repair and renewal of the water supply on the furnace
- Changing lifting columns and regulating cylinders

Maintenance of switchgear

- Assembly, disassembly, inspection and maintenance of switchgear on site



- Changing of high-current cables
- Repairs to all supporting arm systems
- Optimisation of the furnace regulation system for power intensive industries

On call readiness

- 24 hrs. on call: ☎ +49 (0) 700 - 700 300 10

SERVICES

REFERENCE LIST...

The proof of FLOHE's ability, reliability and safety is found across the world.





FLOHE



FLOHE
GMBH & Co. KG



FLOHE CABLE
TECHNOLOGIES GMBH



FLOHE HOCHSTROM-
TECHNIK GMBH



Berg
FLOHE
BERG GMBH



FLOHE
FOUILLERET SAS

WE WILL GLADLY
ADVISE YOU ...

GERMANY

FLOHE GMBH & Co. KG

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44579 CASTROP RAUXEL
GERMANY

☎ +49 (0) 2305 - 7003 - 0
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SERVICE-HOTLINE

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WE ARE ON CALL
24 HOURS

FRANCE

FLOHE FOUILLERET SAS

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77650 SAINT-LOUP-DE-NAUD
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