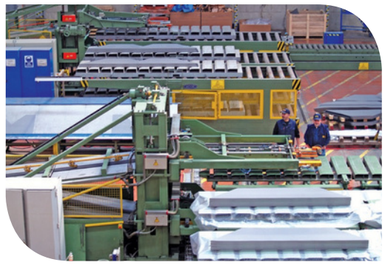





COMPANY PROFILE

MKS TRANSFORMER EQUIPMENTS A.S. is a family-run business. Its story began with its sister company, AKGUN RADIATOR LTD. STI. Identifying a need in the sector of cores for power and distribution transformers, the AKGUN family used the extensive experience gained with AKGUN RADIATOR LTD. STI. and founded MKS TRANSFORMER EQUIPMENTS A.S. Since their foundation, both companies remained important companies on the market. MKS TRANSFORMER EQUIPMENTS A.S. continues the production of cores for power and distribution transformers and AKGUN RADIATOR LTD. STI. successfully continues to produce radiators, flat wall tanks, corrugated tanks and corrugated walls for transformers. MKS TRANSFORMER EQUIPMENTS A.S. has been active in the core producing business since 2003. Since its foundation, MKS TRANSFORMER EQUIPMENTS A.S. continues the production of cores both for power and distribution transformers. MKS TRANSFORMER EQUIPMENTS A.S. is working under ISO 9001:2000 certification and international standards. Its premises are located in Sekerpinar Industrial Zone (Kocaeli) and include a 10.000 sqm. closed area. The machinery park consists of sllitting lines, cutting lines both for distribution and power transformer cores, production lines for rectangular cores, shunt reactor cores, wound cores and magnetic flux collectors. Its main target is to serve the sector with high quality products and services. Currently, MKS TRANSFORMER EQUIPMENTS A.S. operates succesfully in domestic and international markets and maintains its position in the sector as a respectable institution with its qualified personnel and high-quality products and services. MKS TRANSFORMER EQUIPMENTS A.S. is cutting cores for leader companies in the distribution and power transformers sector and has a strong cooperation with many domestic and foreign companies. The company has an increasing export graphic and a permanent communication with partners all around the world. The company's philosophy is to create partnerships and be more effective in new markets in order to show its efficiency, reliability, and quality.

COMPANY TIMELINE

2003

• Started CRGO slitting/ cutting and producing cores for distribution transformers

2008

• Started producing cores for power transformers

2010

• Started producing rectangular cores

2013

• Started producing shunt reac tor cores

2015

• Started producing stacked power transformers up to 150 tonnes

2016

• Started producing magnetic flux collectors (shielding)

2017

• Started producing wound cores (B•Core & D•Core)
• Started producing stacked transformer cores up to 250 tonnes

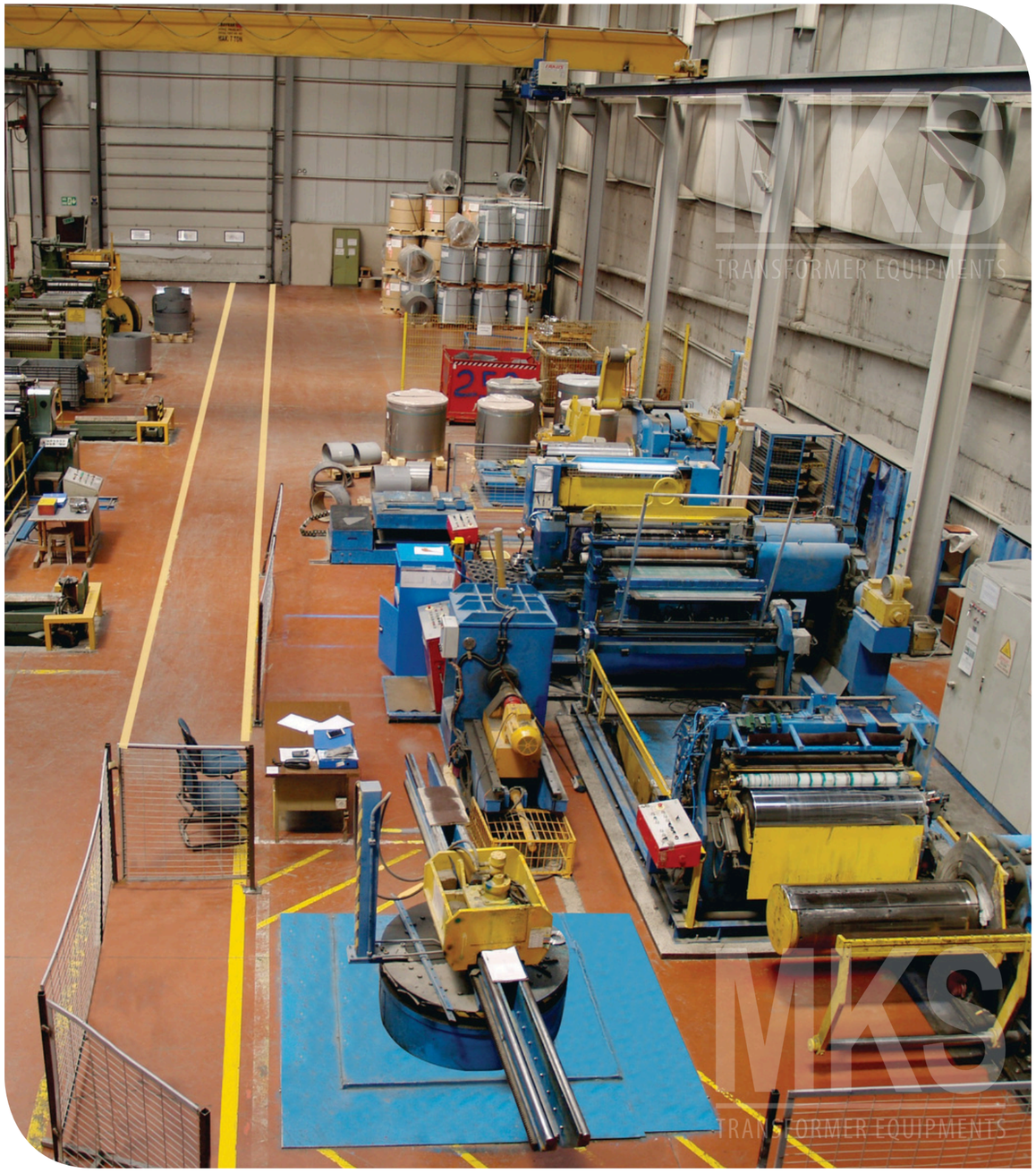
▶STOCKS

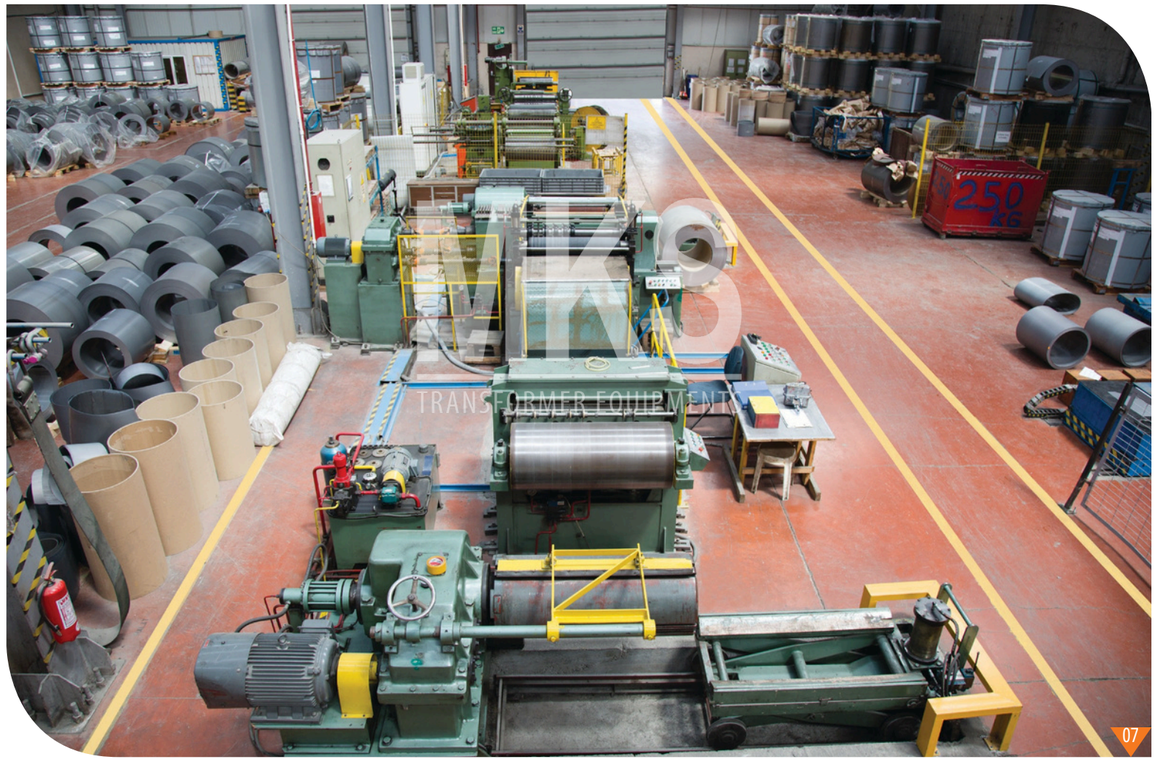
We are supplying CRGO steel from reputable steel mills and we keep in stock various steel grades in order to fulfill customer's requirements.
The coils are rigurously checked and the only high-quality steel becomes part of the end products. CRGO steel is a steel to be handled with care. As the magnetic property of the steel is the important quality required, handling, storing and processing of this steel must be made with caution. Storage of CRGO coils has to be done properly as storage may result unintentionally in excessive stresses.

GRAIN ORIENTED ELECTRICAL STEEL		
Thickness (mm.)	Maximum Iron Loss at 50 Hz.	
	Iron Loss	Induction
0,23	0,75	1.7 Tesla
0,23	0,78	1.7 Tesla
0,23	0,80	1.7 Tesla
0,23	0,85	1.7 Tesla
0,27	0,90	1.7 Tesla
0,27	0,95	1.7 Tesla
0,27	1,00	1.7 Tesla
0,30	1,05	1.7 Tesla
0,30	1,20	1.7 Tesla

NON -ORIENTED ELECTRICAL STEEL		
Thickness (mm.)	Maximum Iron Loss at 50 Hz.	
	Iron Loss	Induction
0,35	3,30	1.5 Tesla
0,50	4,70	1.5 Tesla

▶SLITTING LINES





Our slitting equipments can slit coils from min 40 mm. to max. 1250 mm. Slitting is the first and foremost manufacturing process in order to obtain any type of cut lamination. The slitting operation itself means slitting the

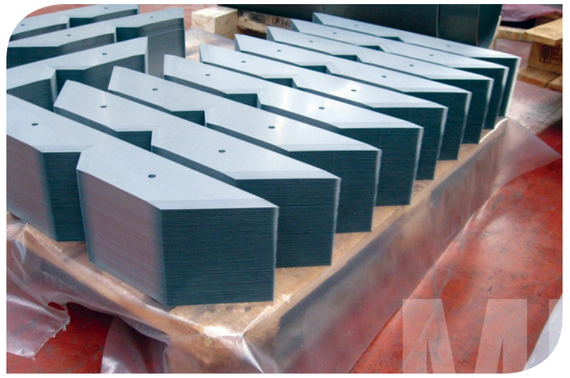
mother coil into narrow hoops by using cutting blades.
Starting from 2017, we offer Aluminum coil slitting as well.

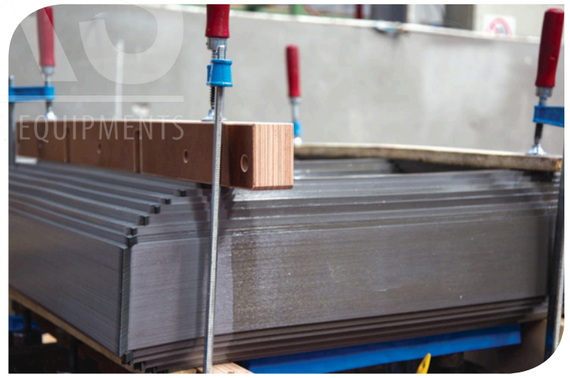
▶CUTTING LINES

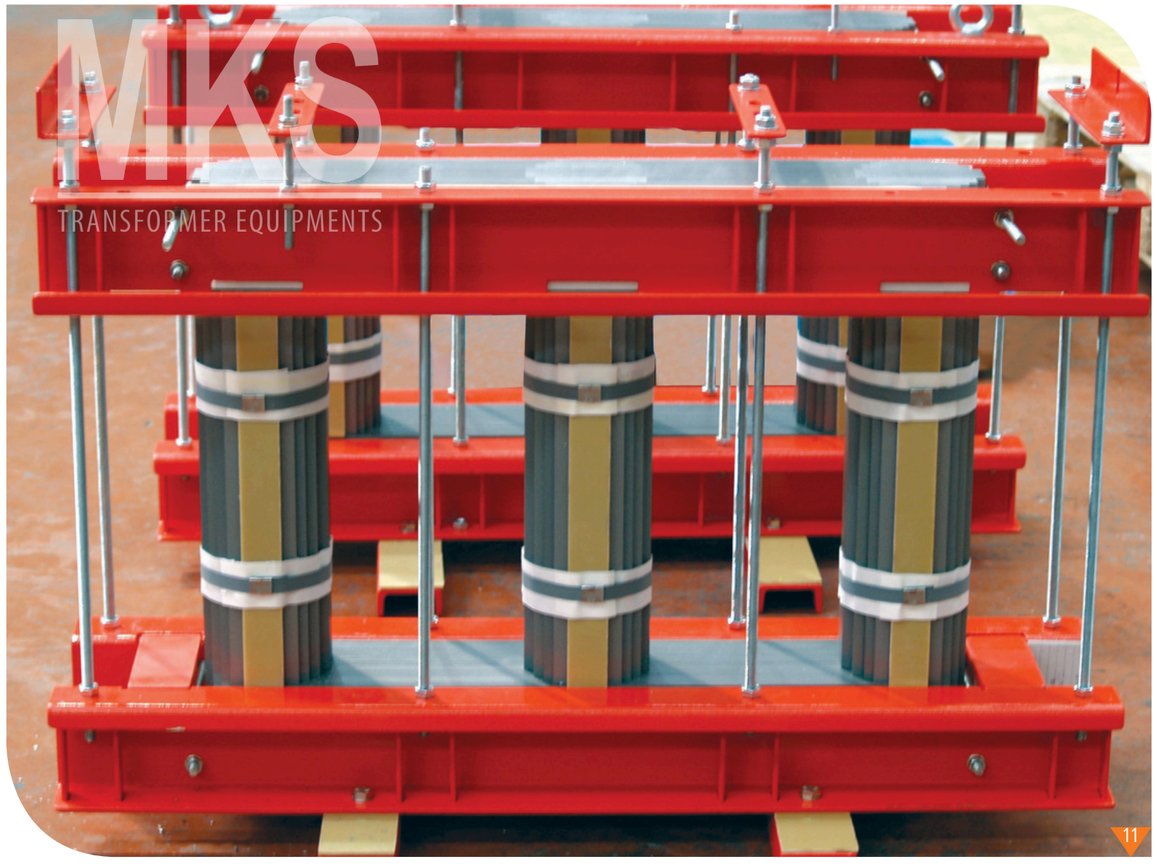
The material can be cut at different dimensions, at various widths and lengths. GOS lamination requires a high degree of precision. Therefore, we routinely perform strong quality checks which measure burr level, stack height, weight and other dimensions.

▶DISTRIBUTION TRANSFORMER CORES

In our company we can produce STEP-LAP cores for distribution transformers, using electrical steel with various dimensions.
All distribution transformer cores can be stacked according to customers' technical drawing. For the cores that need to be assembled, the iron clamps and insulation parts can be produced according to customer's technical specifications and drawings. If iron clamps do not prefered, we can offer temporary wooden clamps. For all stacked cores, the limbs and lower yokes are glued. After stacking, each core is tested for iron losses. The results are recorded in a report which will be sent to the customer. In case the customers do not prefer complete assembly, the cores can be delivered in pre-stacked form, according to the step widths.

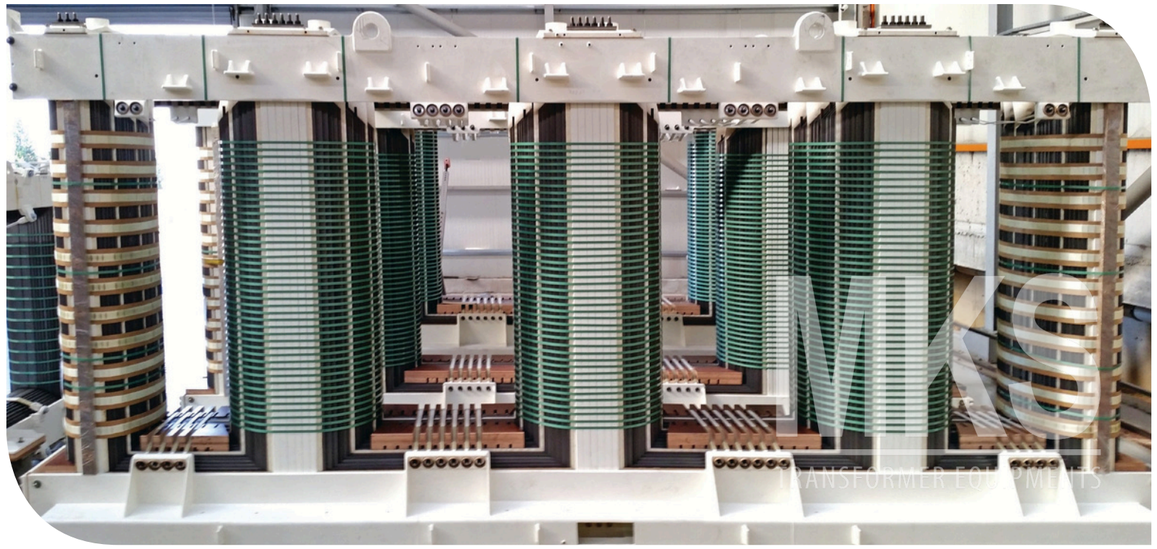


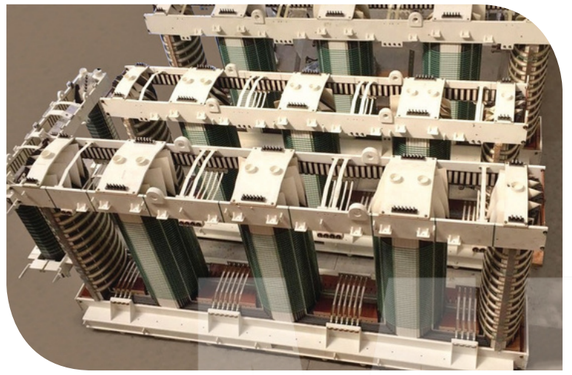


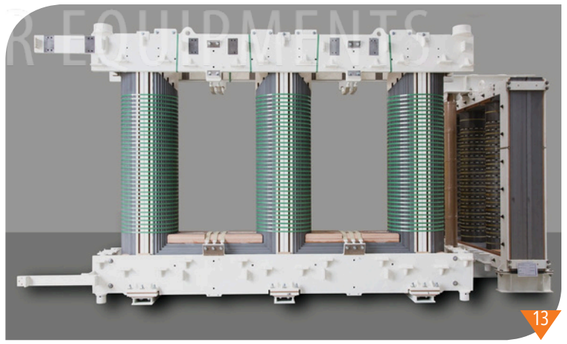


▶POWER TRANSFORMER CORES

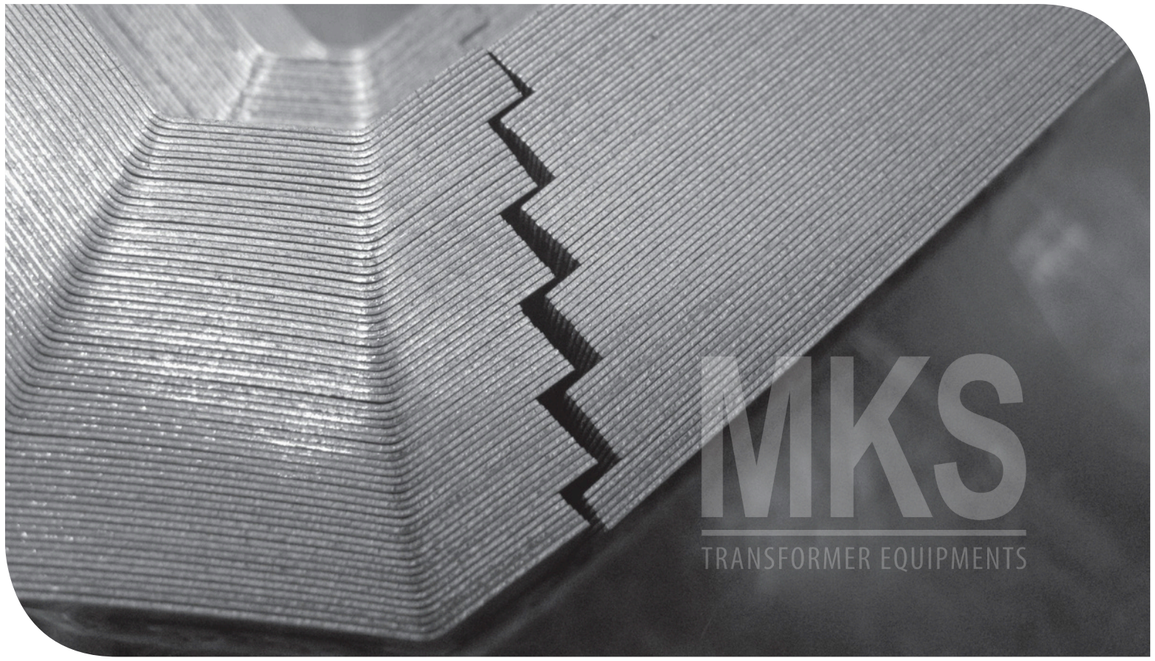
The complete cores can be supplied with iron or wooden clamps and insulation parts.
Our company can produce step-lap power transformer cores up to 1000mm width.
The cores weighing up to 150 tons can be assembled.
For the cores that need to be assembled, the iron clamps and insulation parts can be produced according to customer's technical specifications and drawings.
According to customer request, glue can be applied on the core limbs.
For cores assembled in our factory, iron losses are guaranteed.







▶RECTANGULAR CORES



With our rectangular core production line, we can produce several transformer core types such as: DUO-core, Distributed Gap core, Cruciform cores, Step Butt, Butt and Uncut cores. This types of cores are too small to be cut through step-lap method, hence they are produced from electrical steel cut and shaped with high-precision.

Our production method allows for a wide flexibility regarding the core sizes and types. Compared to other methods of production, the main benefit of our rectangular cores resides in reduced degradation of electrical and magnetic properties of steel that normally results after processing of electrical steel. Compared to the classically cut cores at 90° or EI cores, the rectangular cores provide lower noise and losses.

DUO - core

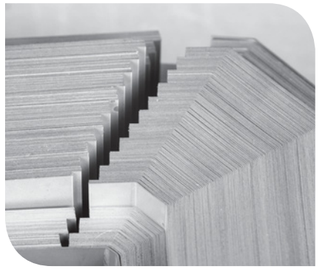
This is a low loss price competitive core with very easy assembly. It is used for core-type, single leg and shell-type, single and 3-phase Distribution and General Purpose Transformers.

DG-core (distributed gap core)

DG cores have a single cut per lamination. They are used for single-leg and shell type distribution transformers. They can be produced with straight cut face, diverging face and End Overlap face.

Cruciform cores

They are made from multiple strip widths. The resultant core legs have a cruciform cross section.



Step-Butt cores

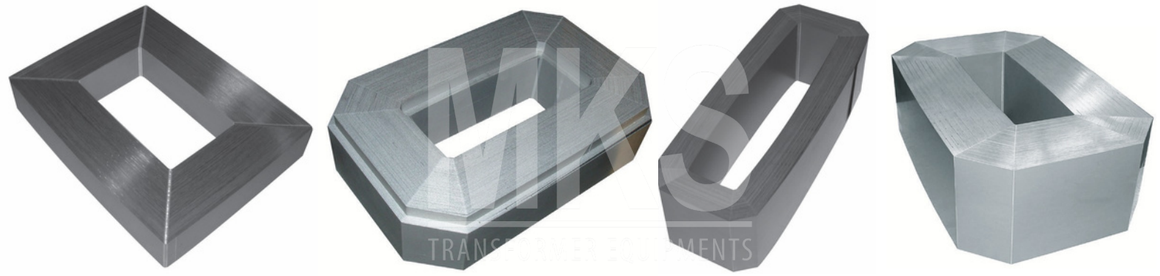
This low-loss type of cores are used for shell type General Purpose Transformer up to approx. 2kVA.

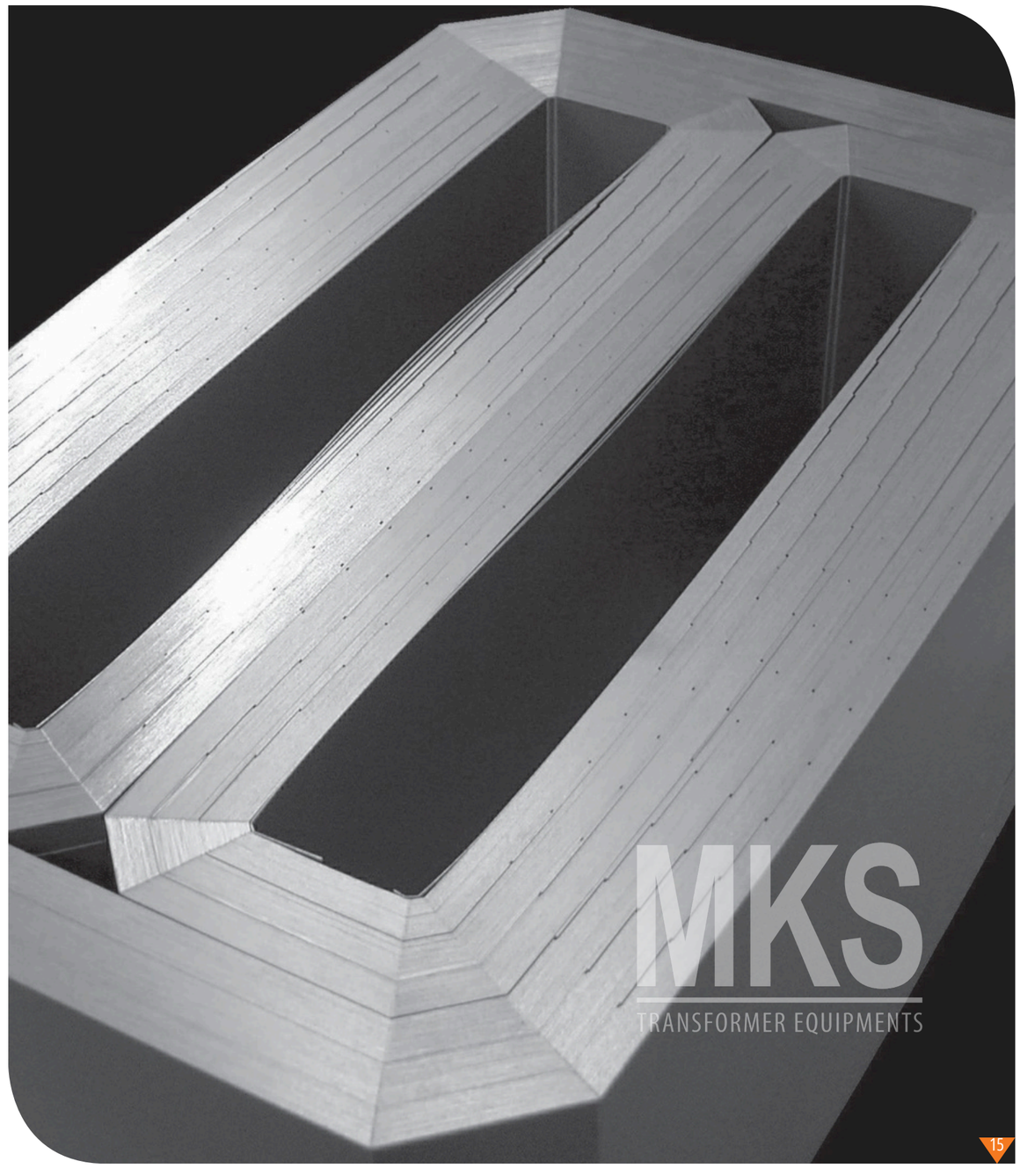
Butt cores

These cores have a gap of programmable size in 2 (single phase) and 3 (3-phase) legs. They are used in chokes and reactors.

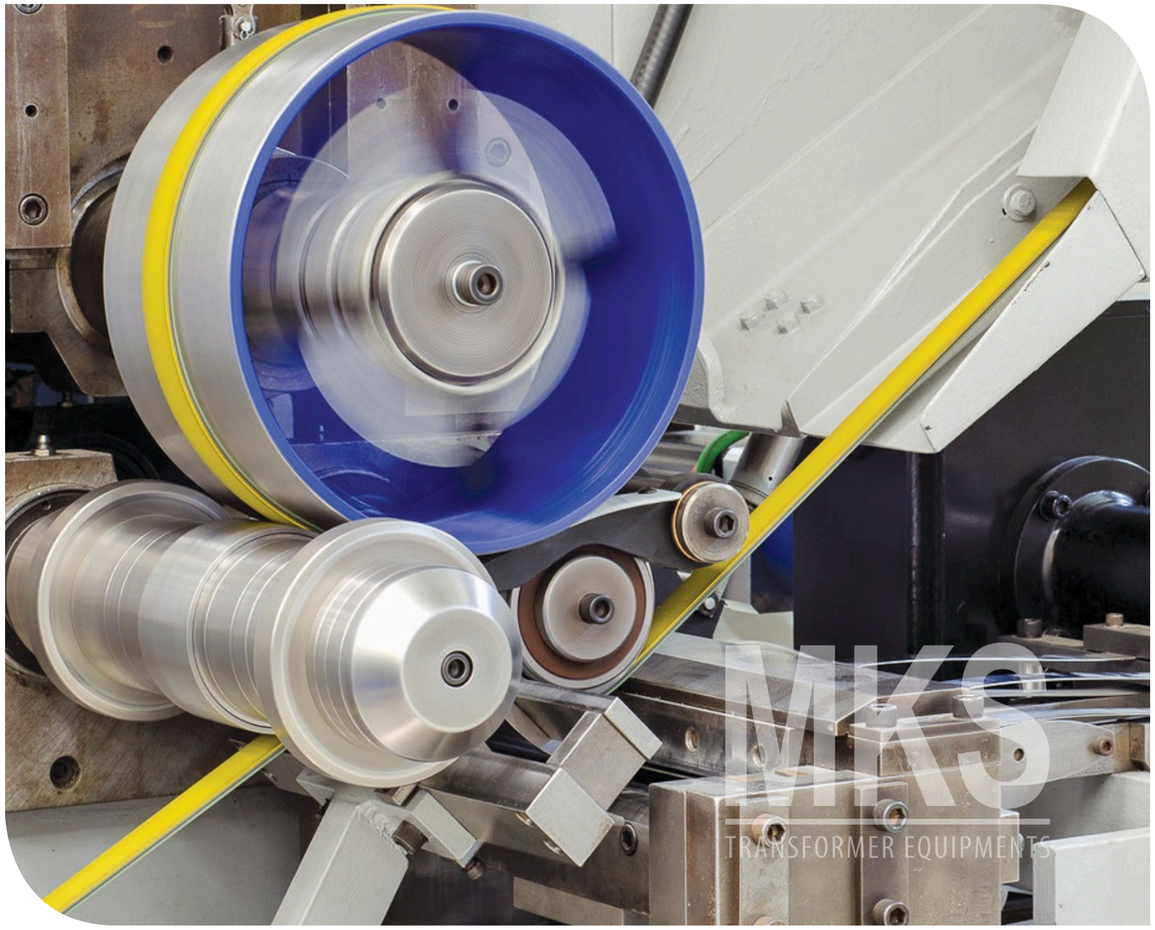
Uncut cores

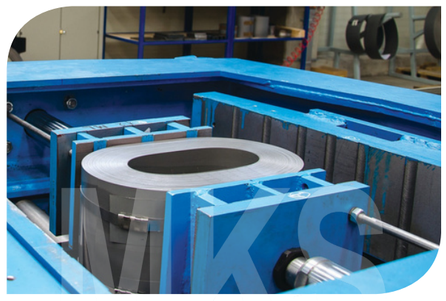
This is an annealed rectangular core with no cuts, produced through feeding and folding the steel into a rectangular shape. Uncut cores are used for current and voltage transformers.





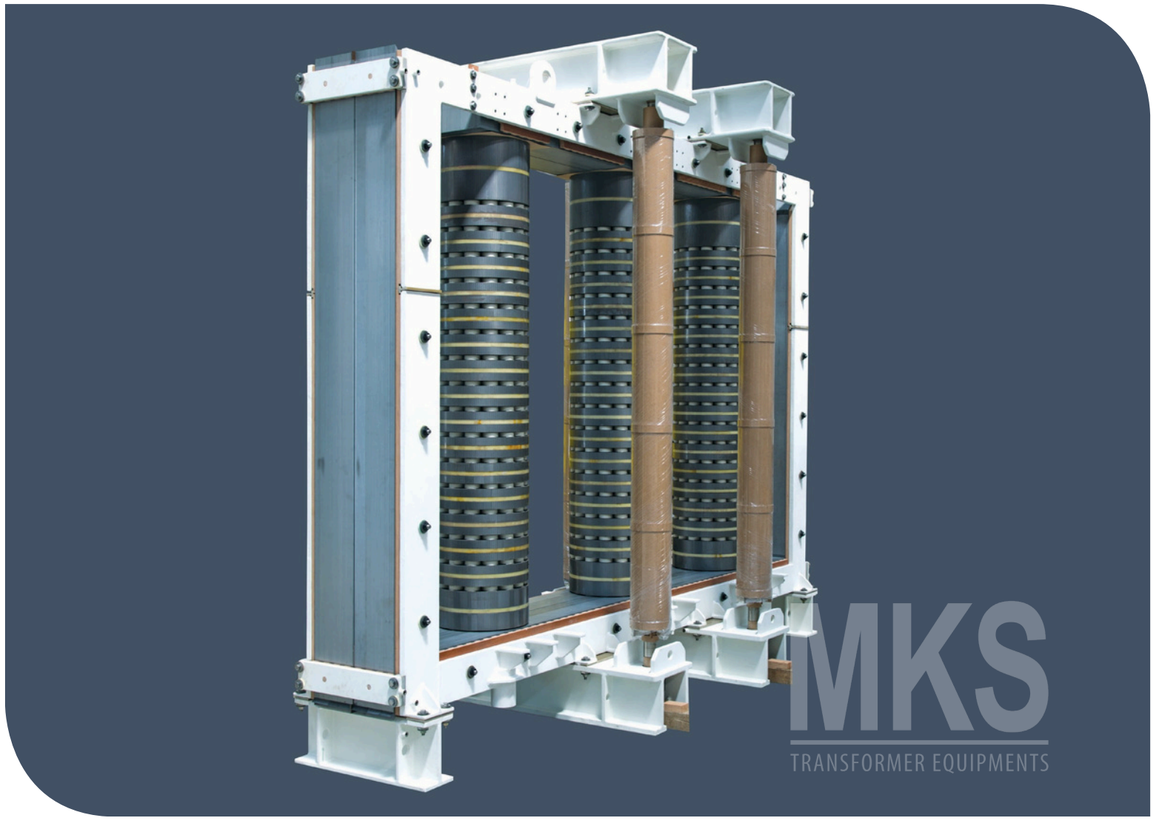
▶WOUND MAGNETIC CORES





Wound magnetic cores have been used in the design and manufacture of distribution, small power and instrument transformers for over 50 years. The wound magnetic cores are ideal for transformers where standard lamination cannot be applied, where weight or dimensional requirements are critical and have to be reduced. With our core winding equipment, we can automatically produce wound cores using a continuous feed process. After the material is cut to width and formed into a roll, a further heat treatment is carried out. A wide variety of consistent gap patterns can be performed, making production more flexible and more effective. The main advantages of wound cores are: • Improved distribution of the magnetic flux density • Reduction of eddy current losses and excitation current • Improved performance and increased efficiency • Suitability for production of large batches of transformers with identical design

▶SHUNT REACTOR CORES



In order to meet the increasing need for shunt reactors of international and domestic companies, MKS has completed the shunt reactor core production line, starting production in 2013. MKS manufactures the shunt reactor cores according to customer's design with a high flexibility for medium and high voltage systems. The shunt reactor cores are produced with yokes and legs, including all metal parts and insulation accessories. The complete weight of a reactor core can reach

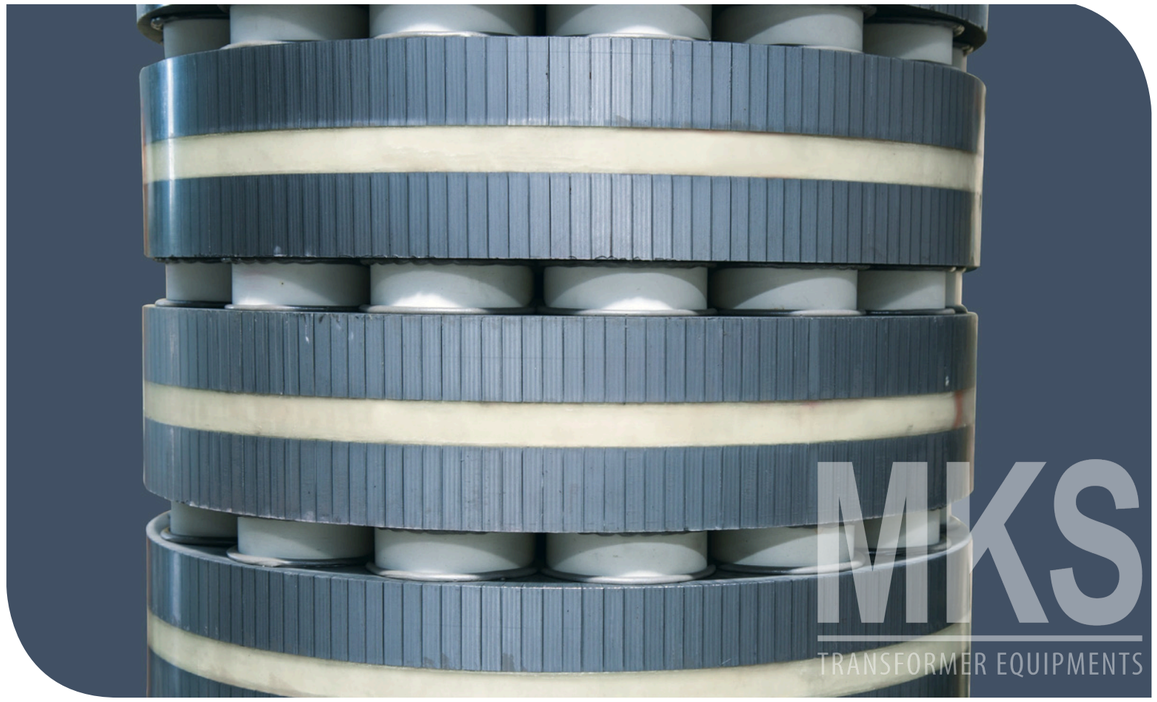
150 tons.

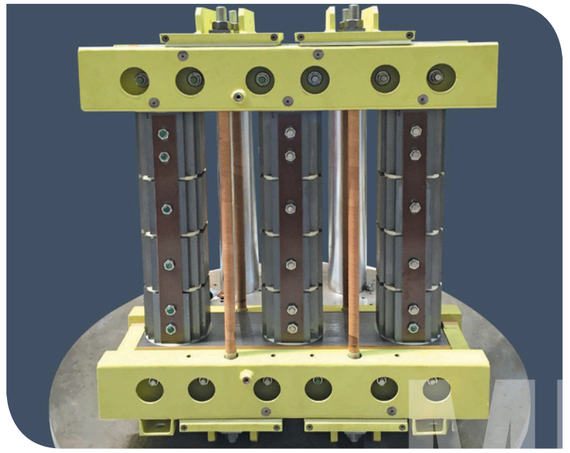
The shunt reactor cores can be built with 5 limbs (3/2) with the outer frame limbs or stacked as 3 limbs (3/0) with the upper and lower yoke sheets.
The limbs and frame sheets can be packed and delivered separately.
The limbs are clamped with strong plates and bolts for

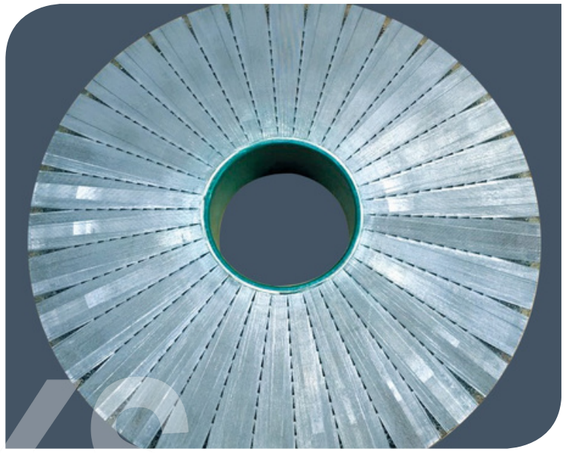
separate dispatch.

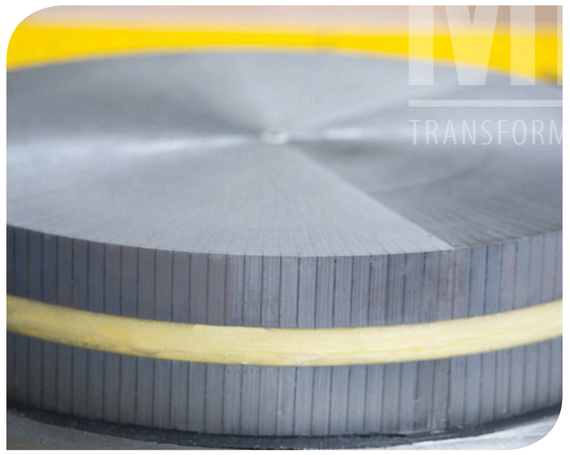
The legs can consist of 90o stacks or radial reactor bundles. The radial reactor bundles' height can reach 500 mm.

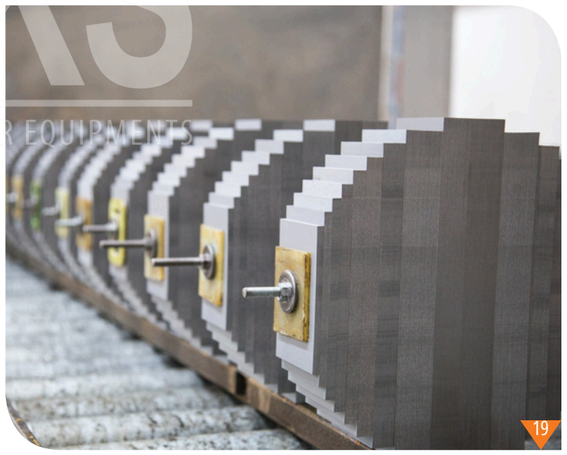
The bundles' inner and outer diameters are determined by customers.
The outer diameter can reach more than 1000 mm.
The decisive factor of the outer diameter is inner diameter.
The inner and outer diameter of the bundles can be produced with a 45o bevelled edge for more efficiency.
The ceramic spacers are used to obtain axial distance between radial reactor bundles. These ceramic spacers are glued to both bundles with special adhesive under pressure.
First, the limbs are completed and checked.
Then, the limbs are glued on the lower yoke.
It is very important to give special attention to the assembly of the shunt reactor cores.
The main target is the production of an economical, low-noise, low-loss and highly-efficient reactor core.
After doing the magnetic analyzes and tests of the desired products and obtaining their characteristics and electrical values, results are recorded and archived in company's database.



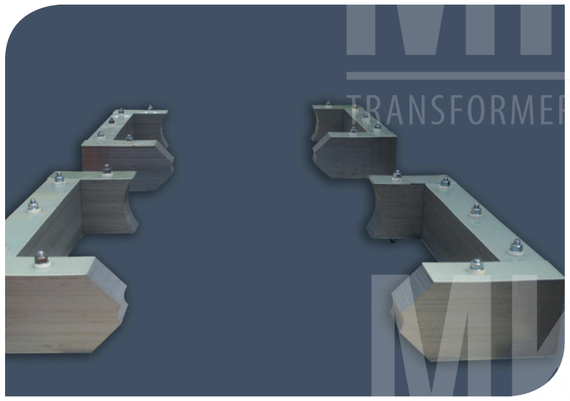


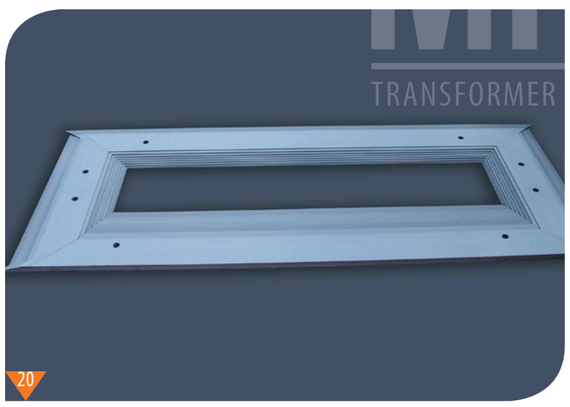


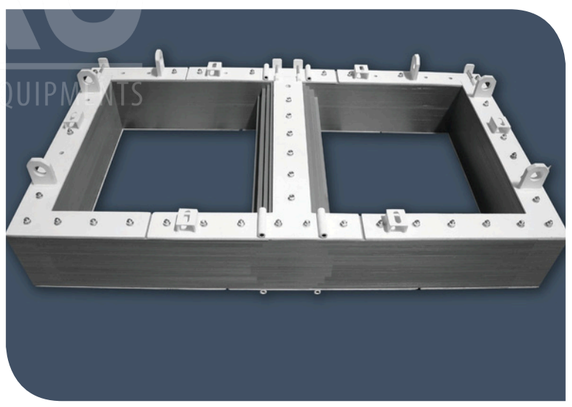


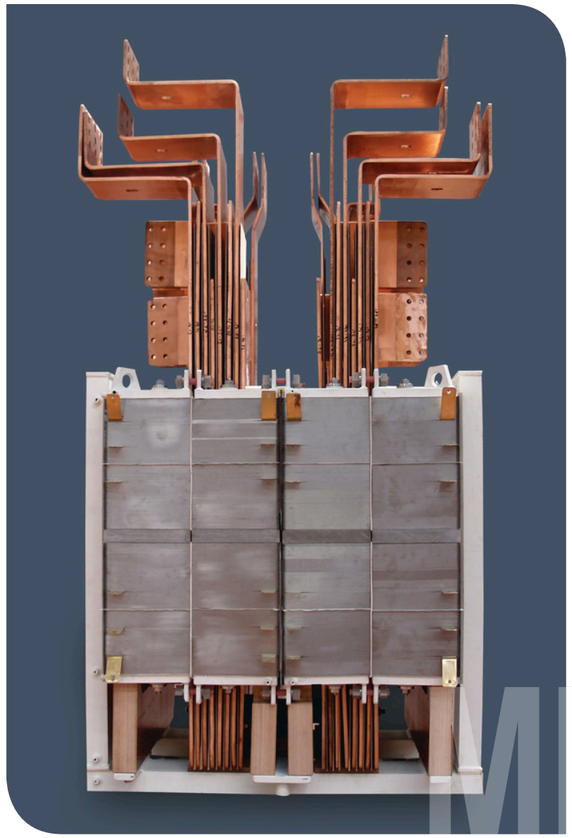


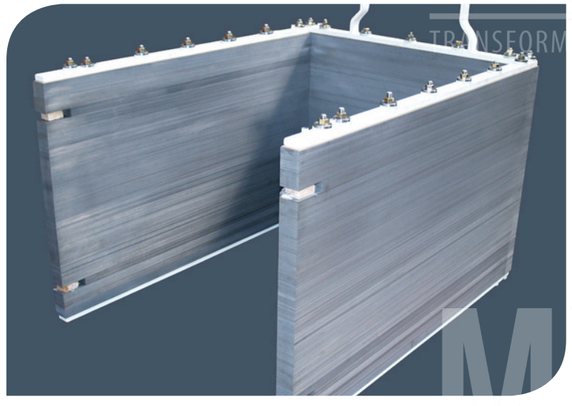
▶SPECIAL TYPE CORES

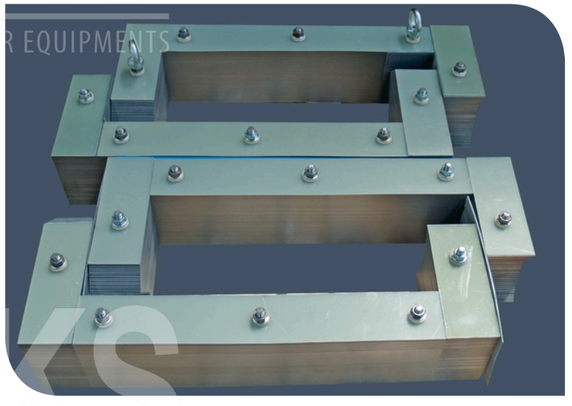


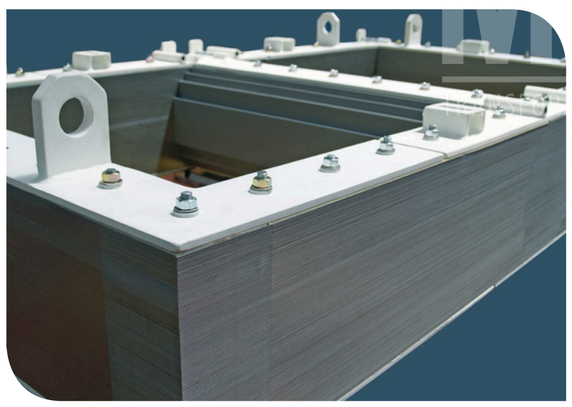


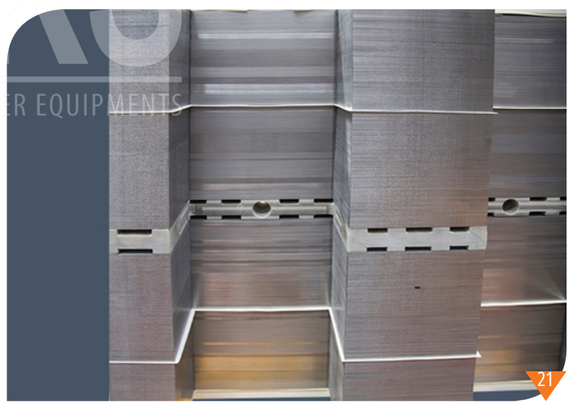




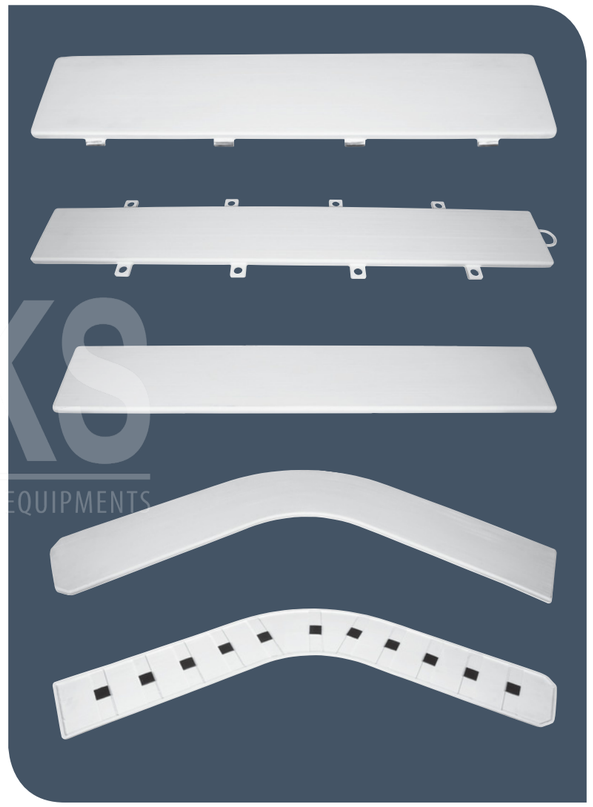








▶MAGNETIC FLUX COLLECTORS (SHIELDING)



Power transformers are important components of the electrical network. Their maximum efficiency is reached when the power losses are minimized.
Magnetic flux collectors are steel elements that are used to reduce losses in power transformer tank walls by collecting leaked electromagnetic flux into a construction with high conductivity and to prevent transformer gassing by restraining excessive heating in tank walls.
In general, magnetic flux collectors are manufactured for power transformers starting from 10 MVA and higher. Flux collectors with 10 mm. width are used for 30 MVA – 100 MVA power transformers. Flux collectors with 20 mm. width are used for power transformers starting from 200 MVA.
MKS TRANSFORMER EQUIPMENTS produces flux collectors with/without rubber, in painted or bare form for power transformers, in any size required by the customers' projects.

Manufacturing specification
Length: 100 mm. to 10.000 mm.
Width: 50 mm. to 600 mm.
Thickness: 10 mm. to 200 mm.

Painting
White primer coat resistant to transformer oil (acc. to DIN EN ISO 12944)

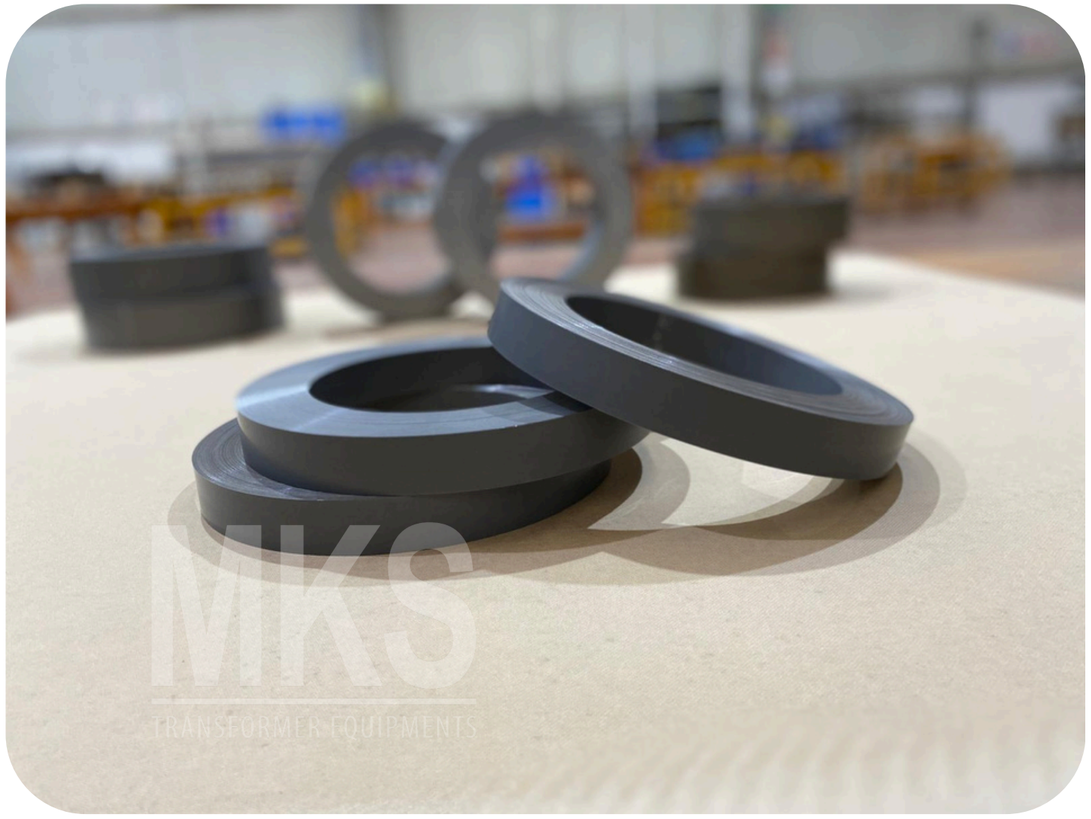
Quality
Magnetic flux collectors are checked as follows:
Dimensional check for slit sheets
Flux collector frame dimensional check
Dimensional check on welding fixture
Welding quality check (according to DIN-ISO 13920 norm)
Straightness and planarity check after press operation
Cleanliness and visual control before paint, non-painting area masking control.
Dry film thickness measurement and visual check of the paint layer. Paint adhesion test is done with cross cut test equipment.
If there are NBR on collector, bonding of NBR plates are controlled

Delivery
Magnetic flux collectors subject to delivery are dispatched in wooden boxes/palettes in order to prevent any mechanical impac t.

▶TOROIDAL CORES

A toroid core is a magnetic core shaped like a ring, typically made mainly of Electrical Steel , laminated steel. It is a crucial component in various electrical and electronic devices, primarily used in inductors and transformers.

It Concentrates Magnetic Flux, Increases Inductance, Improves Transformer Efficiency,Reduces Electromagnetic Interference (EMI) It gives also advantages due its ompact size and lighter weight.



QUALITY AND TESTING LABORATORY

Electrical steel sheets which will be used to produce cores are thoroughly and accurately analyzed in our testing facility with the latest technological test equipment.
In this manner, by doing all analyzes we obtain the characteristic map of sheets. The material properties guaranteed by the steel suppliers can be verified, thus reducing the frequency of deviations in measured losses from the guaranteed values.

After we decide the suitability of the sheets, we present to our customers all the test results confirming suitability. All tests performed in our facility are stored in our database.

According to customer orders, design parameters are determined and the cores are designed with the aid of performance simulation. In the next step, cores are produced and delivered to customers with guaranteed losses.

For distribution and transformer cores ranging from 5 kVA to 100 MVA, after production is complete, the no load losses are measured. Test certificates confirming desired values for each core are sent to customer.

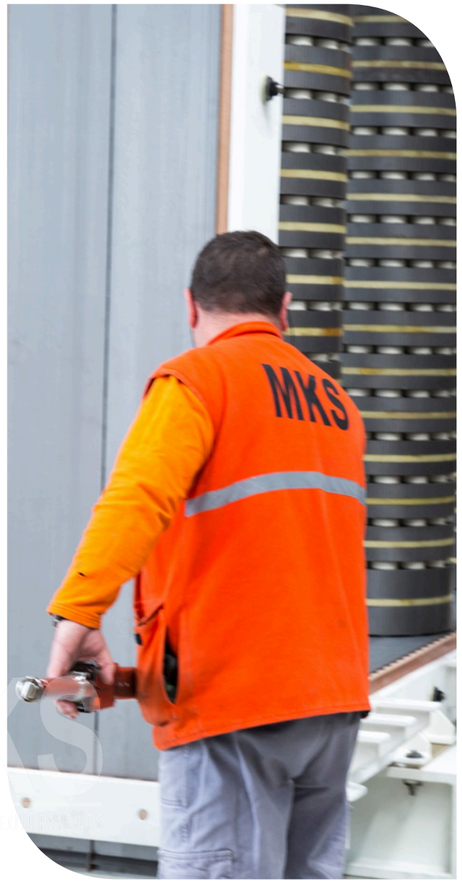
We are very responsive to customers' feedbacks, evaluating them thoroughly in order to ensure continuous improvement for our products and services.

Our testing facility is equipped with brand new Brockhaus devices in order to give best service to our customers. Worldwide recognized Brockhaus testing units give reliable and extremely accurate results. Using these devices enhances the optimization of the core design through the use of materials with better stacking factors.

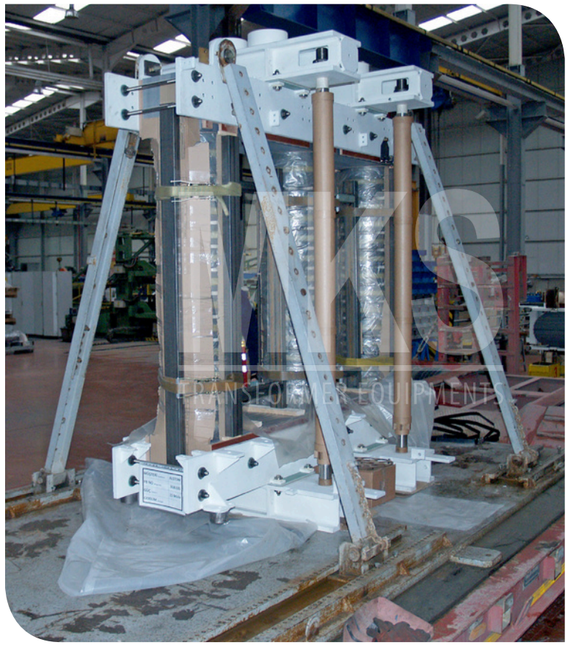
In our facility we have the following devices:

Single Sheet Tester 250*250 mm.
Epstein Frame
Franklin Tester
DC (megger)
AC (gw instek AC/DC withstand voltage tester)



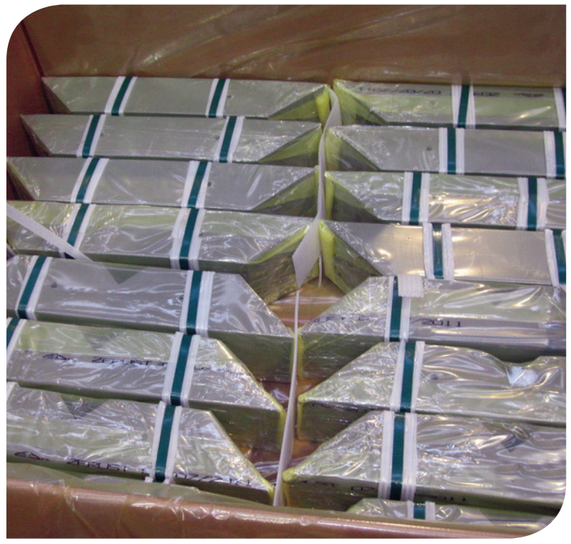




▶PACKAGING - TRANSPORTING



Our products are usually packed on wooden pallets, cradles and cardboard boxes. In order to protect the metal against atmospheric moisture (humidity) and rust, Nylon (VCI) and plastic/metal straps are used. However, the packing method can be adjusted as per customers' requirements.
Special care is taken when packaging the laminations in order to guarantee the stability of the pallets and protection from possible oxidation or other type of damages, during the loading/unloading process and

transpor t.



▶TECHNICAL DRAWINGS

TRANSFORMER CORES

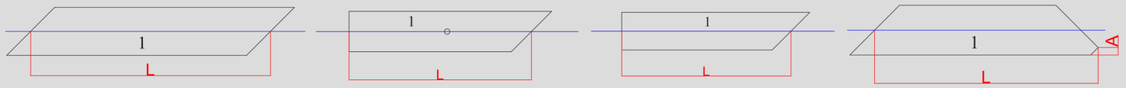


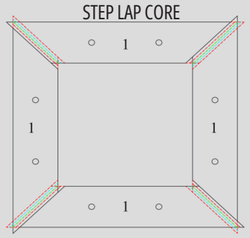
FIGURA 101

FIGURA 102 WITH HOLE
LMIN: 370MM

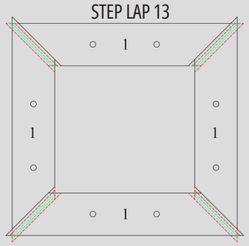
FIGURA 102
LMIN: 370MM

FIGURA 103

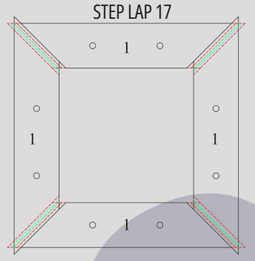
STEP LAP CORE



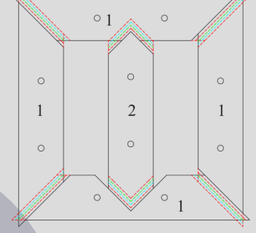
STEP LAP 13



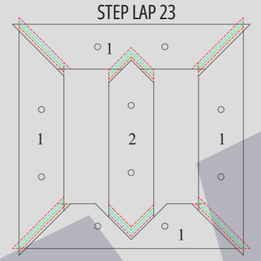
STEP LAP 17



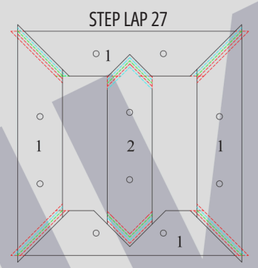
STEP LAP CORE TRANSVERSAL
STEP LAP 17



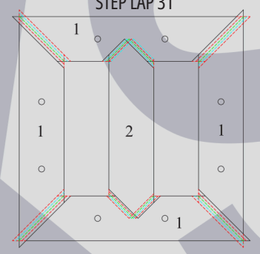
STEP LAP 23



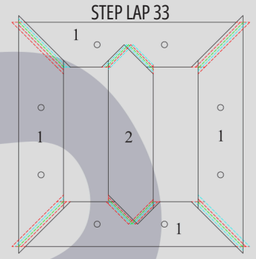
STEP LAP 27



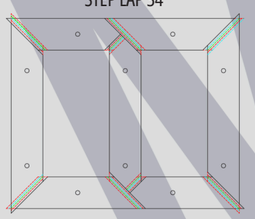
STEP LAP CORE LONGITUDINAL
STEP LAP 31



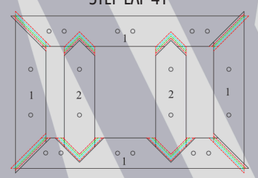
STEP LAP 33



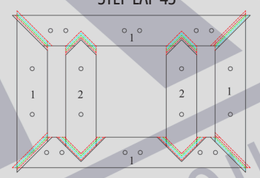
STEP LAP 34



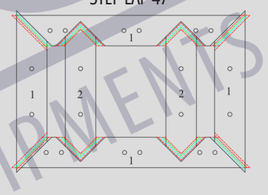
STEP LAP 41



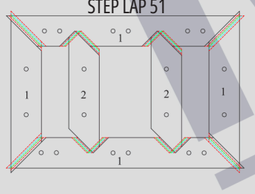
STEP LAP 43



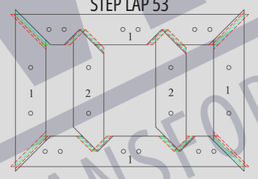
STEP LAP 47



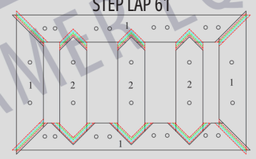
STEP LAP 51



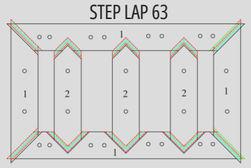
STEP LAP 53



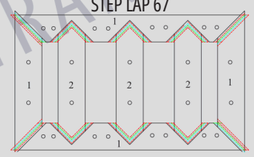
STEP LAP 61



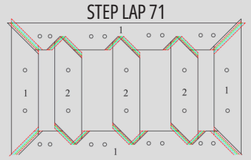
STEP LAP 63



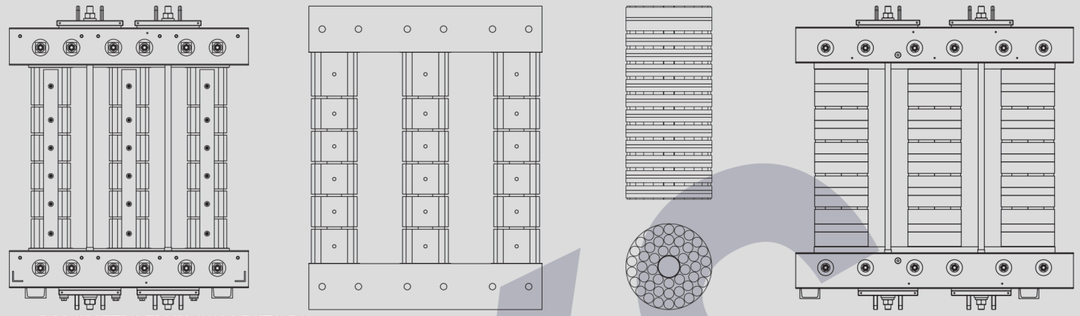
STEP LAP 67



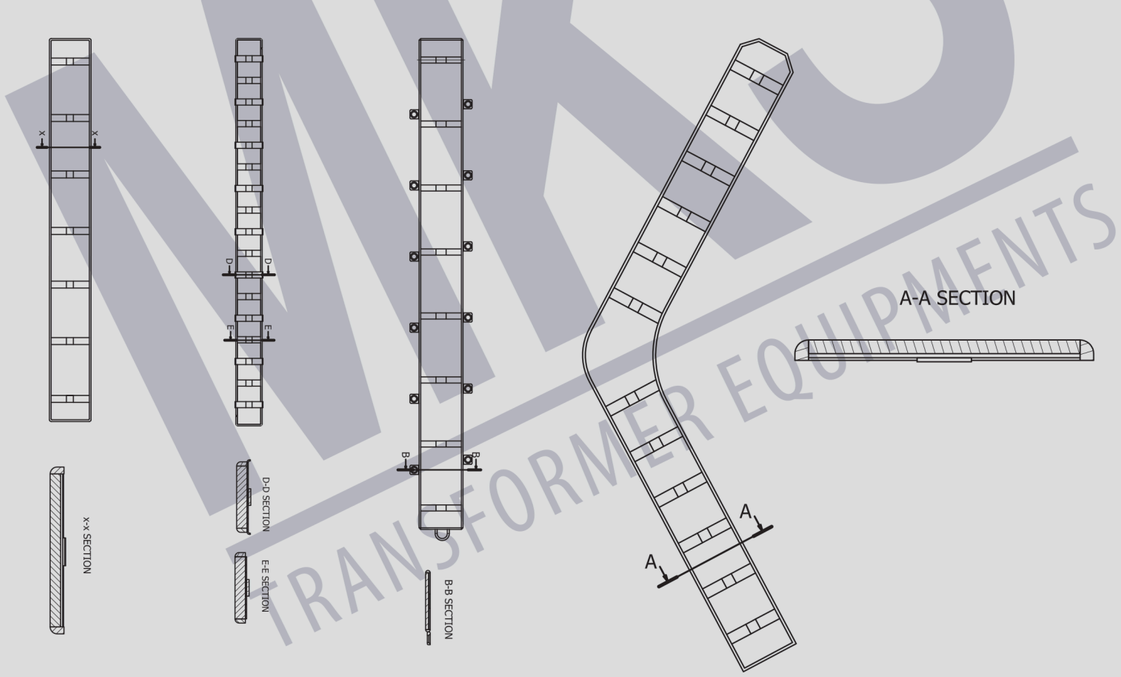
STEP LAP 71



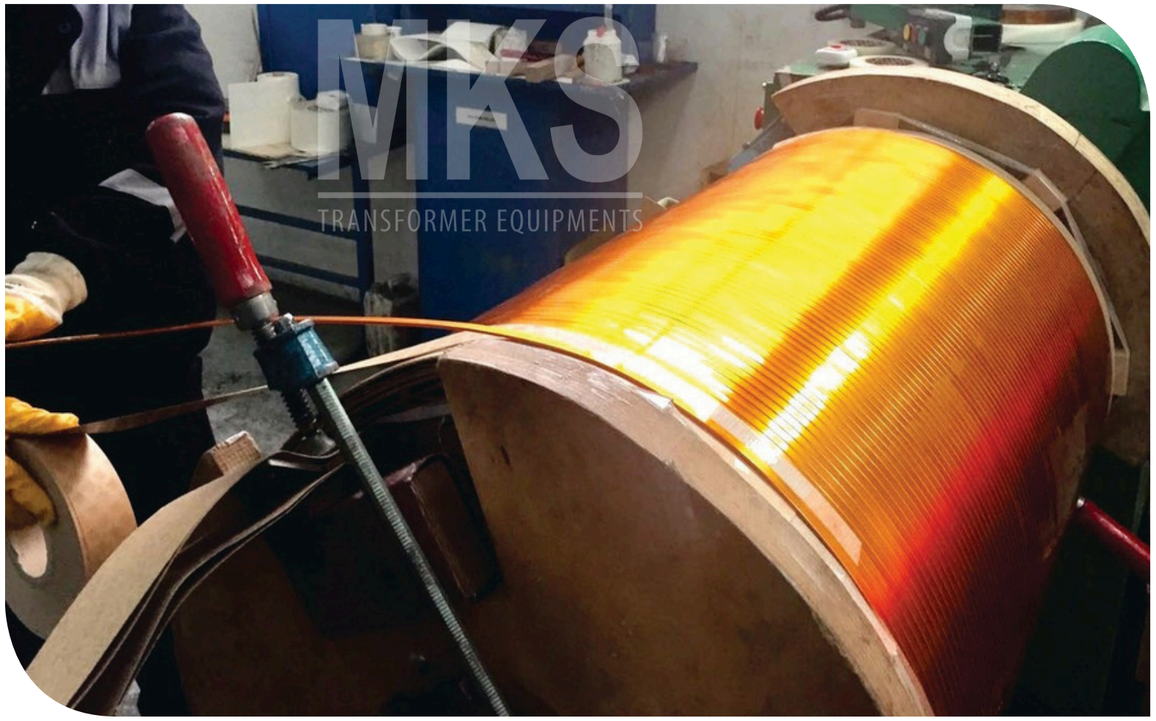
SHUNT REACTOR CORES

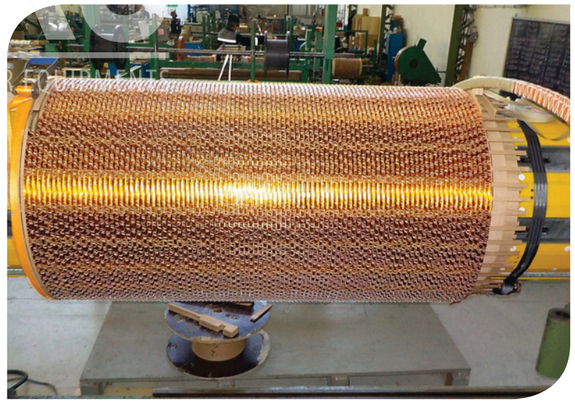


MAGNETIC FLUX COLLECTORS



▶ACCESSORIES





▶STANDARDS

The company has successfully implemented ISO 9001:2000 Quality Management System, ISO 14001
Environmental Management System and OHSAS 18001 Occupational Health and Safety Management System.