INSULATION COMPONENTS AND MATERIALS

PUCARO insulation for transformers, motors and generators
PUCARO stands for premium insulating materials for transformers, electric motors and generators on a global scale for as many as 50 years.

We offer a wide range of high quality insulation products, taking advantage of our company's broad experience, qualified employees and modern technology.
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A long journey
from a local papermill to a global insulation materials manufacturer

1667 The paper manufacturer Jobst Roedter establishes a papermill in Roigheim, Germany

1740 The papermill passes to Paul Haeuser

1770 Paul Haeuser sells the mill to Gabriel Schmidtberger whose family keeps it for almost 100 years

1840 For the first time, the papermill is called a paper factory

1854 Christian Authenrieth founded the firm of Authenrieth

1872 Christian Authenrieth acquires the papermill in Roigheim bringing new technology to the venerable workshop and building up a steam boiler house

1893 Constantin Authenrieth takes over the factory and for the first time introduces the product brand PUCARO (Presspan- und Cartonfabrik Christian Authenrieth Roigheim) to the market

1929 Guenther Authenrieth takes over the family business and sets up laboratories and test stations, enabling the scientific bases for developing and improving products. He invests in modern machines, and establishes a company of global renown

1952 Bernhard Authenrieth and his mother, Margarethe Arndt-Authenrieth, continue his successful work

1973 Figeholm becomes member of the ABB Group

1989 PUCARO becomes member of the ABB Group

1997 Implementation of pre-assembled insulation kits

2003 PUCARO becomes official DuPont Nomex® Qualified Laminator

2007 Approval for 800 kV / UHVDC transformers

2007 Raman Boards becomes member of the ABB Group

2008 Foundation of new plant in Piestany, SK

2011 Launch of the new high-voltage lead exit system for transformers - HaPuflex 550 kV and HaPuflex 800 kV

2012 Product portfolio extension - HaPuflex 1200 kV successfully type tested

2013 Product portfolio extension - Triflexil ESA with extra smooth coating, as well as thermosetting laminates and finished components

2014 New plant in Roigheim for production of glass fibre reinforced insulating materials

2015/2016 Expansion of Piestany factory and introduction of CNC machining of composite components

Today PUCARO is active in more than 80 countries. Our products are marketed by competent sales team globally. This guarantees short distances and optimal customer support. A comprehensive product portfolio covers most of the customer’s needs, while our on-site technical and sales support can offer tailor-made products.
Environment & Quality
key tasks in all areas of the company

A successful business consists of passionate people, satisfied customers, products that are assured with good quality, and work processes that sharpen our execution but also lessen the environmental impacts.

PUCARO has attained DQS certification according to DIN EN ISO 9001 and DIN EN ISO 14001.

Many of our products are also registered or acknowledged components by Underwater Laboratories Inc. (UL), a global, independent company that inspects and certifies products with regard to safety.
PUCARO insulation product portfolio

PUCARO is a premium manufacturer of insulating materials for transformers, electric motors and generators on a global scale for as many as 50 years.

Our portfolio targets mainly oil-filled transformers, from distribution to large power transformers up to UHVDC (Ultra High Voltage Direct Current) projects. We offer solutions also for dry-type transformers and motors and generators (LV, HV, e-mobility).

In addition, series of niche products cover special applications, e.g. pharma (support materials for high frequency welding) and shields for telecommunication industry.

Our products are based on:

**Cellulose**
Presspaper incl. DDP (diamond dotted paper) pressboard; components in standard and custom geometries and pre-assembled component systems, called KITs

**Flexible laminates**
PUCARO Triflexil® and PUCARO Ecoflexil® contain combinations of: Nomex, Kapton, Mylar - non-woven polyester (embossed/plain), polyester films and presspaper. Additional requirements related to specific material properties, production process and ease of use are addressed by a series of coatings including: gloss lacquer (GL), matte lacquer (ML), B-stage resins (BL), extra slippery application coating (ESA)

**Resin/Glass fiber composites**
Glass fiber reinforced laminates and machined components

We have an extraordinarily broad global network of competent Front-end-sales team and local sales and technical experts sitting in Roigheim, Germany and Piestany, Slovakia, who guarantee both optimal technical service on site and short delivery times.

Listening to the voice of the customer is the first and foremost ingredient in our recipe for success. Continuously improving our competences, processes, quality and product added value results in high levels of customer satisfaction. We are proud of forging long-term strategic collaborations with our partners and being recognized as “preferred supplier” by our customers.
PUCARO insulation
for oil-filled transformers

Insulation components and insulation sheets of pressboard are primarily used in oil-filled power transformers and distribution transformers because of their high purity, mechanical strength and optimum oil-impregnability.

**Insulation materials**
Pressboard is a special product based on pure cellulose taken from long-fibred coniferous wood. This is structured into a fibrous tissue without additional adhesive and then pressed. Due to its high chemical purity, pressboard is excellently suited as an insulation material in electric machines, capacitors and oil-filled transformers. It is manufactured acc. to IEC standards and is a class A (105°C) insulation material. Two processing methods have been developed for different fields of application. These are referred to as pressboard and presspan in rolls.

**Pressboard:**
- Figeholm Elboard HD acc. to IEC 60641 Type B.3.1 A
- PUCARO Elboard N (IEC 60641 Type B.2.1 A), Elboard ZF (Type B.4.1) and Elboard LD (Type B.5.1)
- Figeholm Elboard HDLP (IEC 60763 Type LB3.1A.2) and Figeholm Elboard HDLC (Type LB3.1A.1)
- Thermally upgraded presspaper and diamond dotted paper (DDP) (temperature class 120°C)

**Presspan in rolls:**
- Transformer presspan TT/RO/HD, MD, LD acc. to IEC 641-1, Type P2.1
- Transformer presspan DDP with diamond-pattern baked enamel coating

**Insulation components**
Components such as angle rings, snout segments and lead exits are formed from pressboard and permit precise adaptation to the electrical field conditions prevailing in the transformer. Their high resistance to deformation and good dielectric properties are of great advantage, particularly where high field intensities are involved.

Special moulding and pressing procedures are employed in the manufacture of pressboard components, ensuring high density and dimensional stability. The outstanding mechanical properties of the insulation material provide the appropriate level of protection in the event of short-circuiting. Excellent oil-impregnability intensifies the electro-mechanical properties which – in this combination – cannot be achieved by any other insulation material.

Our insulation components made of presspan are made of the same base products as insulation sheeting. Some of these components are manufactured by shaping insulation sheets, others are the result of new processing techniques. The properties of insulation components are equivalent to those of insulation sheets.

**Offering for power transformers:**
- Cylinders
- Strips and spacers
- Angle rings, caps and snout segments
- Static rings and metallized cylinders
- High-voltage lead exits
- L-profiles for lead frames (cleat end lead)
- Support cylinders/end rings
- Corrugated board
- U-channels
- Clackband
- DDP tubes
- Corner collars
- Pressplates

**Offering for distribution and special transformers:**
- Cylinders
- Duct spacing
- Corrugated board
- Crepe tubes
- Diamond dotted paper (DDP)
KIT insulation systems
Complete pre-assembled insulation systems, so-called KITs have become very popular with our customers and offer considerable cost and effectiveness benefits. As a result of our competence and extensive experience in the field of insulation we are regarded as a strategic partner by our customers.

Our customers can benefit from just-in-time supplies and from our assembly services tailored to their specifications.

Advantages:
• Reduction of production costs and increase of production capacity by minimizing processing times
• Cost transparency for insulation material
• Reduction of freight costs by consolidating products and delivery dates
• Easier purchasing process
• Reduction of warehousing costs for insulation material
• Creation of more efficient internal organization
PUCARO insulation
for dry-type transformers, motors and generators

Our flexible insulation materials are used in electric machines as interlayer insulation, slot lining, slot closures and as interphase insulation. As a result of the general trend towards higher performance, the materials are subjected to intense electrical and thermal stressing. Outstanding mechanical strength is prerequisite for automatic processing.

These requirements are met by extremely flexible insulation materials in multi-layer structures of electrical pressboard, polyester and polyimide films, aramid papers and various non-woven fabrics.

Various combinations of the individual materials enable optimal adaptation to the required properties in each case.

As a result of special outer layers of electrical pressboard, non-woven fabrics and NOMEX® papers, multilayer insulation materials are ideally combined with impregnating and trickle resins. This is essential to ensure a permanently stable insulation system.

All flexible electrical insulation materials are available in rolls, strips and sheets.

PUCARO Presspaper brown E, TT/RO/HD or MD
- Insulation class A (105°C)
- Calendered presspaper made of 100% sulfate wood pulp
- Various applications in motors and transformers, e.g. slot lining and layer insulation

PUCARO special presspaper grey SS
- Insulation class A (105°C)
- Calendered presspaper made of 100% sulfate wood pulp
- High density for improved mechanical properties
- Various applications in highly stressed motors and transformers, e.g. slot lining and layer insulation

PUCARO presspaper DS and Triflexil M/DS
- Presspaper DS: Insulation class A (105°C)
- Triflexil M/DS: Insulation class B (130°C)
- Laminate of DS presspaper with polyester film, consequently high temperature-resistance
- Special presspaper, or combination with polyester film
- High rigidity, well-suited as slot closure

PUCARO Triflexil M
- Insulation class B (130°C)
- Flexible composite of PUCARO special presspaper grey SS and high-grade polyester film
- Especially suited as slot insulation, slot closure and "Kreppisol" interphase insulation

PUCARO Triflexil M/VL
- Insulation class B (130°C), suitable for applications in insulation class F (155°C) when saturated with the appropriate impregnation and trickle resins
- Flexible composite of non-woven polyester and high-grade polyester film
- Especially suited as slot insulation, slot closure and inter-phase insulation
- Smooth surface ensures excellent machinability

PUCARO insulation for dry-type transformers, motors and generators
PUCARO Triflexil M/VL-UE („DMD“)
- Insulation class F (155°C)
- Laminate made of esterimide-saturated non-woven polyester and high-grade polyester film
- Especially suited as slot insulation, slot closure and inter-phase insulation
- Smooth surface ensures excellent machinability
- Very good bonding with impregnating and trickle resins

PUCARO Triflexil NMN
- Insulation class F (155°C)/H (180°C)
- Laminate of aramide paper (NOMEX®) and high-grade polyester film
- Especially suited as slot insulation and slot closure
- Smooth, abrasion-resistant surface ensures excellent machinability
- Excellent absorption of impregnating and trickle resins
- Available as a non-calendered version for inter-phase insulation (Type 411)

PUCARO NKN
- Insulation class H (180°C)
- Laminate of aramide paper (NOMEX®) and special polyimide film (KAPTON®)
- Especially suited as slot insulation and slot closure for highly stressed electric motors
- Smooth, abrasion-resistant surface ensures excellent machinability
- Very good absorption of impregnation and trickle resins

PUCARO baked enamel coatings
- Coating with PUCARO baked enamel green (duroplastic, all-over)
- DDP coating (rhombic) for transformers
- Applications as slot linings and slot closures on stators
- Layer insulation of choke coils (ballasts) and smaller transformers
- "PREPREG"-coated PUCARO Triflexil M/VL-UE Dacron-Mylar-Dacron (DMD) for dry-type transformers

PUCARO special products
- PUCARO Triflexil 2.5-M 3-ply with GL 3000 brilliant varnish as high-frequency punch-welding base
- PUCARO 5-layer material for protective linings in cable sleeves
- Special presspapers for the paperprocessing and graphic industries
- PUCARO Triflexil ESA with extra smooth coating for higher productivity during motor manufacturing

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