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Mica is a mineral that offers a wide range of exceptional properties. For about fifty years, COGEBI has been involved in processing mica into an industrial material, without changing its valuable natural characteristics.

As you read this document, you may find that some of the properties of mica could improve your own products. Please do not hesitate to contact us. We can offer a wide selection of materials based on mica, each of them meeting a series of specific requirements and designed for a particular application. We will be able to determine the material best suited to your requirements. If we cannot find one, we will meet with your engineers so that we can develop a new material to meet your needs.

This approach, emphasizing direct contact, has helped us adapt our products to the real world and has allowed us to create the materials of tomorrow, today.
COGEBI’s origins

1929: The company “COMPAGNIE GÉNÉRALE BELGE DES ISOLANTS” (General Insulation Company of Belgium) was founded, the name shortened to COGEBI. As the name suggests, the main objective of the company was the manufacture of components used in the insulation of electrical machines. Initially this took the form of moldings created by compressing thermosetting plastics.

1950: Manual production of electric insulation based on mica flakes.

1951: COGEBI develops insulating varnishes. It markets resins for the paints industry and introduces a decorative laminate “Panolux”.

1957: On the basis of an American license, COGEBI perfects the industrial, automated manufacture of mica paper. Cogemica® is born.

1963: A laboratory is set up in order to formulate epoxy resins.

1970-80: COGEBI concentrates all its activities on developing, manufacturing and marketing mica insulation, selling all its other interests to specialized manufacturers.

1983: COGEBI gains a foothold in the North American market by establishing a subsidiary, COGEBI, Inc. in Dover, New Hampshire (USA).

1986: As part of the restructuring of ACEC, COGEBI is sold to COMPAGNIE ROYALE ASTURIENNE DES MINES, of which it becomes a division.

1990: COGEBI develops new markets outside the electrical sector.

1994: The two main shareholders in COMPAGNIE ROYALE ASTURIENNE DES MINES, SOCIÉTÉ GÉNÉRALE DE BELGIQUE and UNION MINIÈRE, sell their shares to FOCEP, which in 1996 then merges with CONTINENTALE D’ENTREPRISE, part of the Swiss group HARWANNE.

1997: COGEBI continues its internal and external growth.

1997-99: FOCEP is integrated into CONTINENTALE D’ENTREPRISES which thereby acquires “NORD-EST”, into which it incorporates COMPAGNIE ROYALE ASTURIENNE DES MINES.

2002: COGEBI establishes COGEBI China Ltd. in Hong Kong.

2003: Acquisition of EIT a.s. in the Czech Republic and integration in the COGEBI Group.

2005: COGEBI, a division of Compagnie Royale Asturienne des Mines SA, becomes a Société anonyme, a company under Belgian law controlled by Nord Est (France). COGEBI establishes COGEBI Asia in Malaysia.

2006: EIT a.s. becomes COGEBI a.s.

2007: The COGEBI GROUP has been acquired by the Russian – German ELINAR GROUP, specialized in the development, manufacturing and distribution of electrical and mica insulation materials, leader in its markets. COGEBI establishes COGEBI PRC (China) in Shanghai.
COGEBI Group is the world leading manufacturer of mica-based insulating materials. It exports virtually all its output - 75% to European countries and 25% to the Far-Eastern and American markets.

The major brands use COGEBI products in the fields of household appliances, electrical cables, electromechanics, metallurgy, vehicle manufacture, fluid transport, etc.

COGEBI Group employs about 375 people.
A gift of nature

Natural mica has exceptional physical characteristics. It can be found throughout the world, most notably in the presence of Paleozoic rocks. Accessible deposits are located primarily in India, on the American continent, in southern Africa and in Russia. Mica’s chemical composition places it in the aluminium silicates group. Two types are extracted - Muscovite, in which there is a predominance of potassium and Phlogopite, in which the presence of magnesium can be detected.

As a mineral, mica has a special characteristic - it can be cleft to obtain very thin flakes of constant thickness.

Mica can withstand temperature in excess of 1000°C / 1830°F (Phlogopite), it is flame-retardant, non-flammable, does not give off fumes, and conducts very little heat, especially perpendicular to its strata.

Natural mica has a dielectric strength greater than 25 kV/mm (625 V/mil), has good resistance to arcing and electrical erosion, and is permeable to microwaves.

Mica is tolerant of water and most chemical agents, such as solvents, acids, bases and mineral oils.

Mica has good compressive strength. It behaves well in the presence of tensile and bending stresses. It has a high modulus of elasticity.

Muscovite
K Al₂ (Al Si₃ O₁₀) (OH)₂
This is the most widespread mineral, and the name comes from the city of Moscow - in the Middle Ages, large deposits were used nearby to make windows. It contains potassium and is light in appearance. The mechanical properties are better than those of Phlogopite.

Phlogopite.
K Mg₃ (Al Si₃ O₁₀) (OH)₂
Phlogopite contains magnesium and is dark in appearance. It can withstand higher temperatures than Muscovite.
Retaining the properties of natural mica

COGEBI has perfected technology that allows the agglomeration of mica fragments to create a homogenous material in continuous production. The COGEBI process subjects the mineral to the action of a highly pressurized water jet, producing flat particles several microns thick, whose physical and chemical properties have been carefully preserved.

The resulting water slurry is fed to a special type of paper machine, which forms a continuous sheet of mica paper. At this stage, there is no need for a binding agent to hold the particles together, because their existing natural intermolecular attraction is usually sufficient. This 100% mica paper is called Cogemica®, and is based on either Muscovite or Phlogopite.

COGEBI maintains a strategic reserve of the raw material.

All the products marketed by COGEBI are asbestos-free. Mica, supplied in the form of flakes, is innoxious and has extremely good thermal and mechanical properties, making it a suitable alternative to asbestos in a wide range of applications.
Mica papers

100% mica papers are used by COGEBI as the basis for developing their range of products. The mechanical characteristics of Cogemica® papers need to be improved before they can be used in industrial applications. This is done either by impregnating them with a binding agent or by attaching them to a backing (fabric or glass fiber cloth, for example).

Types of mica paper

These are paper samples magnified 4 x. COGEBI produces mica paper using Muscovite for applications with high mechanical requirements and using Phlogopite where thermal performance is paramount.

To alter the properties of the finished product, it is possible to subject the Muscovite to the process of calcination before the paper is manufactured in the normal way. This thermal treatment removes most of the crystallization water usually contained in the mineral.

Finished products

In the final stages of the manufacture of COGEBI products, the papers are impregnated with resin and combined to form a laminate. Because of the small quantity of resin used, the materials retain the remarkable qualities displayed by mica in its natural state.

COGEBI can alter the properties of its products in a very precise way by controlling various parameters:
- the choice of mineral - Phlogopite or Muscovite, the weight and thickness of the mica paper
- the type and quantity of binding agent - acrylic resin, epoxy, silicone, etc.
- the type of any backing used: glass fiber cloth, polyester mat, polyethylene film, ceramic felt, etc.
Insulation for motors and generators

The products developed by COGEBI for use in the manufacture and rebuilding of motors and generators offer a high level of quality, and meet IEC 371 standards.

Commutator segment plates

Cogemicanite 400 is a range of mica laminates specially designed for use in the manufacture of commutators for electrical machines. Thickness tolerances are very stringent: both sides of the plates are perfectly sanded. COGEBI offers different types of Cogemicanite 400, in accordance with the application, the type of machine and its manufacturing process.

Insulating tapes - VPI & Resin Rich

Mica tapes (VPI – Vacuum Pressure Impregnation & Resin Rich) are designed to meet the requirements of the specialists in the manufacture, and repair of high-voltage motors and generators. COGEBI offers a comprehensive range of VPI tapes (Vacuum Pressure Impregnation) with a low binder content for coils and bars insulation of HV Rotating Machines operating in Thermal Classes F and H (155°C – 180°C) and a comprehensive range of Resin Rich Insulation system for HV Stator Windings of Rotating machines operating in Thermal Class F (155°C).

These tapes are backed on one or both sides to meet the requirements of modern taping machines. After curing, the insulation can be rigid or flexible according to the user’s requirements. COGEBI offers also a complete range of KALASTIK products; used mainly for the insulation of copper and other conductors of a rectangular or round cross-section that are used for windings of the electric machines with an operating voltage of up to 11 kV and the thermal insulation class F (155°C).
Insulation for fire-resistant cables

Under the registered trademarks Firox® and Pyronax®, COGEBI produces a range of tapes based on mica paper, reinforced with glass fiber fabrics. These tapes have great flexibility and high tensile strength, and their combined characteristics mean they can be used to create inorganic, fire-resistant insulation for electrical cables.

**Firox® and Pyronax®**

Firox® and Pyronax® tapes are manufactured using Muscovite mica or Phlogopite mica, characterized by its high thermal resistance properties. They have the following features:

- they have high tensile strength and good shearing and shock resistance
- their flexibility allows them to be used with the thinnest conductors
- they retain their exceptional properties at both very low and very high temperatures, in conditions which would make other materials unsuitable
- they do not give off fumes at high temperatures
- they maintain their insulating properties even at 1000°C / 1832°F
- they have high radiation resistance
- they can be applied through winding or lengthwise wrapping
- their use means cables comply with the following standards: IEC 331, EN 50200, BS 6387 S/Z/W, DIN 4102, NF C32-070, NB 30-004, MIL-C-24640, MIL-C-25038/3, U.L.2196, Nec 760-2b, JFDB test n° 7, AS/NZS 1660 5.5, etc.

Live cable with Firox® and Pyronax® insulation can withstand 3 hours of exposure to the flame from a gas float (1000°C / 1832°F).

Off-shore platforms in the North Sea are fitted with power, control and communication cables that must continue to operate in the most demanding of environments.
COGEBI produces electrical and thermal insulation for use in the manufacture of domestic appliances - the rigid (505) or flexible (132) insulation can be cut very precisely using die-stamping. The insulation complies with the IEC 371-3-3 standards, is classed as 94 V-0 by the UL 94 standard, and has been authorized for use in contact with food products (certificate from the CERIA experiment and analysis center in Brussels).

**Rigid plates**

The Cogemicanite 505 products come in the form of very rigid laminated plates. They retain their properties even after being exposed to heat. They are used for the following applications:
- to implement resistor supports, especially for heating elements in toasters, hair dryers, etc.
- to manufacture closed heating elements, such as heater bands, annular heating elements, clothes irons, clothes presses, kettles, cooking appliances, heating elements for extrusion machines,
- as thermal insulation in circuit breakers, as a divider between components affected by high heat loads, etc.

In constant operation (electric radiator, for example), the plates can withstand temperatures up to 700°C / 1292°F, or up to 1000°C / 1832°F in intermittent operation (toasters, etc.).

**Flexible plates**

The Cogemicanite 132 products can be cold-formed and are used in hair dryers, fan heaters, etc. and in circuit breakers, transformers, etc.

They are used as linings, covers or backings, as a separating sheet or insulating sheet, etc. In certain applications, installation is facilitated by the products’ spring-like action. Self-sealing products with high mechanical strength can also be supplied.
Cogetherm

Cogetherm is used in different areas of application including as a replacement for asbestos.

Here are some examples:
- in forging presses, a Cogetherm plate can be placed between the plate and the die to prevent the loss of heat in the press mechanism - Cogetherm displays excellent compressive strength at high temperatures
- in the hollow glassware industry, Cogetherm’s thermal and abrasion resistance qualities are used to create components to guide the bottles as they emerge from the mold - their temperature is still as high as 700°C / 1292°F
- in high voltage equipment, Cogetherm is used because of its dielectric strength and its resistance to arcing and electrical erosion
- in the production of induction furnaces and arc furnaces, Cogetherm is used because of its thermal and electrical insulation properties and its permeability to high frequency wavelengths
- the above characteristics are also present in the induction welding of saucépan bases.

High performance thermal and electrical insulation plates

Cogetherm is the name given to our mica laminates designed for extreme conditions, requiring one or more of the following characteristics:
- very good heat retarding and even flame resisting properties
- low thermal conductivity
- very good electrical insulation properties
- high mechanical strength, particularly in compression, even at high temperatures
- low sensitivity to chemical agents, especially oils and greases
- asbestos-free and non-toxic
Protecting coils in induction furnaces

All the Cogemicanites 504 products were developed specifically for use as thermal, electrical and even mechanical insulation in induction furnaces. It is available in various forms:
- in sheets or on a roll
- without a backing or with glass fiber backing on one or both sides
- with ceramic felt to improve thermal insulation and absorb expansion
- with a metal sensor to detect any risk of perforation of the crucible.

Cogemicanites 504

The products are made from Phlogopite mica, because it displays better temperature characteristics, with a small amount of binding agent, which is also resistant to high temperature. They are placed between the coil and the refractories in induction furnaces:
- they protect the coil from mechanical stresses resulting from the expansion and movement of the crucible
- they improve electrical insulation during sintering
- they can be used to adjust the sintering depth and to reduce heat losses from the furnace
- they reduce the risk of perforation when the crucible wears or cracks
- they can be used in the electronic detection of defects in the crucible
- they facilitate the removal of a worn crucible

They can also be used in tapping furnaces, channel furnaces and transport ladles.
COGEBI has developed high-performance materials intended to replace asbestos seals.

Hi-Temp

Cogemica® Hi-Temp was developed to create seals that can withstand temperatures of up to 1000°C / 1832°F. It is 100% asbestos free and is resistant to most chemical substances. Hi-Temp seals are used in the automobile industry (exhaust systems) and, more widely, as high-temperature gas seals in bolted flange unions. It is also used in sandwich form in spiral joints and as a material for "camprofile" joints. Cogemica® Hi-Temp can be supplied in plates or on a roll.
Policies and outlook

Corporate policy

Our challenge consists in achieving excellence in both product quality and services for our customer’s benefit. Otherwise, COGEBI concentrates on direct contact with the industrial end users, as this approach shortens reaction times, makes it easier for the partners to share information and, most importantly, is essential in moving the process forward with different people involved.

Wherever you are in the world, an engineer from one of the COGEBI locations - who is up to date on the special aspects of mica technology - will help you find just the right mica product for your application. And if we do not currently have the right solution, our companies R&D department will develop it for you, and with you. The very latest production techniques mean that COGEBI can supply high-tech products with the kind of exceptional properties that our customers demand for their own advanced technologies.

This policy of ongoing contact with the outside world helps COGEBI keep a close track on developments in the industrial markets, and helps us stay one step ahead of our customer’s needs.

New products

The exceptional dielectric strength of mica has always been exploited by COGEBI to provide high-performance insulation to the electrical industry. Research into mechanical properties has resulted in the development of electrical insulation plates used in domestic appliances, residential and industrial heating and electric traction motors. Thicker plates are used for thermal insulation and as a replacement for asbestos.

Our research into flexible micanite has given us a presence in the markets for cold-formable electrical insulation, industrial and automobile seals, and insulation in induction smelting furnaces. The thermal properties of mica are put to use by cable manufacturers, for example, in creating fire-retardant electrical cables. R&D is dedicated to constantly improve COGEBI’s products, and in particular the properties of its’ range of electrical insulation tapes. COGEBI is currently working on perfecting flame-retardant products or thermal insulation to guarantee safety in construction, civil engineering, and in air, sea, rail and road transport, etc. The same technology can also be used in other areas, such as partitions and fire doors.

Examining all the fundamental properties of mica, COGEBI’s research focuses on developing those properties which will maintain the company’s presence into the future, creating mica products adapted to new technologies.