

Insulating Materials - Oil Filled - Transformers





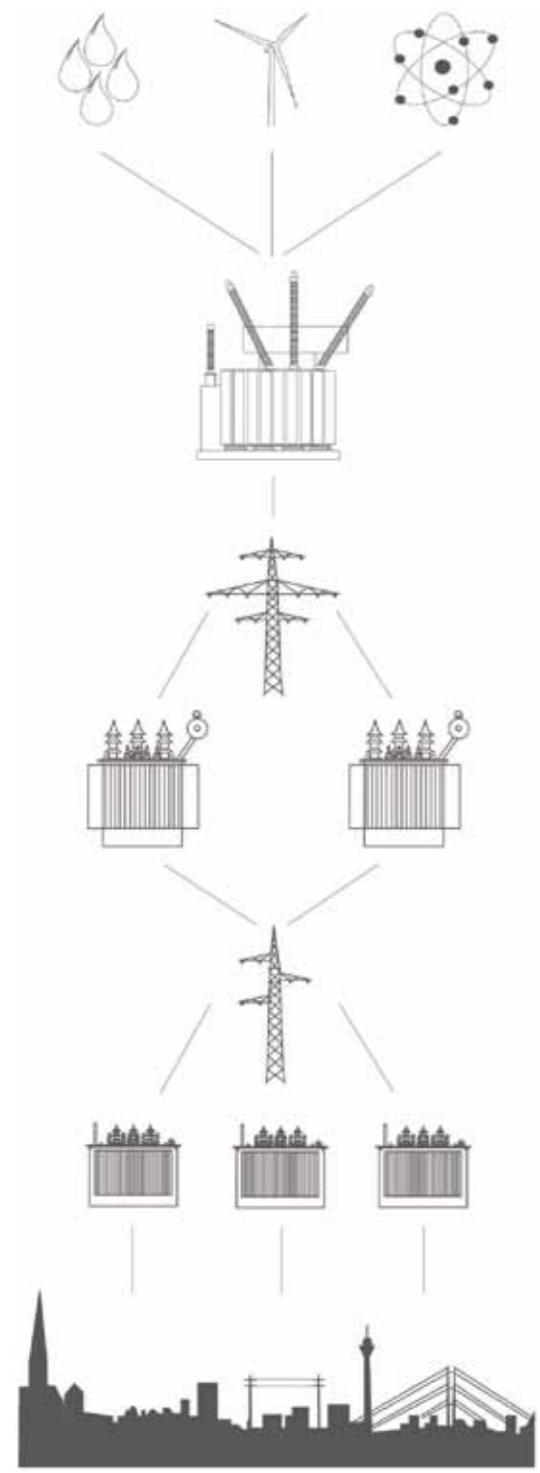
ADDING OIL TO OUR PRODUCTS

A new portfolio – The same reliability

In the transmission of electrical energy from the power station to the consumer, transformers play an important role: their ability to convert voltages makes it possible to transmit currents over long distances – and means that they reach the place where the energy is needed without major losses. High-quality insulating materials are crucial for the reliability of functions and absolutely safe operation of transformers. ISOVOLTA already has wide professional

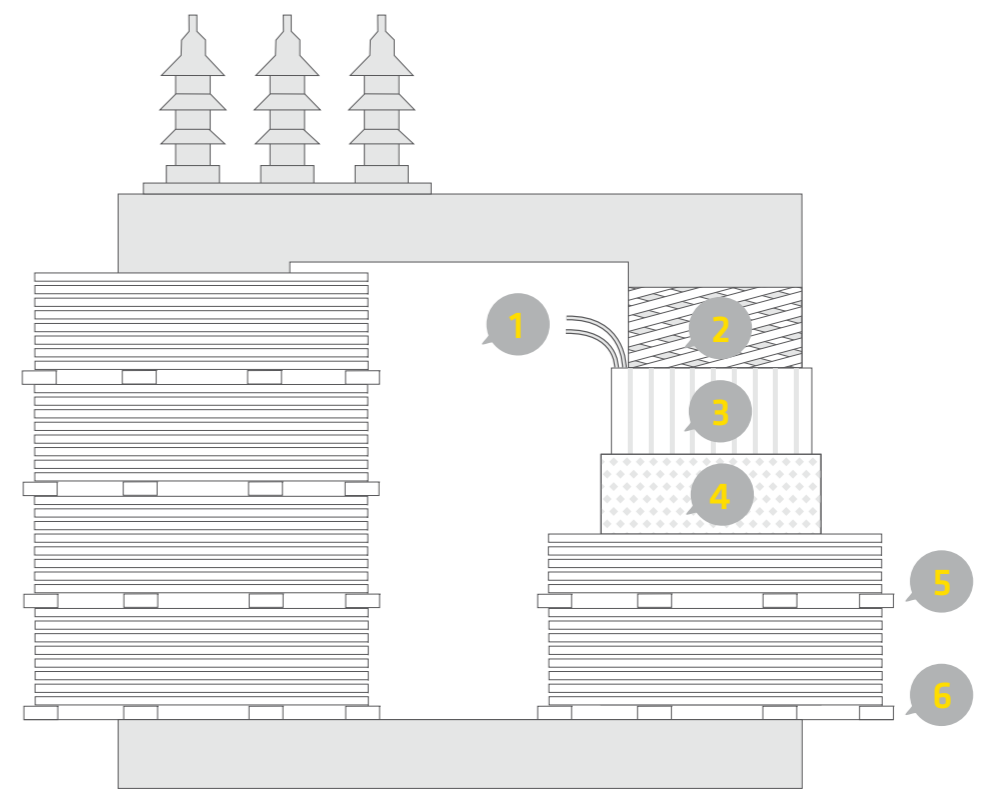
skills in the manufacturing of insulating materials for dry transformers. For some years ISOVOLTA has been bundling these competencies which are leading to a new portfolio for oil filled-transformers. Now we are able to support our customers even in this field as a fullservice supplier with our own extensive product range: from raw materials to tailor-made components.

THE WAY OF ENERGY



- **Power Generation**
 - **Large Power Transformers**
Power transformers are defined as those transformers which carry out voltage conversion for large transport networks.
 - **Medium Power Transformers**
Medium Power Transformers are defined as those transformers which carry out voltage conversion from transport networks to medium voltage networks. They normally are located in medium electrical substations.
 - **Distribution Transformers**
Distribution transformers are defined as those transformers which carry out voltage conversion from medium voltage networks to domestic or industrial use voltages.
 - **Power Consumption**
- ISOVOLTA offers different product lines for Medium Power- and Distribution Transformers & High Temperature Transformers.

THE TRANSFORMATION OF ENERGY



- 1 ISOCREPE TUBES 3588 page 14
ISOCREPE PAPER 0411 / ISOCREPE TUBES 0411 page 19/20
- 2 ISOAD TAPE 2400 / ISOAD TAPE 4000 page 22
ISOGLAS page 23
- 3 ISOCHANNEL 3052 page 15
ISOSTRIPS 0994 page 20
- 4 ISO DD PAPER 3588 / ISO DD PAPER 3040 page 13
ISO DD PAPER 0410 / ISO DD PAPER E56 page 18
- 5 ISOSPACER 3052 / ISOSTRIPS 3052 page 14
ISOSPACER 0994 / ISOSTRIPS 0994 page 20
- 6 ISOBOARD 3052 page 12
NOMEX® BOARD T-992 / NOMEX® BOARD T-993 / NOMEX® BOARD T-994 page 16/17

A SOUND FOUNDATION FOR INSULATION

Quality

As oil filled-transformers normally have a service life of several decades, safety and durability are important key criteria. This particularly applies to the insulating materials, which are expected to fulfil their purpose reliably for the entire period. Raw materials are subjected to careful quality inspections and regular tests in our in house laboratories before further processing. Among others, we test the purity of the materials as well as the mechanical and electrical properties.

Experience

The new product portfolio for oil filled-transformers benefits from the valuable experience ISOVOLTA has gained in many years of activity in the insulation sector. That's why we can ensure reliable function right from the start and even under the most extreme operating conditions.

Global presence

ISOVOLTA stands by the quality of the products supplied world-wide. Moreover, our networks and storage capabilities spanning countries and continents, allow for personal consultation on location, flexible delivery and lead to powerful international partnerships.



INSULATION IN OIL

Various products - One purpose

DIAMOND DOTTED PAPER

KRAFT PAPER

ISOKRAFT PAPER 3588





INSULATION MATERIALS

A guarantee of the high quality of its products

Kraft Paper

Kraft Paper is made of 100% pure sulphate cellulose. It is used as insulation of high voltage parts in electrical equipment constructions. Ideal for wrapping wires, cables and as insulation in oil filled-transformers. Performs excellently on automatic wrapping machines.

ISOKRAFT Paper 3588

Standard thickness in mm	0.05 / 0.075 / 0.08 / 0.125
Standard width for all thicknesses in mm approx.	1,000 / 1,100
Outer diameter for master rolls in mm approx.	250 - 800
Outer diameter for tapes in mm approx.	250 - 450
Coils (tapes) width in mm	≥ 8
Reference Standard	IEC 554 - 3 - 5, 5B2 - 2H1 Type

ISOKRAFT Paper 3688

Standard thickness in mm	0.05
Standard width for all thicknesses in mm approx.	1,000
Outer diameter for master rolls in mm approx.	250 - 800
Outer diameter for tapes in mm approx.	250 - 450
Coils (tapes) width in mm	≥ 8
Reference Standard	IEC 554 - 3 - 5, 5A2 - 1M3 Type

ISOKRAFT Paper 3689

Standard thickness in mm	0.05 / 0.075
Standard width for all thicknesses in mm approx.	1,000 / 1,100
Outer diameter for master rolls in mm approx.	250 - 800
Outer diameter for tapes in mm approx.	250 - 450
Coils (tapes) width in mm	≥ 8
Reference Standard	IEC 554 - 3 - 5, 5B1 - 2H2 Type

ISOKRAFT Paper 3693

Standard thickness in mm	0.05
Standard width for all thicknesses in mm approx.	1,000 / 1,100
Outer diameter for master rolls in mm approx.	250 - 800
Outer diameter for tapes in mm approx.	250 - 450
Coils (tapes) width in mm	≥ 8
Reference Standard	IEC 554 - 3 - 5, 5A1 - 1H1 Type



ISOPRESS Paper 3040

ISOPRESS Paper 3040 is a calendered cellulose paper with enhanced properties, made of 100% pure sulphate cellulose. Because of high breakdown voltage and tensile strength the material has advantage in electrical and mechanical applications. ISOPRESS Paper 3040 is typically used in electrical equipment for end windings, layer insulation, rings, a.s.o

Thickness in mm	0.100 / 0.125 / 0.250 / 0.300 / 0.400 / 0.500 / 0.600 / 1
Width standard for all thicknesses in mm	1,000
Outer diameter in mm approx.	350 / 450
Reel weight in kg approx.	100 / 200
Coils (tapes) width in mm	≥ 8
Reference Standard	IEC 60641 - 3 - 2, P.4.1 type



ISOBOARD 3050

ISOBOARD 3050 is a pressboard with very good elongation and dimensional stability properties. Manufactured from unbleached sulphate pulp, it is recommended for applications such cylinders, barriers between phases and centers and also disks and rings.

Thicknesses in mm	1 / 1.5 / 2 / 2.5 / 3 / 4
Possible format size in mm	1,000 x 1,750
Reference Standard	IEC 60641 - 3 - 1 , B.2.1 type

ISOBOARD 3052

ISOBOARD 3052 is a high density precompressed pressboard characterized by high mechanical strength and superior dimensional stability. Manufactured from unbleached sulphate pulp, it is recommended for applications in power transformers requiring structural strength and high electrical integrity like rings, staticrings, beams, clamping plates, strips, a.s.o.

Thicknesses in mm	1 - 5
Possible format size in mm	3 ,200 x 2,200 / 2,200 x 1,100
Standard format in mm	2,200 x 1,100
Weight of pallets in kg	1,000 - 2,000
Thicknesses in mm	6 - 25
Format size	2,000 x 1,000
Weight of pallets in kg	1,000 - 2,000
Reference Standard	IEC 60641 - 3 - 1 , B.3.1 type

Diamond Dotted Paper

Diamond Dotted Paper is made of ISOKRAFT Paper 3588 or ISOPRESS Paper 3040. It is printed on both sides with B-staged epoxy resin dots. ISO DD Paper 3588 and 3040 bonds layers of aluminium or copper foils and insulates them simultaneously. The pattern of resin dots ensures sufficient space for oil impregnation.

ISO DD Paper 3588

Standard thicknesses in mm	0.050 / 0.080 / 0.125
Standard width for all thicknesses in mm	960 / 1,100
Outer diameter in mm approx.	250 - 485
Coils (tapes) width in mm ≥	8
Reference Standard	IEC 554 - 3 - 5, 5B2 - 2H1 Type (base ISOKRAFT paper 3588)

ISO DD Paper 3040

Standard thicknesses in mm	0.130 / 0.200 / 0.250
Standard width for all thicknesses in mm	960 / 1,100
Outer diameter in mm approx.	250 - 485
Coils (tapes) width in mm ≥	8
Reference Standard	IEC 60641 - 3 - 2, P.4.1 Type (base ISOPRESS paper 3040)

ISOCREPE Paper 3588

ISOCREPE Paper 3588 is made of ISOKRAFT Paper 3588. It can be used as insulation of high voltage parts in electrical equipment constructions. The high degree of creping guarantees problem-free manual or automated processing and provides firm ply-to-ply bonds. Different grades of creping are produced in order to fulfil all market requests.

Standard width for all thicknesses in mm	1,000 / 1,100
Outer diameter for master rolls in mm approx.	250 - 600
Outer diameter for coils in mm approx.	250 - 300
Coils (tapes) width in mm ≥	10
Reference Standard	IEC 554 - 3 - 5, 5B2 - 2H1 type (base ISOKRAFT paper 3588)

Creping range

40 / 60	40 g/m ² before creping	60 g/m ² after creping
67 / 90	67 g/m ² before creping	90 g/m ² after creping
67 / 100	67 g/m ² before creping	100 g/m ² after creping
100 / 200	100 g/m ² before creping	200 g/m ² after creping

ISOSTRIP (RE-TR-T)* 3052

ISOSTRIP 3052 is made of ISOBOARD 3052. It is prepared with rounded edges for avoiding any damage of the insulation applied. For cooling channels in oil filled-transformers, axial spacers or any other application.

*RE = Rectangular, TR = Trapezoid, T = T-Profile

Thickness in mm	1 - 25
Width in mm	upon request
Length in mm max.	3,200
Packaging	100 units / pack
Reference Standard	IEC 60641 - Part 3, B.3.1 type

ISOSPACER 3052

Radial ISOSPACER 3052 is made of ISOBOARD 3052. Machined according to specification. Different standard shapes available, e.g. T-Shape, U-shape. For cooling channels in oil filled transformers.

Thickness in mm	1 - 25
Width in mm	according to drawing
Length in mm	according to drawing
Reference Standard	IEC 60641 - Part 3, B.3.1 type

ISOCREPE TUBE 3588

ISOCREPE Tube 3588 is made of ISOCREPE Paper 3588. For cable insulation in oil filled transformers.

Inner diameter in mm	> 3
Outer diameter in mm	upon request
Length in mm	1,000
Reference Standard	IEC 554 - 3 - 5, SB2 - 2H1 type (ISOKRAFT paper 3588)

ISOCHANNEL 3052

Ladders of ISOBOARD 3052 with rounded edges, glued to a press paper. For cooling channels in oil filled transformers.

Dimensions of ladders in mm	upon request
Pitch in mm	20 / 25 / 30
Thickness presspaper in mm	upon request
Rolls cut in mm	width from 50
Roll lengths in lm	10 - 15
Reference Standard	IEC 60641 - 3 - 1, B.3.1 type



HIGH TEMPERATURE TRANSFORMERS

NOMEX® T-410

NOMEX® Type 410 is a calendered insulation paper which offers high inherent dielectric strength, mechanical toughness, flexibility and resilience. NOMEX® Type 410 is the original form of NOMEX® paper, and is widely used in a majority of electrical equipment Applications.

Thickness in mm	0.05 - 0.76
Width in mm	914 / 1,830
Outer diameter in mm approx.	280 - 300
Coils (tapes) width in mm	≥ 8

NOMEX® T926

DuPont Nomex® Paper Type 926 is a strong, high-dielectric, thermally-stable paper which is specifically designed by DuPont for use as a conductor insulation in liquid-immersed transformers.

Thickness in mm	0.05
Width in mm	610
Outer diameter in mm	12X
Coils (tapes) width in mm	≥ 8

NOMEX® E56

NOMEX® Type E56 is designed for cost-critical applications which require a moderate amount of mechanical and electrical strength. It is thermally similar to NOMEX® Type 410 (220°C UL component rated), but as a medium density paper, it exhibits properties that are midway between NOMEX® Type 410 and NOMEX® Type 411.

Thickness in mm	0.13 - 0.51
Width in mm	914 / 1,778
Outer diameter in mm	280 - 300
Coils (tapes) width in mm	≥ 8

NOMEX® BOARD T-992

NOMEX® Type 992 is a low-density pressboard which is designed for applications requiring a combination of electrical, mechanical and forming characteristics, such as barrier, gap spacers, end fillers, core tubes, and coil yokes.

Thickness in mm	1.6 / 3.2
Standard format in mm	2,100 x 3,200

NOMEX® BOARD T-993

NOMEX® Type 993 is a medium-density pressboard which offers a balance of rigidity and conformability along with outstanding saturability and excellent properties in air and oil. Typical applications include 3-dimensional parts such as V-rings, angle rings and spools, as well as barrier, gap spacers and core tubes.

Thickness in mm	1 / 1.5 / 2 / 2.4 / 3 / 4
Standard format in mm	2,110 x 3,200

NOMEX® BOARD T-994

NOMEX® Type 994 is a densified, rigid board which has a unique combination of superior resistance to compression, even at elevated temperatures, along with relatively high oil absorption characteristics. This combination results in a product which is especially useful as spacers or other structural components in liquid-filled systems.

Thickness in mm	3 / 4 / 5 / 6 / 7 / 8 / 9.6
Standard format in mm	355 x 1,500

NOMEX® BOARD T-994 NPT

NOMEX® Type 994 NPT is a densified, rigid board which has a unique combination of superior resistance to compression along with relatively high oil absorption characteristics. The particularity of this grade is its thin thickness.

Thickness in mm	1 / 1.5 / 2
Standard format in mm	720 x 2,200 / 710 x 2,200 / 700 x 2,200



ISO DD PAPER 0410

ISO DD Paper 0410 is produced with Nomex® T-410 and a high class B-stage epoxy resin on both sides in dots shapes. The geometry of the impregnation is made in diamond form. ISO DD Paper 0410 has the Nomex® Paper properties combined with the adherence proved by the resin, and be glued after the curing process using some layer of film and the complete winding becomes one solid block. The high tensile strength and elasticity of ISODD Paper 0410 are perfect to use it in the coil-winding. The short circuit strength of such a winding is considerably increased compared to conventional Systems.

Thickness in mm	0.05 – 0.76
Width in mm	900
Outer diameter in mm approx.	300
Coils (tapes) width in mm	≥ 8

ISO DD PAPER E56

ISO DD Paper E56 is produced with Nomex® E56 and a high class B-stage epoxy resin on both sides in dots shapes. The geometry of the impregnation is made in diamond form ISO DD Paper E56 has the Nomex® Paper properties combined with the adherence proved by the resin, and be glued after the curing process using some layer of film and the complete winding becomes one solid block.

Thickness in mm	0.13 – 0.51
Width in mm	900
Outer diameter in mm approx.	300
Coils (tapes) width in mm	≥ 8



ISOCREPE PAPER 0410

ISOCREPE Paper 0410 is produced base on Nomex® T-410 Paper. The high crepe degree guarantees problem-free manual or automated processing and provides firm ply-to-ply bonds.

Base Nomex® thickness in mm	0.05 / 0.08
Width in mm	900
Outer diameter in mm approx.	Upon request
Elongation	110%
Coils (tapes) width in mm	≥ 20

ISOCREPE PAPER 0411

ISOCREPE Paper 0411 is produced based on Nomex® T-411 paper. The high crepe degree guarantees problem-free manual or automated processing and provides firm ply-to-ply bonds.

Base Nomex® thickness in mm	0.18
Width in mm	900
Outer diameter in mm	Upon request
Elongation	100%
Coils (tapes) width in mm	≥ 20



ISOSTRIPS 0994

ISOSTRIP 0994 are made with Nomex® T-994 Boards; For cooling channels, axial spacers among other Applications.

Standard thicknesses in mm	3 / 4 / 5 / 6 / 7 / 8 / 9.6
Format in mm	Upon request.
Max. Length	1,500

ISOSPACERS 0994

ISOSPACER 0994 are made with Nomex® T-994 Boards. Machined according customer specification, the spacers are used in the medium power and power transformers. Different Standard shapes are available: T-Shape and U-shape.

Standard thicknesses in mm	3 / 4 / 5 / 6 / 7 / 8 / 9.6
Format in mm	Upon request

ISOCREPE TUBES 0411

ISOCREPE Tubes 0411 are made with Nomex® T-411 and have an optimum flexibility due to the elasticity of the Nomex® paper which is creped in a perpendicular way. This reduces the possibility of cracking and increases in a spectacular way the flexibility and the capacity to be bended in comparison with a normal paper tube. The use of ISOCREPE Tubes 0411 eliminates the problem of layer separation of the tubes made from non creped paper when they are subjected at deformation. A special adhesive guaranties the non contamination of the oil when ISOCREPE Tubes 0411 are used as components of the oil transformers.

Inner diameter in mm	5 - 40
Length in mm	1,000
Thickness in mm	1-3



AUXILIARY MATERIALS



ISOAD TAPE 4000

ISOAD Tape 4000 is based in a support of Nomex® Paper, and an acrylic thermosetting adhesive.

Base Nomex® thickness in mm	0.05 / 0.08 / 0.130
Width in mm	910
Length in lm	66
Coils (tapes) width in mm	≥ 6
Colour	yellowish

ISOAD TAPE 2400

ISOAD Tape 2400 is based on a polyester film carrier reinforced with glass fabric. It is coated with a thermosetting acrylic adhesive which is suitable for applications in oil filled-transformers, e.g. as core-, layer- and final-insulation of coils.

Thickness in mm	0.200
Coils (tapes) width in mm	≥ 6
Length in lm	66
Colour	Transparent

ISOTAPE GC

Isotape GC is a Glass cloth flat tape made of twisted thread, without finish or primer coating.

Thickness in mm	0.06 / 0.08 / 0.10 / 0.13 / 0.18 / 0.20 / 0.22 / 0.25 / 0.30 / 0.40 / 0.50
Width in mm	10 - 60
Length in lm	50 - 100



ISOTAPE GP

Isotape GP is a Woven glass/ polyester tape without finish. The polyester fibres are in the warp direction and glass fibres are in the weft direction.

Thickness in mm	0.10 / 0.15 / 0.20
Width in mm	20 - 25 - 30
Length in lm	50 - 100

ISOTAPE CC

Isotape CC is a Woven cloth flat tape based on 100% cotton.

Thickness in mm	0.10 / 0.15 / 0.20
Width in mm	20 - 25 - 30
Length in lm	50 - 100

ISOGLAS

Banding tape, consisting of unidirectional glass fibres coated with thermosetting polyester resin in B-stage. For end winding bracing or banding of transformer cores.

Thickness in mm	0.300
Width in mm	10 / 15 / 20 / 25 / 30 - other widths on request
Length in lm	100 - 2,000

Properties High tensile strength combined with low elongation and high moisture resistance after curing.

PERSONAL SUPPORT. HIGHLY FLEXIBLE.

ISOVOLTA sees itself in the role of a competent and reliable partner always poised to assist its customers. Personal, on-location support by staff who speaks the local language and fast response to enquiries and individual requirements are important aspects that serve to the benefit of our customers. ISOVOLTA passes on the advantage of its leverage as a powerful international partner with established quality assurance and quality management processes. We value our long-standing relationships with our business partners and foster these with personal commitment. It is our close contact to customers and partners that enables us to provide customized services – from the very first meeting, right up to delivery of the products and far beyond this.



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