

DuPont™ Nomex® 358 Paper

Preliminary technical data sheet

Product Description

DuPont™ Nomex® 358 is a 100% meta-aramid paper which is optimized for insulation applications in thermal classes up to 180°C, such as wrapped conductor insulation for dry-type transformers. It has balanced dielectric, mechanical and thermal properties.

Nomex® 358 is currently available in a 0.05 mm (2-mil) thickness. Additional thicknesses of this product may be offered in the future.

Application

When applied as conductor insulation, it is recommended to use a minimum of 2 layers of 0.05 mm Nomex® 358 on wire in a wrapping process with greater than 50% overlap or cross wrapping with 2 layers. The number of paper layers should be increased for higher demanding applications, such as transformer windings for rated voltages up to 36 kV.

Electrical properties

The preliminary electrical property values of DuPont™ Nomex® 358 paper are shown in Table I. The AC rapid rise dielectric strength data, shown in Table I, represents voltage stress levels withstood for 10 to 20 seconds at operating frequencies of 50 and 60 Hz. This value differs from the long-term strength potential. DuPont recommends that continuous stresses in transformers should not exceed 1.6 kV/mm to minimize the risk of partial discharges (corona). This recommendation is based on dielectric strength of the air adjacent to the paper. The dielectric strength data is typical values and not recommended for design purposes. In cases where there is high potential for frequent line voltage surges or if other abnormal conditions exist, continuous working stresses should be kept below 1.2 kV/mm for maximum equipment life expectancy.

Table I. Typical Electrical Properties of DuPont™ Nomex® 358 in air

Property	Typical Value	Test Method
AC Rapid Rise Breakdown vV/mil kV/mm	430 17.2	ASTM D149 ⁽¹⁾
Partial Discharge Inception Voltage kV	0.5	ASTM D1868
Surface resistivity ohm/square	4.5 x10 ¹⁶	ASTM D257
Volume resistivity ohm.cm	8.4 x10 ¹⁶	ASTM D257
Dielectric constant in air, at 60 Hz	1.6	ASTM D150

(1) ASTM D-149, 50 mm electrodes, rapid rise; corresponds with IEC 60243-1, subclause 9.1, except for electrode set-up of 50 mm

Mechanical properties

The preliminary typical mechanical property values of DuPont™ Nomex® 358 are shown in Table II. Its lower density and lower basis weight, together with high elongation properties as compared to other high density aramid papers, make Nomex® 358 more suitable for conductor insulation applications. Nomex® 358 paper allows for a good impregnation, due to its open structure.

Table II. Typical Mechanical Properties of DuPont™ Nomex® 358

Property	Typical Value	Test Method
Nominal Thickness mm mil	0.056 2.21	ASTM D374 ⁽¹⁾
Basis Weight, g/m ²	38.2	ASTM D646
Density, g/cc	0.68	ASTM D646
Tensile Strength, N/cm MD XD	36 18	ASTM D828
Elongation, % MD XD	9.0 6.5	ASTM D828
Initial Tear Strength, N MD XD	10.0 5.5	ASTM D1004 ⁽²⁾

MD = machine direction; XD = cross direction

(1) Method D, using 17 N/cm²

(2) Data presented for initial tear strength is listed in the direction of the sample, per ASTM D 1004.

The tear is 90 degrees to the sample direction; therefore, for papers with a higher reported machine direction initial tear strength, the paper will be tougher to tear in the cross direction.

Chemical stability

The compatibility of Nomex® brand paper and pressboard with virtually all classes of electrical varnishes and adhesives (polyimides, silicones, epoxies, polyesters, acrylics, phenolics, synthetic rubbers, etc.), as well as other components of electrical equipment, is demonstrated by many UL recognized systems, including Nomex® materials, and longstanding commercial experience.

Please note: The properties in this data sheet are typical, or average values and should not be used as specification limits. Unless otherwise noted, all properties are measured in air under “standard” conditions (in equilibrium at 23 °C, 50% relative humidity). Note that, like other products of papermaking technology, Nomex® papers have somewhat different properties in the papermaking machine direction (MD) compared to the cross direction (XD). In some applications it may be necessary to orient the paper in the optimum direction to obtain its maximum potential performance.

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Product safety information is available upon request. This information corresponds to our current knowledge on the subject. It is offered solely to provide possible suggestions for your own experimentation. However, it is not intended to substitute any testing you may need to conduct to determine for yourself the suitability of our products for your particular purposes. This information may be subject to revision as new knowledge and experience become available. Since we cannot anticipate all variations in actual end-use conditions, DUPONT MAKES NO WARRANTIES AND ASSUMES, NO LIABILITY IN CONNECTION WITH ANY USE OF THIS INFORMATION. Nothing in this publication is to be considered as a license to operate under or a recommendation to infringe any patent right. DuPont™, the DuPont Oval Logo, and all trademarks and service marks denoted with ™, SM or ® are owned by affiliates of DuPont de Nemours, Inc. unless otherwise noted. © 2022 DuPont. All rights reserved. (06/22)