

Slot insulation Nomex® 410 (manufacturer DuPont) is a calendered insulation material of aramid fiber that has good electrical, mechanical and thermal properties. An insulation material recommended for electric motors, generators and dry transformers for applications up to 220°C.

Nomex® 410 is the original variant of Nomex paper.



## Applications

Typical applications are insulation mainly in oil-filled transformers as a construction element (interlays, etc.), layer, liner and core insulation.

A recommended insulation material for electrical applications from class F (+155°C) to class C (+220°C).

Manufacturers of electric motors, generators, wind turbine generators, hybrid systems, etc., have succeeded in improving the performance of installations, systems and techniques with Nomex® materials.

## Properties

- Approved for insulation Class C (+220°C).
- High dielectric strength. Good values even up to +400°C for several hours.
- Compatible with virtually all types of impregnation varnishes based on polyimides, silicone, epoxy, polyester, acrylic, phenols, synthetic rubber, etc.
- Very good adhesion to impregnation varnishes despite the material's smooth structure.
- High resistance to chemicals and solvents.
- Self-extinguishing properties.
- Very good resistance to radiation.
- Very good durability.
- Can be punched or cut.

## Composition

Nomex® consists of aramid fibers (aromatic polyamide), a material with high temperature resistance. Manufactured in much the same way as paper, Nomex® 410 is densified through calendering at high temperatures.

## Colour

Usually pale white.

## Dimensions

- Nomex® 410 is manufactured in thicknesses 50–760 µm.
- Can be slit to desired widths up to ca 900 mm.
- Can be punched or cut to desired form or shape. In the case of die-cutting a die tool is required (tools available at low costs).

## Packaging

- Standard packaging width ca 450 mm, depending on item, in rolls of ca 5 kg\*.
- Standard packaging width ca 900 mm, depending on item, in rolls of ca 30 kg\*.
- Other slit-to-width dimensions on MOQ\*\* in kg on request.
- Punched and die-cut items: Volume MOQ\*\* by agreement (with die tool or cut).

\* Other weights on request

\*\* MOQ – Minimum Order Quantity

## Technical data

The properties in this data sheet are typical values, or average values and should not be used as specification limits. Unless otherwise noted, all properties were measured in air under standard conditions at 23°C, 50% relative humidity.

Properties, Nomex® 410 , thickness 50–250 µm								
Dimensions and weight	Unit	Test method						
Nominal thickness (ca)	µm		50	80	100	130	180	250
Typical thickness	µm	ASTM D374	60	80	110	130	180	260
Thickness tolerance/weight ca*	+/- %		20	10	10	10	10	10
Weight/m <sup>2</sup> , ca	g/m <sup>2</sup>	ASTM D646	41	64	88	115	174	249
Density, ca	g/cm <sup>3</sup>		0.72	0.81	0.83	0.88	0.95	0.96
Area/kg, ca	m <sup>2</sup> /kg		24.4	15.6	11.4	8.7	5.7	4.0
Mechanical properties								
Tensile strength MD	N/10mm	ASTM D828	43	68	93	141	227	296
Tensile strength XD	N/10mm	ASTM D828	19	34	49	71	116	161
Elongation MD	%	ASTM D828	9	12	12	16	20	22
Elongation XD	%	ASTM D828	7	9	9	13	15	18
Shrinkage at 300°C MD	%		1.8	1.1	0.8	0.7	0.6	0.3
Shrinkage at 300°C XD	%		0.0	0.0	0.0	0.0	0.1	0.0
Thermal properties								
Electrical insulation class	class/°C		C/220	C/220	C/220	C/220	C/220	C/220
Flame retardant		UL94 - VO	-	-	Yes	Yes	Yes	Yes
Electrical properties								
Dielectric strength **	kV/mm	ASTM D-149	18	22	21	28	34	33

Properties, Nomex® 410 , thickness 300–760 µm								
Dimensions and weight	Unit	Test method						
Nominal thickness (ca)	µm		300	380	510	610	730	760
Typical thickness	µm	ASTM D374	310	390	520	610	730	780
Thickness tolerance/weight ca*	+/- %		10	10	10	10	10	10
Weight/m <sup>2</sup> , ca	g/m <sup>2</sup>	ASTM D646	310	395	549	692	846	839
Density, ca	g/cm <sup>3</sup>		1.00	1.02	1.06	1.13	1.16	1.08
Area/kg, ca	m <sup>2</sup> /kg		3.2	2.5	1.8	1.45	1.2	1.2
Mechanical properties								
Tensile strength MD	N/10mm	ASTM D828	380	462	610	728	832	816
Tensile strength XD	N/10mm	ASTM D828	208	252	374	500	623	592
Elongation MD	%	ASTM D828	23	20	21	18	16	18
Elongation XD	%	ASTM D828	18	16	17	14	13	14
Shrinkage at 300°C MD	%		0.3	0.2	0.0	0.0	0.0	0.0
Shrinkage at 300°C XD	%		0.1	0.1	0.0	0.0	0.0	0.0
Thermal properties								
Electrical insulation class	klass/°C		C/220	C/220	C/220	C/220	C/220	C/220
Flame retardant		UL94 - VO	Yes	Yes	Yes	Yes	Yes	Yes
Electrical properties								
Dielectric strength **	kV/mm	ASTM D-149	34	33	32	32	30	27

## Dimensions and packing information



Description	Thickness (mm)	Width (ca mm)	Internal diameter (mm)	Ca weight/roll (kg)	Nom. weight (g/m <sup>2</sup> )	Ca length/roll (m)
Nomex 410 0,18×457 mm	0,18 +/-10%	457	76	5	174	63
Nomex 410 0,25×457 mm	0,25 +/-10%	457	76	5	249	44
Nomex 410 0,30×457 mm	0,30 +/-10%	457	76	5	310	35
Nomex 410 0,13×914 mm	0,13 +/-10%	914	76	30	115	285
Nomex 410 0,18×914 mm	0,18 +/-10%	914	76	30	174	171
Nomex 410 0,25×914 mm	0,25 +/-10%	914	76	30	249	132
Nomex 410 0,30×914 mm	0,30 +/-10%	914	76	30	310	105
Nomex 410 0,38×914 mm	0,38 +/-10%	914	76	30	395	83
Nomex 410 0,76×914 mm	0,76 +/-10%	914	76	30	839	39

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