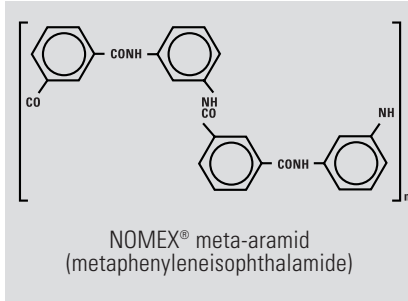
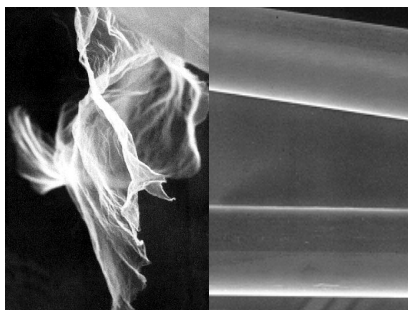


# INTRODUCTION

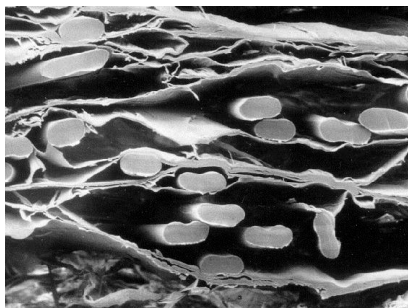


Chemically, NOMEX® paper is an aromatic polyamide and is generally known as an aramid. The molecular structure of the material is particularly stable and the properties of NOMEX® paper are a consequence of this.

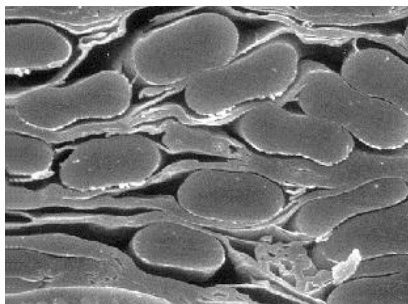


Fibril

Floc



Side view – NOMEX® Type 411



Side view – NOMEX® Type 410

The paper is produced from two forms of the aramid polymer. Small fibrous binder particles – fibrils – are derived directly from the polymer under high shear conditions. These are mixed with short fibres – floc – which are cut to length from a fibre filament.

The two components, floc and fibrils, are combined in a water-based slurry from which a continuous sheet structure is produced on a specialized papermaking machine. The paper, as it comes from the machine, is low density with only moderate mechanical and electrical properties.

Subsequent densification and internal bonding is achieved by means of high-temperature calendering. The resulting paper is mechanically strong, flexible and has good electrical properties, which are maintained at high temperatures.

## TECHNICAL DATA SHEET

During the papermaking process, the floc, which are longer than the fibrils, align themselves with the direction of the paper coming off the machine. There is therefore a significant difference in mechanical properties of NOMEX® paper in the Machine Direction – MD – and the Cross Direction – XD. Mechanical properties are thus quoted for the two directions.

Commercial production of NOMEX® paper was started in 1967 at the Spruance Plant located in Richmond, Virginia (USA). Today, this plant continues to be the primary producer of all the NOMEX® paper types. In July 1991, the NOMEX® paper plant in Richmond was awarded the ISO 9002 Quality Assurance Certification after undergoing a rigorous quality audit by a joint team from Underwriters Laboratories (UL) and the British Standards Institute (BSI).

Since early 1989, a selected number of NOMEX® paper types are also produced at the Mishima Plant, located in Osaka (Japan). The Mishima plant also achieved ISO 9002 certification in 1992.

Both facilities are also certified for compliance to ISO 9001:2000, the more stringent requirement recently developed.

# DIMENSIONS AND WEIGHTS

## NOMEX® TYPE 410

Thickness		914 mm/2X (36 inches/2X)				1828 mm/6X (72 inches/6X)				Yield		Basis weight	
		Roll Weight		Length		Roll Weight		Length					
mm	mil	kg	lb	m	yd	kg	lb	m	yd	m <sup>2</sup> /kg	sq. yd/lb	g/m <sup>2</sup>	oz/sq. yd.
0.05	2	43	94	1143	1250	255	562	3429	3750	24.6	13.3	40.7	1.2
0.08	3	45	98	768	840	267	589	2304	2520	15.8	8.6	63.4	1.9
0.13	5	46	102	439	480	278	613	1317	1440	8.7	4.7	115.6	3.4
0.18	7	51	113	320	350	306	676	960	1050	5.7	3.1	174.6	5.1
0.25	10	54	119	238	260	325	716	713	780	4.0	2.2	249.2	7.3
0.30	12	52	114	183	200	310	683	549	600	3.2	1.8	308.9	9.1
0.38	15	56	124	155	170	338	746	466	510	2.5	1.4	396.7	11.7
0.51	20	59	131	119	130	356	786	357	390	1.8	1.0	546.6	16.1
0.61	24	64	140	101	110	382	843	302	330	1.4	0.8	693.0	20.4
0.65	25.5	61	135	96	105	N/A	N/A	N/A	N/A	1.4	0.8	696.4	20.5
0.73	29	64	142	82	90	386	850	247	270	1.2	0.6	854.4	25.2
0.76	30	64	141	82	90	382	843	247	270	1.2	0.6	847.3	25.0

\*Standard width 914 mm +/- 3 mm (36 inches +/- 1/8 inch)  
Standard width 1828 mm +/- 6 mm (72 inches +/- 1/4 inch)

## NOMEX® TYPE 411

Thickness		Roll weight		Length		Yield		Basis weight	
mm	mil	kg	lb	m	yd	m <sup>2</sup> /kg	sq. yd/lb	g/m <sup>2</sup>	oz/sq. yd.
0.13	5	21	47	530	580	24.0	13.0	41.7	1.2
0.18	7	21	47	347	380	15.6	8.5	64.1	1.9
0.25	10	21	47	265	290	12.2	6.6	81.7	2.4
0.38	15	21	47	165	180	7.5	4.1	133.9	3.9
0.58	23	18	40	91	100	4.9	2.6	205.1	6.0

Standard width 965 mm +/- 6 mm (38 inches +/- 1/4 inch)

## NOMEX® TYPE 414

Thickness		Roll weight		Length		Yield		Basis weight	
mm	mil	kg	lb	m	yd	m <sup>2</sup> /kg	sq. yd/lb	g/m <sup>2</sup>	oz/sq. yd.
0.09	3.4	45	99	594	650	12.1	6.6	82.7	2.4
0.18	7	52	114	320	350	5.7	3.1	176.3	5.2
0.25	10	55	121	238	260	4.0	2.2	251.9	7.4
0.30	12	52	114	183	200	3.2	1.8	309.2	9.1
0.38	15	57	125	155	170	2.5	1.4	398.4	11.8

Standard width 914 mm +/- 3 mm (36 inches +/- 1/8 inch)

## NOMEX® TYPE 418

Thickness		Roll weight		Length		Yield		Basis weight	
mm	mil	kg	lb	m	yd	m <sup>2</sup> /kg	sq. yd/lb	g/m <sup>2</sup>	oz/sq. yd.
0.08	3	50	110	613	670	11.2	6.1	89.2	2.6
0.13	5	60	131	439	480	6.7	3.7	148.4	4.4
0.20	8	63	140	293	320	4.2	2.3	236.8	7.0
0.25	10	63	140	229	250	3.3	1.8	301.3	8.9
0.36	14	53	117	146	160	2.5	1.4	396.7	11.7

Standard width 914 mm +/- 3 mm (36 inches +/- 1/8 inch)

## NOMEX® TYPE 419

Thickness		Roll weight		Length		Yield		Basis weight	
mm	mil	kg	lb	m	yd	m <sup>2</sup> /kg	sq. yd/lb	g/m <sup>2</sup>	oz/sq. yd.
<b>0.18*</b>	<b>7</b>	<b>28</b>	<b>61</b>	<b>329</b>	<b>360</b>	<b>10.9</b>	<b>5.9</b>	<b>91.45</b>	<b>2.7</b>
<b>0.33**</b>	<b>13</b>	<b>82</b>	<b>182</b>	<b>576</b>	<b>630</b>	<b>6.6</b>	<b>3.6</b>	<b>152.32</b>	<b>4.5</b>

\*Standard width 914 mm +/- 6 mm (36 inches +/- 1/4 inch)  
 \*\*Standard width 940 mm +/- 6 mm (37 inches +/- 1/4 inch)

## NOMEX® TYPE E56

Thickness		Roll weight		Length		Yield		Basis weight	
mm	mil	kg	lb	m	yd	m <sup>2</sup> /kg	sq. yd/lb	g/m <sup>2</sup>	oz/sq. yd.
<b>0.13</b>	<b>5</b>	<b>35</b>	<b>77</b>	<b>439</b>	<b>480</b>	<b>11.4</b>	<b>6.2</b>	<b>87.5</b>	<b>2.6</b>
<b>0.18</b>	<b>7</b>	<b>35</b>	<b>78</b>	<b>320</b>	<b>350</b>	<b>8.3</b>	<b>4.5</b>	<b>120.4</b>	<b>3.6</b>
<b>0.25</b>	<b>10</b>	<b>37</b>	<b>82</b>	<b>238</b>	<b>260</b>	<b>5.9</b>	<b>3.2</b>	<b>170.9</b>	<b>5.0</b>
<b>0.30</b>	<b>12</b>	<b>33</b>	<b>72</b>	<b>183</b>	<b>200</b>	<b>5.1</b>	<b>2.8</b>	<b>196.0</b>	<b>5.8</b>
<b>0.38</b>	<b>15</b>	<b>36</b>	<b>80</b>	<b>155</b>	<b>170</b>	<b>3.9</b>	<b>2.1</b>	<b>256.7</b>	<b>7.6</b>
<b>0.51</b>	<b>20</b>	<b>37</b>	<b>82</b>	<b>119</b>	<b>130</b>	<b>2.9</b>	<b>1.6</b>	<b>341.8</b>	<b>10.1</b>

Standard width 914 mm +/- 3 mm (36 inches +/- 1/8 inch)

## NOMEX® TYPE 992

Thickness		Width		Length		Typical basis WT*		Sq. meters	Sq. yards	Approx. sheet WT*	
mm	mil	mm	inches	mm	inches	g/m <sup>2</sup>	oz/sq. yd.	m <sup>2</sup>	sq. yd.	kg	lbs.
<b>1.6</b>	<b>63</b>	<b>1067</b>	<b>42</b>	<b>1041</b>	<b>41</b>	<b>810</b>	<b>23.9</b>	<b>1.11</b>	<b>1.33</b>	<b>0.90</b>	<b>2.0</b>
<b>3.2</b>	<b>125</b>	<b>1067</b>	<b>42</b>	<b>1041</b>	<b>41</b>	<b>1630</b>	<b>48.1</b>	<b>1.11</b>	<b>1.33</b>	<b>1.81</b>	<b>4.0</b>

## NOMEX® TYPE 993

Thickness		Width		Length		Typical basis WT*		Sq. meters	Sq. yards	Approx. sheet WT*	
mm	mil	mm	inches	mm	inches	g/m <sup>2</sup>	oz/sq. yd.	m <sup>2</sup>	sq. yd.	kg	lbs.
<b>1.0</b>	<b>40</b>	<b>1067</b>	<b>42</b>	<b>1041</b>	<b>41</b>	<b>720</b>	<b>21.2</b>	<b>1.11</b>	<b>1.33</b>	<b>0.80</b>	<b>1.8</b>
<b>1.5</b>	<b>60</b>	<b>1067</b>	<b>42</b>	<b>1041</b>	<b>41</b>	<b>1050</b>	<b>31.0</b>	<b>1.11</b>	<b>1.33</b>	<b>1.17</b>	<b>2.6</b>
<b>2.0</b>	<b>80</b>	<b>1067</b>	<b>42</b>	<b>1041</b>	<b>41</b>	<b>1530</b>	<b>45.1</b>	<b>1.11</b>	<b>1.33</b>	<b>1.70</b>	<b>3.7</b>
<b>2.4</b>	<b>95</b>	<b>1067</b>	<b>42</b>	<b>1041</b>	<b>41</b>	<b>1770</b>	<b>52.2</b>	<b>1.11</b>	<b>1.33</b>	<b>1.97</b>	<b>4.3</b>
<b>3.0</b>	<b>120</b>	<b>1067</b>	<b>42</b>	<b>1041</b>	<b>41</b>	<b>2270</b>	<b>67.0</b>	<b>1.11</b>	<b>1.33</b>	<b>2.52</b>	<b>5.6</b>
<b>4.0</b>	<b>160</b>	<b>1067</b>	<b>42</b>	<b>1041</b>	<b>41</b>	<b>3410</b>	<b>100.6</b>	<b>1.11</b>	<b>1.33</b>	<b>3.79</b>	<b>8.4</b>

## NOMEX® TYPE 994

Thickness		Width		Length		Typical basis WT*		Sq. meters	Sq. yards	Approx. sheet WT*	
mm	mil	mm	inches	mm	inches	g/m <sup>2</sup>	oz/sq. yd.	m <sup>2</sup>	sq. yd.	kg	lbs.
<b>1.0</b>	<b>40</b>	<b>355</b>	<b>14</b>	<b>1500</b>	<b>59</b>	<b>1148</b>	<b>33.9</b>	<b>0.53</b>	<b>0.64</b>	<b>0.61</b>	<b>1.3</b>
<b>1.5</b>	<b>60</b>	<b>355</b>	<b>14</b>	<b>1500</b>	<b>59</b>	<b>1708</b>	<b>50.4</b>	<b>0.53</b>	<b>0.64</b>	<b>0.91</b>	<b>2.0</b>
<b>2.0</b>	<b>80</b>	<b>355</b>	<b>14</b>	<b>1500</b>	<b>59</b>	<b>2310</b>	<b>68.1</b>	<b>0.53</b>	<b>0.64</b>	<b>1.23</b>	<b>2.7</b>
<b>3.0</b>	<b>120</b>	<b>355</b>	<b>14</b>	<b>1500</b>	<b>59</b>	<b>3448</b>	<b>101.7</b>	<b>0.53</b>	<b>0.64</b>	<b>1.84</b>	<b>4.1</b>
<b>3.2</b>	<b>125</b>	<b>355</b>	<b>14</b>	<b>1500</b>	<b>59</b>	<b>3657</b>	<b>107.9</b>	<b>0.53</b>	<b>0.64</b>	<b>1.95</b>	<b>4.3</b>
<b>4.0</b>	<b>160</b>	<b>355</b>	<b>14</b>	<b>1500</b>	<b>59</b>	<b>4554</b>	<b>134.3</b>	<b>0.53</b>	<b>0.64</b>	<b>2.43</b>	<b>5.4</b>
<b>4.8</b>	<b>190</b>	<b>355</b>	<b>14</b>	<b>1500</b>	<b>59</b>	<b>5484</b>	<b>161.7</b>	<b>0.53</b>	<b>0.64</b>	<b>2.92</b>	<b>6.4</b>
<b>5.0</b>	<b>200</b>	<b>355</b>	<b>14</b>	<b>1500</b>	<b>59</b>	<b>5691</b>	<b>167.8</b>	<b>0.53</b>	<b>0.64</b>	<b>3.03</b>	<b>6.7</b>
<b>6.0</b>	<b>240</b>	<b>355</b>	<b>14</b>	<b>1500</b>	<b>59</b>	<b>6768</b>	<b>199.6</b>	<b>0.53</b>	<b>0.64</b>	<b>3.61</b>	<b>8.0</b>
<b>6.4</b>	<b>250</b>	<b>355</b>	<b>14</b>	<b>1500</b>	<b>59</b>	<b>7148</b>	<b>210.8</b>	<b>0.53</b>	<b>0.64</b>	<b>3.81</b>	<b>8.4</b>
<b>7.0</b>	<b>275</b>	<b>355</b>	<b>14</b>	<b>1500</b>	<b>59</b>	<b>8039</b>	<b>237.1</b>	<b>0.53</b>	<b>0.64</b>	<b>4.28</b>	<b>9.4</b>
<b>8.0</b>	<b>315</b>	<b>355</b>	<b>14</b>	<b>1500</b>	<b>59</b>	<b>9068</b>	<b>267.4</b>	<b>0.53</b>	<b>0.64</b>	<b>4.83</b>	<b>10.7</b>
<b>9.6</b>	<b>380</b>	<b>355</b>	<b>14</b>	<b>1500</b>	<b>59</b>	<b>11069</b>	<b>326.5</b>	<b>0.53</b>	<b>0.64</b>	<b>5.90</b>	<b>13.0</b>

\*basis weights & sheet weights include nominal moisture content

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