



DuPont Protection Technologies

INDUSTRIAL PERSONAL PROTECTION LABORATORY

Test Report

WS No : AFS-DPP1200073

Customer : Howay Tech

Date of receipt: Mar.22.2012

WS Name: EN Cut Resistance Test on
Kevlar Woven/Knitted/Nonwoven Fabric
for Howay Tech

Date of completion: Apr.27.2012

Object: 1#, WFHowKE120142, Kevlar®, woven plain fabric, from Howay Tech
2#, WFHowKE120143, Kevlar®, woven plain fabric, from Howay Tech
3#, WFHowKE120144, Kevlar®, woven twill fabric, from Howay Tech
4#, KFHowKE120145, Kevlar®, knitted fabric, from Howay Tech
5#, KFHowKE120146, Kevlar®, knitted fabric, from Howay Tech
6#, FEHowKE120147, Kevlar®, Felt fabric, from Howay Tech

Order:

[Determination of resistant to cutting by sharp objects \(EN 388\)](#)

Determination of resistant to cutting by sharp objects

The test is done according to the standard EN 388

Date of the test : Apr.20.2012

Test conditions

Conditioned at 21°C ± 1°C and 65% ± 2% R.H.

Climate 21°C ± 1°C and 65% ± 2% R.H.

Results

EN 388 terms and calculation referred in Appendix

Identification: 1#

	C_n	T_n	C_{n+1}	I_n	\overline{Cn}
1	1.0	2.0	1.0	3.00	1.00
2	1.0	2.6	1.0	3.60	1.00
3	1.0	2.9	1.6	3.23	1.30
4	1.6	3.1	1.0	3.38	1.30
5	1.0	3.1	1.1	3.95	1.05

Cut Index: 3.43

	C_n	T_n	C_{n+1}	I_n	\overline{Cn}
1	1.0	3.5	1.0	4.50	1.50
2	1.0	3.6	1.1	4.43	1.55
3	1.1	4.2	1.1	4.82	1.60
4	1.1	4.3	1.1	4.91	1.55
5	1.1	4.6	1.6	4.41	1.55

Cut Index: 4.61

Cut index	3.43
Cut Level	2

Identification: 2#

	C_n	T_n	C_{n+1}	I_n	\overline{Cn}
1	1.6	12.7	1.7	8.70	1.65
2	1.7	13.7	1.7	9.06	1.70
3	1.7	16.4	1.8	10.37	1.75
4	1.8	16.4	2.1	9.41	1.95
5	2.1	14.9	1.9	8.45	2.00

The tests results are valid only for the samples tested. The use of this report, for publicity purposes, including mere reference to it, as well as the publication of an extract requires the approval of E.I. du Pont de Nemours.
 Test reports and the respective documents will be stored for five years.

Cut Index: 9.20

	C_n	T_n	C_{n+1}	I_n	\bar{C}_n
1	1.1	8.9	1.2	8.74	1.15
2	1.2	6.8	1.6	5.86	1.40
3	1.6	10.8	1.6	7.75	1.60
4	1.6	10.9	1.7	7.61	1.65
5	1.7	10.9	2.0	6.89	1.85

Cut Index: 7.37

Cut index	7.37
Cut Level	3

Identification: 3#

	C_n	T_n	C_{n+1}	I_n	\bar{C}_n
1	1.1	1.5	1.2	2.30	1.15
2	1.2	1.5	1.5	2.11	1.35
3	1.5	2.5	1.3	2.79	1.40
4	1.3	2.2	1.2	2.76	1.25
5	1.2	2.7	1.5	3.00	1.35

Cut Index: 2.59

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	C_n	T_n	C_{n+1}	I_n	$\overline{C_n}$
1	1.0	1.9	1.5	2.52	1.25
2	1.5	2.6	1.6	2.68	1.55
3	1.6	3.0	1.6	2.88	1.60
4	1.6	3.0	1.7	2.81	1.66
5	1.7	3.7	1.7	3.18	1.70

Cut Index: 2.81

Cut index	2.59
Cut Level	2

Identification: 4#

	C_n	T_n	C_{n+1}	I_n	$\overline{C_n}$
1	1.7	4.1	1.8	3.34	1.75
2	1.8	5.1	2.0	3.68	1.90
3	2.0	5.1	1.8	3.68	1.90
4	1.8	6.8	2.1	4.49	1.95
5	2.1	5.8	2.1	3.76	2.10

Cut Index: 3.79

	C_n	T_n	C_{n+1}	I_n	$\overline{C_n}$
1	1.5	4.0	1.6	3.58	1.55
2	1.6	4.5	1.6	3.81	1.60
3	1.6	5.5	1.8	4.24	1.70
4	1.8	5.8	1.8	4.22	1.80
5	1.8	5.8	1.8	4.22	1.80

Cut Index: 4.01

Cut index	3.79
Cut Level	2

Identification: 5#

	C_n	T_n	C_{n+1}	I_n	$\overline{C_n}$
1	1.0	3.0	1.0	4.00	1.00
2	1.0	3.4	1.4	3.83	1.20
3	1.4	3.5	1.5	3.41	1.45
4	1.5	3.5	1.5	3.33	1.50
5	1.5	4.5	1.5	4.00	1.50

Cut Index: 3.72

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	C_n	T_n	C_{n+1}	I_n	\overline{Cn}
1	1.1	5.5	1.1	6.00	1.10
2	1.1	5.5	1.6	5.07	1.35
3	1.6	6.5	1.5	5.19	1.55
4	1.5	4.9	1.5	4.27	1.50
5	1.5	6.5	1.5	5.33	1.50

Cut Index: 5.17

Cut index	3.72
Cut Level	2

Identification: 6#

	C_n	T_n	C_{n+1}	I_n	\overline{Cn}
1	1.5	4.8	1.5	4.20	1.50
2	1.5	6.1	1.5	5.07	1.50
3	1.5	7.0	1.6	5.52	1.55
4	1.6	6.6	1.5	5.26	1.55
5	1.5	6.2	1.5	5.13	1.50

Cut Index: 5.03

	C_n	T_n	C_{n+1}	I_n	\overline{Cn}
1	1.5	5.6	1.5	4.73	1.50
2	1.5	6.5	1.6	5.19	1.55
3	1.6	6.0	1.7	4.64	1.65
4	1.7	7.6	1.6	5.61	1.65
5	1.6	7.1	1.8	5.18	1.70

Cut Index: 5.07

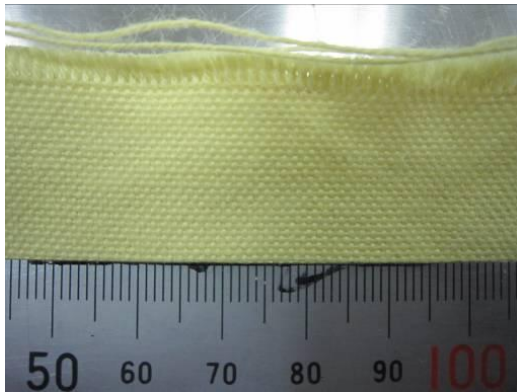
Cut index	5.03
Cut Level	3

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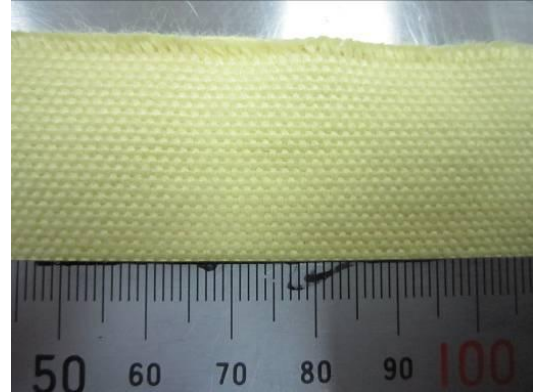
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Discussion & Summary:

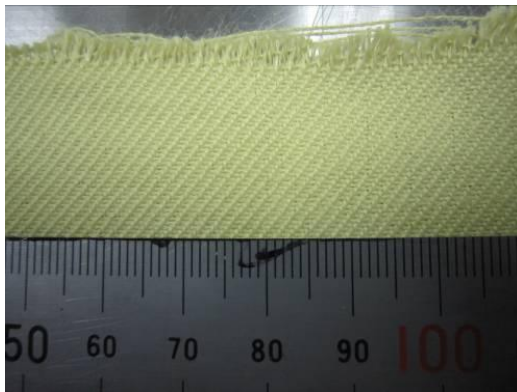
- Object:** 1#, WFHowKE120142, Kevlar®, woven plain fabric, from Howay Tech
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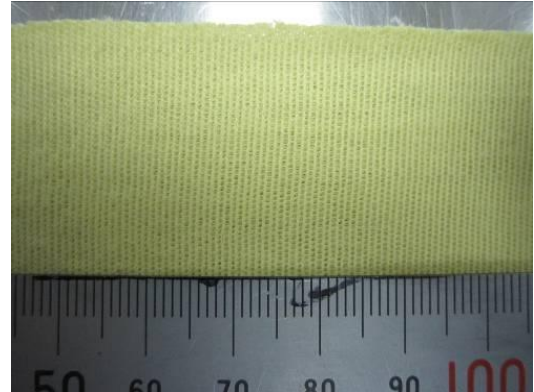
1#



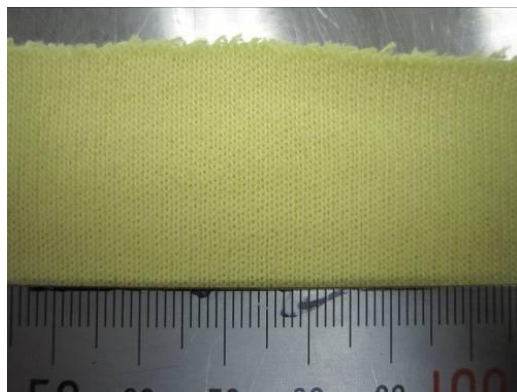
2#



3#



4#



5#



6#

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EN Cut Resistant Performance (EN388):

	Cut Index	Cut Level
1#	3.43	2
2#	7.47	3
3#	2.59	2
4#	3.79	2
5#	3.72	2
6#	5.03	3

IPP Laboratory

Prepared by: Eric Lu
Date: Apr.27.2012

Reviewed by: Kevin.Jiang
Date: Apr.28.2012

Remaining material: Will be discarded after one year.

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Appendix

EN 388 Cut Index calculation, cited from EN388

6.2.7 Calculation of test results

The results shall be presented in accordance with table 4.

Table 4 — Blade cut test - Calculation of index

Sequence	<i>C</i> Control specimen	<i>T</i> Test specimen	<i>C</i> Control specimen	<i>I</i> Index
1	<i>C</i> ₁	<i>T</i> ₁	<i>C</i> ₂	<i>i</i> ₁
2	<i>C</i> ₂	<i>T</i> ₂	<i>C</i> ₃	<i>i</i> ₂
3	<i>C</i> ₃	<i>T</i> ₃	<i>C</i> ₄	<i>i</i> ₃
4	<i>C</i> ₄	<i>T</i> ₄	<i>C</i> ₅	<i>i</i> ₄
5	<i>C</i> ₅	<i>T</i> ₅	<i>C</i> ₆	<i>i</i> ₅

$$\bar{C}_n = \frac{(C_n + C_{n+1})}{2}$$

represents the average value of cycles on control specimen before and after the cut of the test specimen

T_n and is calculated as follows:

$$\bar{C}_n = \frac{(C_n + C_{n+1})}{2} \tag{1}$$

For each test specimen the final index value (*I*) is calculated as follows:

$$I = \frac{1}{5} \sum_{n=1}^5 i_n \tag{2}$$

with

$$i_n = \frac{(\bar{C}_n + T_n)}{\bar{C}_n} \tag{3}$$

The minimum value of *I* is 1 if *T* = 0. *I* is a number without unit.

The report shall show the 10 results *i_n*. The performance level is defined as the lowest of the two calculated index values.

Table Cut Levels of performance

Cut Level	1	2	3	4	5
Cut Index	1.2	2.5	5.0	10.0	>20.0

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