CHARACTERISTICS STUDY OF UNCONVENTIONAL TEXTILE FIBERS RECOVERED FROM RECYCLABLE MATERIALS - PART I

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Abstract: *Unconventional textiles are manufactured different from those obtained by the classic spinning weaving and knitting. They are obtained by mechanical or chemical consolidation of a textile backing up of fibrous layers or combinations of layers of fiber and yarn, fabrics and yarns, fabrics or knitted fabrics and fibers. The non-conventional textiles can be obtained by mechanical or chemical consolidation of a system or several systems of wires.*
The increasing trend of chemical fiber production compared to natural fibers found also in the unconventional fabrics. In addition emphasis is laid increasingly on the use of recyclable materials recovered fibers and preforms or debris resulting from a regular textile processing. Processing unconventional fibers that are recovered from such materials are best suited for the production of unconventional textile. The production of unconventional textile fiber made from layers have the largest share. The fiber layers may have fibers oriented in a single direction, in two or more directions. The fiber layers can enhance mechanical, chemical and mixed. This produces textile auxiliaries for clothing, replacement canvas for buckram wadding, sanitary ware carpet filters, support for synthetic leather, cloth, wallpapers.

Key words: *skin, specimens, canvas, manufacturing, standard atmosphere, stopwatch fabric.*

1. INTRODUCTION

The physical and mechanical for tests to enforce the parameters that characterize the environment, namely: 200C temperature, relative humidity 60% and pressure of 760mm Hg. [1] The room's laboratories carrying out measurements must meet the following conditions:

- Be bright and clean;
- To be located so that the vibration from various disturbing factors do not influence the following measurements;
- To be protected from sources of dust, water vapor and gases;
- To have ventilation and air conditioning so as to maintain the temperature and humidity values required by current standards.

For proper operation of the measuring instruments and control and eliminate error sources, it is recommended; placing squares on independent foundations or supports that exclude the vibrations, the settlement devices away from sources of heat, placing devices so as to avoid the negative influence of magnetic and electric fields. [2] The number of samples taken depending on the size of the lot and can not be less than 5. The shape and dimensions of the specimens depends upon physico-chemical tests and the measuring method used will be specified in each determination. All specimens are subjected to climate. For cooling of tested samples, the physical and mechanical materials must be kept in standard atmosphere until steady state is established between the water molecules absorbed and transferred. It is considered that the material has reached equilibrium with the standard atmosphere when two successive weighings are made at hourly intervals do not show a difference of more than 0.1% over the first weighing [3, 4]. Testing is performed in test specimens of unconventional textile fiber made from layers have the largest share.

2. THE PHYSICAL AND MECHANICAL TESTS FOR UNCONVENTIONAL TEXTILES

2.1. Determination of thickness and the apparent density

To determine the thickness of the textile using a timer. [5] The measuring accuracy of the device is 0.01 mm and the maximum thickness which can be measured is 10 cm. The apparent density is expressed in g / cm3 and is calculated according to the mass M of the specimen in grams and dimensions of square shape specimen, expressed in m and the average thickness d in mm. The calculations made shall be centralized in Table 1.

- The apparent density;

$$\gamma = \frac{M \cdot 10^3}{L \cdot l \cdot d} \qquad (1)$$

- The mass of the specimen;

$$M_{mp} = \frac{M}{L \cdot l} \qquad (2)$$

$$\gamma = \frac{M_{mp} \cdot 10^3}{d} \qquad (3)$$

Table 1: *The values obtained for the specimen mass*

Crt. No.	Variant 1			Variant 2		
	M_{1mp}[g]	D1[mm]	γn[kg/m^3]	M_{1mp}[g]	D1[mm]	ϒn[kg/m^3]
1	270,73	4,25	63701,17	375,66	5,2	72242,308
2	239,19	4,79	49935,28	376,66	4,72	79800,84
3	234,09	4,25	35080	371,56	4,75	78223,15
4	179,93	3,28	54856,707	335,2	4,7	71219,19
5	175,75	3,21	54741,433	365,8	4,35	84112,64
6	172,05	3,18	55179,602	443,88	4,62	106900,43
7	187,87	3,38	55556,213	452,82	4,52	100196,9
8	189,9	3,25	58430,7669	395,11	5,73	68954,625
9	187,1	3,21	58286,604	419,11	5,05	82992,079
10	269,46	4,84	55673,554	414	5,5	75272,272
X	210,59	3,74	56144,136	399,9	4,91	82001,487
Ϭ	38,86	0,68	3523,4517	0,44	0,44	12474,142
ω	18,54	18,32	6,275	11,63	9,04	15,21

2.3.Determination of tensile strength.

To determine the tensile strength used car tried to drive - dynamometer. [5] The breaking load P can be read directly on the scale stated on the device because the device pedulul may apply different weights additional device on the face can be entered several graduated scales. Elongation after absolute rupture is read on a scale inscribed on the dial. The value of breaking elongation may be expressed in mm, according to the initial distance between the clamps at the time of rupture and the distance between the clamps.

- Elongation after rupture:

$$\Delta l = l - l_o \qquad (4)$$

The ratio of the elongation at absolute rupture and the initial distance representing an relative elongation in mm.

$$\sum = \frac{l - l_0}{l_0} \cdot 100 = \frac{\Delta l}{l_0} \cdot 100[\%] \qquad (5)$$

It may also cause specific tensile strength according to the breaking load and the specimen sectional area A.

$$\tau = \frac{P}{A} = \frac{P}{l_{E \cdot d}} \qquad (6)$$

In Tables 2 and 3, variant 1 and 2 are shown the data taken from the dynamometer and the calculation of the specific resistance to rupture for the two variants of the nonwoven and the calculation parameters and the scattering tendency to break and the specific tensile strength.

Table 2: *The values obtained in calculating specific resistance to tearing and scattering parameters tendency to rupture and specific tensile strength for variant 1*

Specimen No.	Direction	Di[mm]	$A = di \cdot 50$	P[da/N]	$\Delta l[mm]$	$\sum = \frac{\Delta l}{l_0} \cdot 100$	$\sigma = \frac{P}{A}$
1	longitudinal	4,52	226	4,2	18	6	185
2		4,62	231	4,3	20	6,66	186
3		4,7	235	3,9	22	7,33	168
4		4,65	232,5	4,2	18	6	181
X		4,62	231,125	4,15	19,5	6,49	180
б		0,075	3,79	0,173	1,914	0,63	8,1
Ω		1,64	1,64	4,17	9,81	9,79	4,48
10	transversal	4,35	217	0	30	10	0
2		4,05	202	0	20	6,66	0
3		4,25	212	0	25	8,33	0
4		4,45	222,5	0	18	6	0
X		4,27	213,75	0	23,25	7,74	0
σ		0,17	8,53	0	5,37	1,79	0
ω		3,99	3,99	0	23,12	23,14	0
1	longitudinal	4,6	230	1,5	174,3	49,1	65,21
2		4,52	226	1,2	136	45,3	53,09
3		4,45	222,5	1,7	145	48,3	76,57
4		3,95	197,5	1	168,3	56,1	50,76
X		4,38	219	1,35	149,15	49,7	61,43
σ		0,29	14,65	0,3109	13,66	4,56	11,93
ω		6,69	6,69	23,03	9,16	9,19	19,42
1	transversal	3,98	191	0,3	136	9,19	19,42
2		4,52	226	0,6	146	48,9	26,54
3		4,62	231	0,3	124	41,3	12,98
4		4,6	230	0,8	150	50	34,78
X		4,39	219,5	0,5	139	46,37	22,50
σ		0,39	19,12	0,24	11,60	3,93	10,06
ω		8,71	8,71	48,98	8,34	8,48	44,71

Table 3: *The values obtained in calculating specific resistance to tearing and scattering parameters tendency to rupture and specific tensile strength for variant 2*

Specimen No.	Direction	Di[mm]	$A = di \cdot 50$	P[da/N]	$\Delta l[mm]$	$\sum = \frac{\Delta l}{l_0} \cdot 100$	$\sigma = \frac{P}{A}$
0	**1**	**2**	**3**	**4**	**5**	**6**	**7**
1	longitudinal	4,62	231	1,8	7,2	36	77,922
2		4,35	226	1,8	5	25	79,646
3		4,70	217,5	1,75	6,2	31	80,459
4		4,57	235	2,1	6,6	22	89,361
X		4,52	227	1,82	6,25	31,25	81,84
σ		0,158	7,54	0,16	0,92	4,6654	81,847
Ω		3,317	3,317	8,59	2,97	14,86	5
							Continuare tabel 4
0	**1**	**2**	**3**	**4**	**5**	**6**	**7**

1	transversal	4,35	217,5	0,6	1,8	9	27,64
2		4,62	231	0,8	1	5	34,63
3		4,2	210	0,05	1,4	7	2,38
4		4,52	226	0,4	1	5	17,69
X		4,42	221	0,4625	1,3	6,5	20,57
σ		0,18	9,27	0,31	0,38	1,91	13,97
ω		1,19	4,19	69,152	29,45	29,45	67,93
1	45^0	5,05	252,5	1,15	5,2	26	54,544
2		4,75	237,5	1,1	6,6	33	56,315
3		4,65	232,5	0,7	4,8	24	30,1
4		4,72	236	0,65	4,8	24	27,54
X		4,79	239,62	0,9	5,35	26,75	37,37
σ		0,17	8,83	0,26	0,54	4,272	9,938
ω		3,68	3,687	23,045	7,98	15,97	56,59
1	135^0	4,52	226	0,7	6,6	33	26,92
2		4,25	217,5	0,5	5,8	29	22,98
3		4,54	227	0,4	5	25	17,62
4		4,05	202,5	0,2	3	15	9,876
X		4,36	218,25	0,45	5,6	28	19,352
σ		0,22	11,33	0,208	0,765	3,829	7,378
ω		5,19	5,192	46,259	2,7359	13,677	38,126

3. CONCLUSIONS

As noted in laboratory experiments, the article made in two variants allows some different properties. The first version of the fabric shows the average weight per m^2 and average thickness smaller than the latter.

The second variant has a better thermal insulation capacity and a lower permeability. After measurements were calculated average values of parameters and coefficient of variation to highlight the degree of unevenness.

The irregularity average weight, average thickness and density averaged are included within the normal variation in both materials. Load after rupture in the transverse direction has the maximum value and the minimum value in the longitudinal direction in inverse proportion to the elongation after rupture.

Both irregularity breaking load and in ultimate elongation is normal.

The material 1 is not resistant to repeated tensile stress. The rupture load values are small but is very high elongation. In variant 2 inter-weaving hard pulvotex makes the material have good tensile strength. All pulvotex support gives good material resistant to fatigue.

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